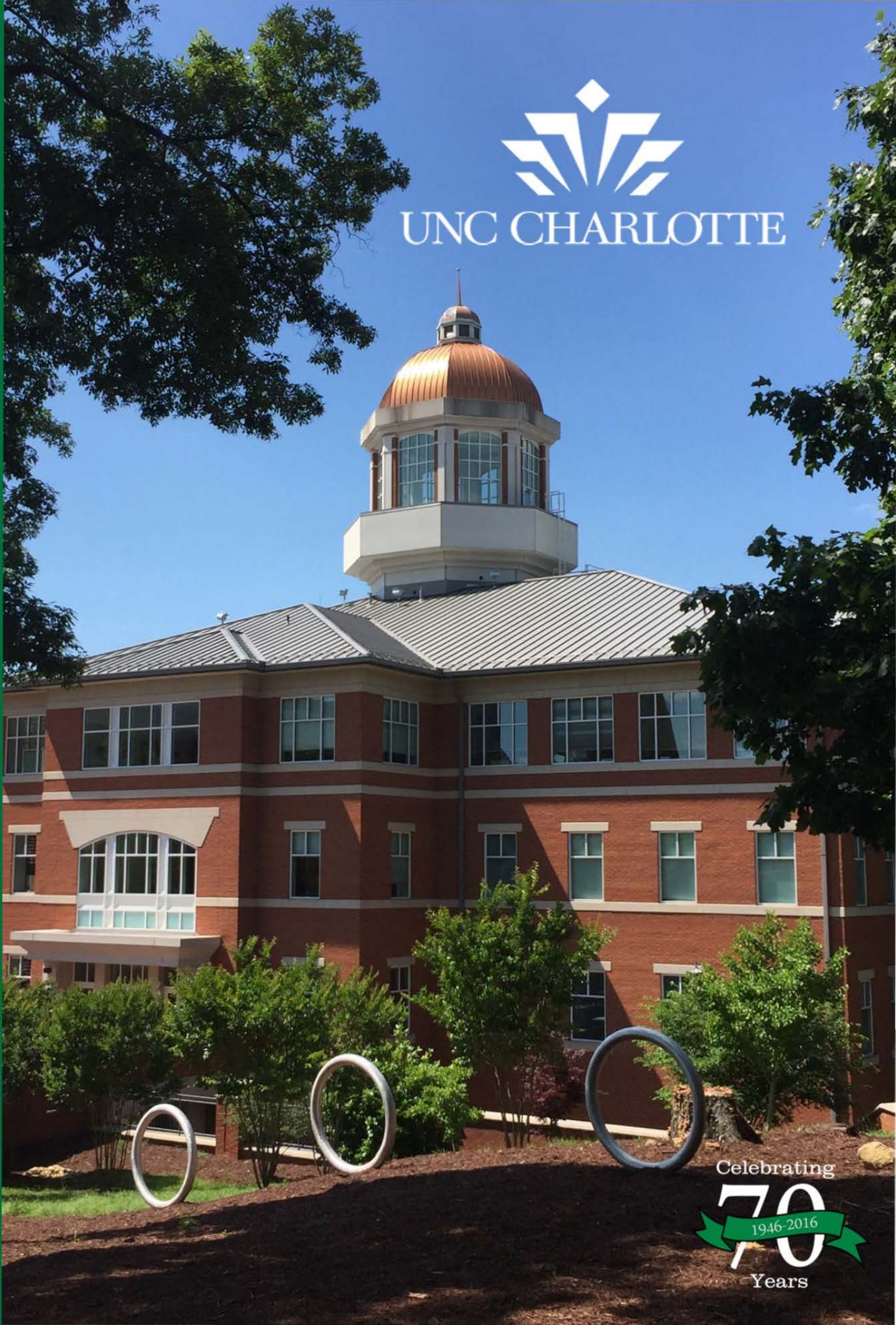


2016-2017 | Graduate Catalog



UNC CHARLOTTE



Celebrating

70
1946-2016

Years

Phone Numbers & Address

If, after reading this *Catalog*, students have further questions or specific inquiries about the programs of, or admission to, The University of North Carolina at Charlotte, they may look below to find the proper office to contact. Correspondence may be addressed to any of the offices by following this format:

The University of North Carolina at Charlotte
Attn: *Department or College*
9201 University City Boulevard
Charlotte, NC 28223-0001

INFORMATION

Campus Operator/Switchboard.....	704-687-8622 (UNCC)
Academic Affairs.....	704-687-5717
Academic Services.....	704-687-7227
Admissions	
Undergraduate	704-687-5507
Graduate.....	704-687-5503
International	704-687-5503
Summer School	704-687-1283
Adult Students and Evening Services	704-687-5104
Advising Center.....	704-687-7717
Athletics.....	704-687-1054
Bookstore.....	704-687-7050
Center for Graduate Life	704-687-5661
Colleges	
Arts + Architecture	704-687-0100
Business	704-687-7577
Computing and Informatics	704-687-8450
Education	704-687-8722
Engineering	704-687-8244
Graduate School	704-687-5503
Health and Human Services	704-687-8374
Honors College	704-687-7197
Liberal Arts & Sciences.....	704-687-0088
University College.....	704-687-5630
Continuing Education.....	704-687-8900
Counseling Center.....	704-687-0311
Dean of Students.....	704-687-0345
Dining Services and Meal Plans	704-687-7337
Disability Services.....	704-687-0040
Distance Education	704-687-1285
Financial Aid.....	704-687-5504
Graduate Center.....	704-687-8763
Health Center.....	704-687-7400
Housing and Residence Life	704-687-7501
ID Office.....	704-687-7337
International Programs	704-687-7755
Library	704-687-0494
Parking.....	704-687-0161
Recreational Services	704-687-0430
Registrar.....	704-687-5505
Student Accounts	704-687-5506
Student Activities/Student Union	704-687-7100
University Career Center	704-687-0795
University Center for Academic Excellence.....	704-687-7837
University Scholarship Office.....	704-687-5871

EMERGENCY NUMBERS

Campus Police -- Emergency.....	704-687-2200 or 911
Non-Emergency Calls.....	704-687-8300
Inclement Weather Hotline.....	704-687-1900

Acknowledgements

This *Catalog* was prepared and published by the Office of Academic Affairs in July 2016. Its goal is to provide a comprehensive, accurate, and useful catalog, which fully describes the academic programs, policies, regulations, and requirements of the University.

Although the publisher of this *Catalog* has made every reasonable effort to attain factual accuracy herein, no responsibility is assumed for editorial, clerical or printing errors, or errors occasioned by mistakes. The publisher has attempted to present information that, at the time of preparation for printing, most accurately describes the course offerings, faculty listings, policies, procedures, regulations, and requirements of the University. However, it does not establish contractual relations. The University reserves the right to alter or change any statement contained herein without prior notice.

We request that omissions and inaccuracies be brought to the attention of the Editor, as well as any suggestions and comments on the presentation and content.

Catalog Compilation

*Eric A. Klee, Publishing Editor, University Catalogs, and
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**THE UNIVERSITY OF
NORTH CAROLINA AT CHARLOTTE**

**Graduate Catalog
2016-2017
Vol. XIII**

<http://catalog.uncc.edu>

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If the Bookmarks Panel has been closed, you can reopen it by clicking on the Bookmarks icon:



The University of North Carolina at Charlotte is committed to equality of educational opportunity and does not discriminate against applicants, students, or employees based on race, color, national origin, religion, sex, sexual orientation, age, genetic information, or disability. In keeping with this commitment, UNC Charlotte actively seeks to promote diversity in its educational environment through its recruitment, enrollment, and hiring practices.

UNC CHARLOTTE ♦ 9201 UNIVERSITY CITY BOULEVARD ♦ CHARLOTTE, NC 28223
www.uncc.edu





Welcome to UNC Charlotte, North Carolina's urban research institution. This is an exciting chapter of your lives, and UNC Charlotte is committed to the prospect of your success. As you work to complete your undergraduate or graduate degree program, UNC Charlotte's dedicated faculty and staff are your partners. Their expertise and support, along with the many University resources and services available to you, will enable you to meet your scholastic, personal, and professional aspirations.

In joining Niner Nation, you become part of a community in which students, faculty, and staff work collaboratively to identify and address the needs of the greater Charlotte region. We have a stake in the quality of life of the citizens of the communities we serve, so we constantly are pioneering new ways to drive economic growth and to meet the region's environmental, health, and social needs.

We know that college is more than textbooks and classes, so we encourage you to become actively engaged on campus. Explore all the possibilities available – study abroad offerings for greater global awareness; leadership and volunteer opportunities; cultural events and lectures; intramural sports; and, of course, we want to see you cheering on your Charlotte 49er athletic teams wherever they might be competing.

In the not-too-distant future, the city's light rail expansion onto campus will provide a quick, convenient avenue to UNC Charlotte Center City, situated in the heart of Uptown Charlotte. This facility is a hub for a number of our graduate programs, and its location provides the University a place to convene influential civic, business, and community leaders around thought-provoking topics. Access to these leaders, and connections you may establish with them, could prove valuable to your educational pursuits and career prospects.

Other exciting developments on the horizon include construction of a new student counseling center, an admissions and visitors center, and a beautifully redesigned Belk Plaza. And, of course, with the recent passage of the Connect NC bond, we are also in the planning stage of a new and much-needed science facility.

It's an exciting time to be a part of Niner Nation. So once again, welcome! I'm delighted that you've made UNC Charlotte your university of choice. Go Niners!

Cordially,

Philip L. Dubois
Chancellor



If this is your first year at UNC Charlotte, welcome to our great campus! If you are returning, we are pleased to welcome you back.

Our University is constantly changing, and you are a part of that change. Because we are situated in a complex, dynamic city, our institution is alive with possibilities to learn and grow. Our distinguished faculty are here to provide you with a quality education that will open doors for you. If we do our job right, your education will be intellectually challenging. If you do your job right, these years at UNC Charlotte will lay the groundwork for a promising and satisfying future.

Remember, too, that there is more to the collegiate experience than coursework. I encourage you to become involved in some of the many activities or student organizations that are available to you. You will build friendships and relationships with both your fellow students and our faculty that you will take with you and cherish as you move on through the years.

I hope you will take advantage of the world-class resources available here, and explore all that our campus has to offer. But do not stop there; explore research, community engagement, and professional development opportunities in the greater Charlotte area and in the world beyond. We're here to help you get started.

We are pleased that you have chosen UNC Charlotte. As we continue to grow, we look forward to your continuing to grow with us as a person, scholar, and future alumnus/alumna.

Sincerely,

Joan F. Lorden
Provost and Vice Chancellor for Academic Affairs

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Academic Calendar

2016-2017

UNC Charlotte's academic year is divided into three terms: Fall, Spring, and Summer.

FALL 2016

Aug 15	Academic year begins
Aug 22	Day of Convocation
Aug 22	First day of classes (evening)
Aug 23	First day of classes (daytime)
Aug 27	First day for Saturday classes
Sep 3	No Saturday classes
Sep 5	HOLIDAY: Labor Day
Oct 10-11	Fall Recess
Nov 7	Registration for Spring 2017 begins
Nov 23-27	HOLIDAY: Thanksgiving
Dec 7	Last day of classes
Dec 8	Reading day
Dec 9-16	Final examinations*
Dec 17	Fall Commencement

SPRING 2017

Jan 9	First day of classes
Jan 14	First day for Saturday classes
Jan 16	HOLIDAY: M.L. King, Jr. Day
Mar 6-11	Spring Break
Mar 20	Registration for Summer 2017 and Fall 2017 begins
Apr 14-15	Spring Recess
May 2	Last day of classes
May 3	Reading day
May 4-11	Final examinations*
May 6	Final examinations for Saturday classes
May 12-13	Spring Commencement
May 15	Academic year ends

SUMMER 2017

May 22 - Jun 28	First Summer Term**
May 22 - Aug 10	Extended Summer Term**
May 29	HOLIDAY: Memorial Day
Jun 29 - Jul 4	No classes
Jul 4	HOLIDAY: Independence Day
Jul 5 - Aug 10	Second Summer Term**

*Common Examinations held on the first day of exams.

**Dates include final examinations.

Please note: All dates are subject to change. No classes are held on the above noted holiday dates. A complete list of dates and deadlines is available online from the Office of the Registrar at registrar.uncc.edu/calendar. Please check this site for the most current information.

AUGUST 2016

S	M	T	W	Th	F	S
	1	2	3	4	5	6
7	8	9	10	11	12	13
14	15	16	17	18	19	20
21	22	23	24	25	26	27
28	29	30	31			

SEPTEMBER 2016

S	M	T	W	Th	F	S
				1	2	3
4	5	6	7	8	9	10
11	12	13	14	15	16	17
18	19	20	21	22	23	24
25	26	27	28	29	30	

OCTOBER 2016

S	M	T	W	Th	F	S
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23	24	25	26	27	28	29
30	31					

NOVEMBER 2016

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20	21	22	23	24	25	26
27	28	29	30			

DECEMBER 2016

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JANUARY 2017

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22	23	24	25	26	27	28
29	30	31				

FEBRUARY 2017

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26	27	28				

MARCH 2017

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APRIL 2017

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16	17	18	19	20	21	22
23	24	25	26	27	28	29

MAY 2017

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	1	2	3	4	5	6
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14	15	16	17	18	19	20
21	22	23	24	25	26	27
28	29	30	31			

JUNE 2017

S	M	T	W	Th	F	S
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11	12	13	14	15	16	17
18	19	20	21	22	23	24
25	26	27	28	29	30	

JULY 2017

S	M	T	W	Th	F	S
30	31					1
2	3	4	5	6	7	8
9	10	11	12	13	14	15
16	17	18	19	20	21	22
23	24	25	26	27	28	29



Introduction to the Catalog

Reader's Guide to the Graduate Catalog

The *University of North Carolina at Charlotte Graduate Catalog* (hereby referred to as the “*Catalog*”) is published annually every Spring for the following academic year, which begins in the Fall. It is also available online at catalog.uncc.edu.

This *Catalog* is divided into three sections. The first section contains information about the academic calendar, the graduate programs offered, admission to The Graduate School, student conduct, degree requirements and academic regulations, and financial information, including tuition and fees and financial aid.

The second (or curricular) section describes the University's academic programs in detail. The section is organized in alphabetical order by the six discipline-based colleges, followed by each individual program, including related courses and their descriptions.

The third and final section contains information about academic resources and student services on campus, as well as a faculty directory and glossary of higher education terminology. Rounding out this section is an index which is helpful in locating a topic quickly.

What's New This Year

2016 celebrates the 70th anniversary of UNC Charlotte, from its humble beginnings as the Charlotte Center.

New Programs

New graduate programs and catalog sections that appear for the first time in this *Catalog* include:

- Doctor of Business Administration (D.B.A.)
- Ph.D. in Educational Research, Measurement, and Evaluation
- Graduate Certificate in Early Childhood Mental Health
- Graduate Certificate in Network Security
- Graduate Certificate in Secure Software Development

Program Changes

Major changes to existing graduate degrees and programs include:

- The Master of Arts in English Education has been discontinued
- The Master of Arts in Mathematics Education has been discontinued
- The Master of Science in Public Health was renamed the Master of Public Health
- Concentration in Marketing Analytics added to the M.B.A. program
- Concentration in Mathematics Education added to the M.S. in Mathematics program
- The Graduate Certificate in Substance Abuse Counseling was renamed the Graduate Certificate in Addiction Counseling

- The Graduate Certificate in Translating and Translation Studies was renamed the Graduate Certificate in Languages and Culture Studies: Translating and now offers options in French, German, Russian, and Spanish

Other Changes

Additional changes include:

- Fall and Spring semesters' Add/Drop period now runs through eighth calendar day
- The Department of Accounting has been renamed the Turner School of Accountancy

Catalog Policies and Disclaimers

The *UNC Charlotte Graduate Catalog* is not an irrevocable contract. Regulations published in it are subject to change by the University at any time without notice. University regulations are policy statements to guide students, faculty, and administrative officers in achieving the goals of the institution. Necessary interpretations of these policies will be made by the appropriate authorities with the interest of the students and the institution in mind. Students are encouraged to consult an advisor if they have questions about the application of any policy.

The University reserves the right to change any of the rules and regulations of the University at any time, including those relating to admission, instruction, and graduation. The University also reserves the right to withdraw curricula and specific courses, alter course content, change the calendar, and to impose or increase fees. All such changes are effective as proper authorities determine and may apply not only to prospective students, but also to those who are already enrolled in the University.

The requirements specified in this *Catalog* apply to students who commence their studies at the UNC Charlotte during the 2016-2017 academic year and who remain in continuous enrollment at the institution until they graduate. If requirements are changed, students may elect to comply with the new requirements or to remain under the requirements by which they are governed at the time of the change. The choice to apply the new requirements must be declared by students at least one semester prior to graduation through their academic departments.

Students who change their major/minor are bound by the requirements of their new major/minor that are in

effect the semester they officially begin studies in the new program.

Students who are readmitted to the University are bound by the program and degree requirements in force at the time of readmission.

Exceptions to these policies may be necessitated by changes in course offerings, degree programs, or by action of authorities higher than the University. In that event, every effort will be made to avoid penalizing the student.

Student Responsibility

Each student is responsible for the proper completion of his or her academic program, for familiarity with the *Catalog*, for maintaining the grade point average required, and for meeting all other degree requirements. Students assume academic and financial responsibility for the courses in which they enroll and are relieved of these responsibilities only by formally terminating enrollment. The advisor will counsel, but the final responsibility remains that of the student.

A student is required to have knowledge of and observe all regulations pertaining to campus life and student behavior. Students are encouraged to familiarize themselves with academic terminology located in the Glossary section of this *Catalog*.

Email is the official form of communication at the University; each student is responsible for checking their uncc.edu email regularly, as well as maintaining communication with the University and keeping a current address and telephone number on file with the Office of the Registrar.

While associated with the University, each student is expected to participate in campus and community life in a manner that will reflect credibly upon the student and the University. The University has enacted two codes of student responsibility -- **The UNC Charlotte Code of Student Academic Integrity** and **The UNC Charlotte Code of Student Responsibility** -- which are summarized in this *Catalog* and available in full online at legal.uncc.edu/policies/chapter-400. As students willingly accept the benefits of membership in the UNC Charlotte academic community, they acquire obligations to observe and uphold the principles and standards that define the terms of UNC Charlotte community cooperation and make those benefits possible. This includes completion of institutional surveys as requested by the University for program assessment and improvement.



Graduate Academic Programs

COLLEGE AND PROGRAM	GRADUATE DEGREE		
	<u>Certificate</u>	<u>Master's</u>	<u>Doctorate</u>
College of Arts + Architecture			
Architecture		MArch, MArch/MUD	
Art Education (<i>interdisciplinary</i>)	Graduate		
Music – Vocal Pedagogy	Graduate		
Urban Design		MUD, MArch/MUD	
Belk College of Business			
Accountancy		MACC, MACC/JD*	
Business Administration	MBA PLUS Post-Master's	MBA, MBA/MA, MBA/MHA, MBA/JD*	DBA, PhD
Business Foundations	Graduate		
Data Science and Business Analytics (<i>interdisciplinary</i>)	Graduate	MS	
Economics	Graduate	MS, MS/MSc	
Mathematical Finance (<i>interdisciplinary</i>)		MS	
Organizational Science (<i>interdisciplinary</i>)			PhD
Real Estate	Graduate	MSRE, MSRE/JD*	
College of Computing and Informatics			
Advanced Databases and Knowledge Discovery	Graduate		
Bioinformatics		MS	
Bioinformatics and Computational Biology			PhD
Bioinformatics Applications	Graduate		
Bioinformatics Technology	Graduate		
Computer Science		MS, MS/MArch	
Computing and Information Systems			PhD
Data Science and Business Analytics (<i>interdisciplinary</i>)	Graduate		
Game Design and Development	Graduate		
Health Informatics (<i>interdisciplinary</i>)	Graduate	MS, MHA/MS, MSPH/MS	
Information Security and Privacy	Graduate		
Information Technology	Graduate	MS, MS/MArch	
Network Security	Graduate		
Secure Software Design	Graduate		

COLLEGE AND PROGRAM	GRADUATE DEGREE		
	<u>Certificate</u>	<u>Master's</u>	<u>Doctorate</u>
College of Education			
Art Education (<i>interdisciplinary</i>)	Graduate		
Child and Family Studies	Graduate	MEd, MAT	
Counseling			PhD
Counseling - Addiction Counseling		MA	
Counseling - Clinical Mental Health Counseling		MA	
Counseling – School Counseling	Post Master's	MA	
Curriculum and Instruction (<i>interdisciplinary</i>)			PhD
Curriculum and Supervision	Post-Master's	MEd	
Early Childhood Mental Health	Graduate		
Educational Leadership			EdD
Educational Research, Measurement, and Evaluation			PhD
Elementary Education	Graduate	MEd, MAT	
Elementary School Mathematics	Graduate		
Foreign Language Education			
French	Graduate	MAT	
German	Graduate	MAT	
Spanish	Graduate	MAT	
Instructional Systems Technology	Graduate	MEd	
Middle Grades Education			
English/Language Arts	Graduate	MEd, MAT	
Mathematics	Graduate	MEd, MAT	
Science	Graduate	MEd, MAT	
Social Studies	Graduate	MEd, MAT	
Play Therapy	Graduate		
Reading Education		MEd	
School Administration	Graduate	MSA	
Secondary Education			
Comprehensive Science	Graduate	MEd, MAT	
English	Graduate	MA, MAT	
Mathematics	Graduate	MA, MAT	
Social Studies	Graduate	MEd, MAT	
Special Education			PhD
Academically or Intellectually Gifted	Graduate	MEd	
Adapted Curriculum	Graduate	MEd, MAT	
Autism Spectrum Disorders	Graduate		
General Curriculum	Graduate	MEd, MAT	
Substance Abuse Counseling	Graduate		
Teaching English as a Second Language	Graduate	MEd, MAT	
The William States Lee College of Engineering			
Applied Energy and Electromechanical Systems	Graduate	MS	
Energy Analytics	Graduate		
Engineering, General		MSE	
Civil Engineering		MSCE	
Construction and Facilities Management		MS	
Electrical Engineering		MSEE	PhD
Engineering Management		MS	
Fire Protection and Administration		M	
Infrastructure & Environmental Systems (<i>interdisciplinary</i>)			PhD
Lean Six Sigma	Graduate		
Logistics and Supply Chains	Graduate		
Mechanical Engineering		MSME	PhD
Systems Analytics	Graduate		

10 Academic Programs

COLLEGE AND PROGRAM	GRADUATE DEGREE		
	<u>Certificate</u>	<u>Master's</u>	<u>Doctorate</u>
College of Health and Human Services			
Community Health Health Administration	Graduate	MHA, MHA/MS, MHA/MBA, MHA/JD*	
Health Services Research (<i>interdisciplinary</i>)			PhD
Health Informatics (<i>interdisciplinary</i>)	Graduate	MS	
Kinesiology		MS	
Public Health Core Concepts	Graduate	MPH, MPH/MS	PhD
Public Health		MPH/JD*	
Social Work		MSW	
School of Nursing			
Nurse Anesthesia Across the Lifespan	Post-Master's	MSN	
Nursing – Advanced Clinical Nursing			
Adult-Gerontology Acute Care Nurse Practitioner	Post-Master's	MSN	
Family Nurse Practitioner Across the Lifespan	Post-Master's	MSN	
Nursing – Systems/Population Nursing			
Nurse Administrator	Graduate	MSN	
Nurse Educator	Graduate	MSN	
Community/Public Health Nursing		MSN	
Nursing Practice			DNP
College of Liberal Arts & Sciences			
Africana Studies	Graduate		
Anthropology		MA	
Biology		MS	PhD
Chemistry		MS	
Cognitive Science	Graduate		
Communication Studies		MA	
Criminal Justice		MS	
Earth Sciences		MS	
Emergency Management	Graduate		
English		MA	
Ethics and Applied Philosophy	Graduate	MA	
Gender, Sexuality, and Women's Studies	Graduate		
Geography		MA	PhD
Gerontology	Graduate	MA	
Health Psychology (<i>interdisciplinary</i>)			PhD
History		MA	
Infrastructure & Environmental Systems (<i>interdisciplinary</i>)			PhD
Languages and Culture Studies: Translating			
French	Graduate		
German	Graduate		
Japanese	Graduate		
Russian	Graduate		
Spanish	Graduate		
Latin American Studies		MA, MBA/MA	
Liberal Studies		MA	
Linguistics, Applied	Graduate		
Mathematical Finance (<i>interdisciplinary</i>)		MS	
Mathematics		MS	

COLLEGE AND PROGRAM	GRADUATE DEGREE		
	<u>Certificate</u>	<u>Master's</u>	<u>Doctorate</u>
College of Liberal Arts & Sciences (continued)			
Mathematics, Applied		MS	PhD
Nanoscale Science (<i>interdisciplinary</i>)			PhD
Nonprofit Management	Graduate		
Optical Science & Engineering		MS	PhD
Organizational Science (<i>interdisciplinary</i>)			PhD
Physics, Applied		MS	
Psychology		MA	
Psychology, Industrial/Organizational		MA	
Public Administration		MPA, MPA/JD*	
Public Budgeting and Finance	Graduate		
Public Policy			PhD
Religious Studies		MA	
Sociology		MA	
Spanish		MA	
Technical/Professional Writing	Graduate		
Urban Management and Policy	Graduate		
Graduate Center			
Adult and Community College Education**			EdD

*These dual degrees are offered in conjunction with the Charlotte School of Law.

**These degrees are not offered by UNC Charlotte. They are offered by other UNC system institutions. However, classes are taught on the UNC Charlotte main campus by faculty from these institutions.



About the University

northcarolina.edu
uncc.edu

University of North Carolina

History

In North Carolina, all the public educational institutions that grant baccalaureate degrees are part of the University of North Carolina. The multi-campus state university encompasses 16 such institutions, as well as the NC School of Science and Mathematics, the nation's first public residential high school for gifted students. Chartered by the North Carolina General Assembly in 1789, the University of North Carolina was the first public university in the United States to open its doors and the only one to graduate students in the eighteenth century. The first class was admitted in Chapel Hill in 1795. For the next 136 years, the only campus of the University of North Carolina was at Chapel Hill.

Additional institutions of higher education, diverse in origin and purpose, began to win sponsorship from the General Assembly beginning as early as 1877. Five were historically black institutions, and another was founded to educate American Indians. Some began as high schools. Several were created to prepare teachers for the public schools. Others had a technological emphasis. One is a training school for performing artists.

The 1931 session of the General Assembly redefined the University of North Carolina to include three state-supported institutions: the campus at Chapel Hill (now the University of North Carolina at Chapel Hill), North Carolina State College (now North

Carolina State University at Raleigh), and Woman's College (now the University of North Carolina at Greensboro). The new multi-campus University operated with one board of trustees and one president. By 1969, three additional campuses had joined the University through legislative action: the University of North Carolina at Charlotte, the University of North Carolina at Asheville, and the University of North Carolina at Wilmington.

In 1971, legislation was passed bringing into the University of North Carolina the state's ten remaining public senior institutions, each of which had until then been legally separate: Appalachian State University, East Carolina University, Elizabeth City State University, Fayetteville State University, North Carolina Agricultural and Technical State University, North Carolina Central University, the North Carolina School of the Arts (now the University of North Carolina School of the Arts), Pembroke State University (now the University of North Carolina at Pembroke), Western Carolina University, and Winston-Salem State University. In 1985, the NC School of Science and Mathematics was declared an affiliated school of the University; in July 2007, NCSSM by legislative action became a constituent institution of the University of North Carolina. All the schools and universities welcome students of both sexes and all races.

Board of Governors

The UNC Board of Governors is the policy-making body legally charged with "the general determination, control, supervision, management, and governance of all affairs of the constituent institutions." The 32 voting members of the Board of Governors are elected by the General Assembly for four-year terms. Former

board chairmen and board members who are former governors of North Carolina may continue to serve for limited periods as non-voting members emeriti. The president of the UNC Association of Student Governments or that student's designee is also a non-voting member.

President & General Administration

The chief executive officer of the University is the president. The president is elected by and reports to the Board of Governors. The President's office is the operations level between the constituent institutions and the Board of Governors. The President has complete authority to manage the affairs and execute the policies of the University of North Carolina and its constituent institutions, subject to the direction and control of the Board of Governors.

Chancellors

Each of the UNC campuses is headed by a chancellor who is chosen by the Board of Governors on the president's nomination and is responsible to the president.

Board of Trustees

Each university has a board of trustees consisting of eight members elected by the Board of Governors, four appointed by the governor, and the president of the student body, who serves ex officio. (The UNC School of the Arts has two additional ex officio members; and the NC School of Science and Mathematics has a 27-member board as required by law.) Each board of trustees holds extensive powers over academic and other operations of its campus on delegation from the Board of Governors.

History of the University of North Carolina at Charlotte

UNC Charlotte is one of a generation of universities founded in metropolitan areas of the United States immediately after World War II in response to rising education demands generated by the war and its technology.

To serve returning veterans, North Carolina opened 14 evening college centers in communities across the state. The Charlotte Center opened Sept. 23, 1946, offering evening classes to 278 freshmen and sophomore students in the facilities of Charlotte's

Central High School. After three years, the state closed the centers, declaring that on-campus facilities were sufficient to meet the needs of returning veterans and recent high school graduates.

Charlotte's education and business leaders, long aware of the area's unmet needs for higher education, moved to have the Charlotte Center taken over by the city school district and operated as Charlotte College, offering the first two years of college courses. Later the same leaders asked Charlotte voters to approve a two-cent tax to support that college.

Charlotte College drew students from the city, Mecklenburg County and from a dozen surrounding counties. The two-cent tax was later extended to all of Mecklenburg County. Ultimately financial support for the college became a responsibility of the State of North Carolina.

As soon as Charlotte College was firmly established, efforts were launched to give it a campus of its own. With the backing of Charlotte business leaders and legislators from Mecklenburg and surrounding counties, land was acquired on the northern fringe of the city and bonds were passed to finance new facilities. In 1961, Charlotte College moved its growing student body into two new buildings on what was to become a 1,000-acre campus 10 miles from downtown Charlotte.

Three years later, the North Carolina legislature approved bills making Charlotte College a four-year, state-supported college. The next year, 1965, the legislature approved bills creating the University of North Carolina at Charlotte, the fourth campus of the statewide university system. In 1969, the University began offering programs leading to master's degrees. In 1992, it was authorized to offer programs leading to doctoral degrees.

Today, with an enrollment ranking it fourth among the 17 schools in the UNC system, it is the largest public university in the greater Charlotte metropolitan region. A doctoral institution, UNC Charlotte serves the region through applied research, knowledge transfer, and engaged community service.

More than 1,000 full-time teaching faculty comprise the University's academic departments, and the 2015 Fall enrollment was close to 28,000 students, including over 5,200 graduate students.

Mission, Vision, and Values of UNC Charlotte

University Mission Statement

UNC Charlotte is North Carolina's urban research university. It leverages its location in the state's largest city to offer internationally competitive programs of research and creative activity, exemplary undergraduate, graduate, and professional programs, and a focused set of community engagement initiatives. UNC Charlotte maintains a particular commitment to addressing the cultural, economic, educational, environmental, health, and social needs of the greater Charlotte region.

University Vision and Values

In fulfilling our mission, we envision a University that promises:

- An accessible and affordable quality education that equips students with intellectual and professional skills, ethical principles, and an international perspective.
- A strong foundation in liberal arts and opportunities for experiential education to enhance students' personal and professional growth.
- A robust intellectual environment that values social and cultural diversity, free expression, collegiality, integrity, and mutual respect.
- A safe, diverse, team-oriented, ethically responsible, and respectful workplace environment that develops the professional capacities of our faculty and staff.

To achieve a leadership position in higher education, we will:

- Rigorously assess our progress toward our institutional, academic, and administrative plans using benchmarks appropriate to the goals articulated by our programs and in our plans.
- Serve as faithful stewards of the public and private resources entrusted to us and provide effective and efficient administrative services that exceed the expectations of our diverse constituencies.
- Create meaningful collaborations among university, business, and community leaders to address issues and opportunities of the region.

- Develop an infrastructure that makes learning accessible to those on campus and in our community and supports the scholarly activities of the faculty.
- Pursue opportunities to enhance personal wellness through artistic, athletic, or recreational activities.
- Operate an attractive, environmentally responsible and sustainable campus integrated with the retail and residential neighborhoods that surround us.

Approved by the Board of Governors on April 11, 2014.

The Colleges Within UNC Charlotte

UNC Charlotte's largest academic units are its colleges. There are seven discipline-based colleges. Each consists of smaller units called schools, departments, or interdisciplinary programs. Additionally, there are University College, the Honors College, and the Graduate School.

College of Arts + Architecture

The College of Arts + Architecture combines Architecture, Art & Art History, Dance, Music and Theatre disciplines to collaborate, expand programs, reach new audiences, research, and develop a new generation of leaders.

Belk College of Business

The Belk College of Business offers outstanding business education programs in a variety of disciplines. The University is located in Charlotte, one of the country's fastest-growing cities and one of the most exciting financial services centers in the world. The Belk College is one of the largest business programs in the Carolinas.

College of Computing and Informatics

The College of Computing and Informatics is a recognized leader for competitive, innovative, and market-responsive computing and informatics education. It develops focused, trend-setting research excellence with national and international recognition, and is recognized as the leader and go-to place for partnerships and collaborations.

College of Education

The College of Education offers undergraduate programs in Child and Family Development; Elementary, Middle Grades, and Secondary Education; and Special Education with a variety of concentrations available. These programs prepare students for the challenging, meaningful, and rewarding careers of teaching, counseling, and educational leadership.

The William States Lee College of Engineering

The College of Engineering is a community of students, faculty, and industry partners who study, design, research and build together. From the bachelor's to the doctoral level, College of Engineering students participate in experiential, hands-on projects while learning to visualize, design, create, build and apply. Engineering is a rigorous program of study, requiring expertise in math. Students may be admitted directly to their major of choice if they meet specific requirements for engineering.

College of Health and Human Services

The College of Health and Human Services offers programs in Kinesiology, Nursing, Public Health Sciences, and Social Work with a focus on achieving excellence in teaching, research, and service. There are a variety of nursing paths offered for earning degrees in nursing.

College of Liberal Arts & Sciences

The College of Liberal Arts & Sciences is an academic community engaged in advancing the discovery, dissemination and application of knowledge in the traditional areas of liberal arts and sciences and in emerging areas of study. As a community focused on learning and teaching, the College is guided by an unshakable commitment to humanistic values and ethical conduct, by a creative and entrepreneurial frame of mind and by an awareness of the global context in which the University exists.

Graduate School

The Graduate School was established in 1985 with the appointment of the first Dean of the Graduate School, although graduate degree programs have been offered since 1969. Today, approximately 750 members of the Graduate Faculty and approximately 5,000 graduate students participate in a broad array of graduate programs at the master's and doctoral levels and in graduate certificate programs. The Graduate

School acts in cooperation with the seven discipline-based colleges and offers doctoral and master's degree programs in a wide variety of fields and specialties ranging from architecture, biomedical engineering, computing, engineering and health administration to history, teacher education, creative writing, business, nursing, and social work.

Honors College

The Honors College offers academically talented, enthusiastic, motivated students many of the personal and intellectual advantages of a small liberal arts college within the diversity of a large university. The emphasis is on seminars, intensive reading, writing, and discussion in which reasoned self-expression and critical thinking are valued and rewarded. The Honors College is comprised of several distinct programs, each with their own standards for admission and requirements for graduation.

University College

University College serves all undergraduate students in all of the academic colleges that make up the academic community through the General Education program. This curriculum reflects the University's commitment to the principles of a liberal arts education; a broad training that develops analytic, problem solving and communications skills; and also awareness of bodies of knowledge and new perspectives that prepare students for success in their careers and communities in the 21st century. Students who are undecided in their major choice benefit from the advising services in University College until they declare a major at the University.

University Structure

UNC Charlotte is organized into four administrative divisions: Academic Affairs, Business Affairs, Student Affairs, and University Advancement. These divisions, as well as Athletics, Legal Affairs, and Internal Audit, all report to the Chancellor.

Academic Affairs

The Division of Academic Affairs provides administrative oversight and academic leadership. It includes Academic Services; Assessment and Accreditation; Enrollment Management; Information and Technology Services; International Programs; Library; Metropolitan Studies and Extended Academic Programs; Research and Economic Development; The Graduate School; University College; and seven discipline-based colleges: the Colleges of Arts + Architecture, Business, Computing and Informatics,

Education, Engineering, Health and Human Services, and Liberal Arts & Sciences.

Business Affairs

Business Affairs plans for and provides essential human, financial, facility, and administrative support services to the University that are customer-focused, results-oriented, fiscally sound, and integrity-bound. The Division of Business Affairs includes Business Services; Facilities Management; Financial Services; Human Resources; Internal Audit; Risk Management, Safety, and Security; and Technical Operations and Planning.

Student Affairs

The Division of Student Affairs commits itself to the enhancement of the personal, educational, occupational, and professional development of students. The Division of Student Affairs consists of the Counseling Center, Dean of Students Office, Housing and Residence Life, Multicultural Resource Center, NinerCare, Recreational Services, Religious and Spiritual Life, Student Activities, Student Activity Center (SAC), Student Affairs Research, Student Health Center, Student Media, Student Union, Cone University Center, Venture Program, and Center for Wellness Promotion.

University Advancement

The Division of University Advancement supports the mission of the University by cultivating alumni, community, and government support and affinity, by raising funds for scholarships and major initiatives, by providing and coordinating community engagement opportunities, and by providing broad based communications leadership that articulates the mission of the University to the region, state and nation. The Division includes Alumni Affairs, Community Relations, Giving and Donor Relations, Government Relations, and University Communications.

Non-Discrimination

UNC Charlotte seeks to promote a fair, humane and respectful environment for its faculty, staff, students, contractors, and visitors. The University prohibits discrimination and harassment on the basis of race, color, religion, age, national origin, physical or mental disability, political affiliation, veteran status, genetic information, sex, sexual orientation, gender expression, or gender identity in its programs and activities, and in its employment and educational decisions.

For contact information, please see the Notice of Nondiscrimination online at legal.uncc.edu/legal-topics/nondiscrimination.

The University's grievance procedures may be found in University Policy 501, Nondiscrimination and Procedures Addressing Reports of Discrimination, online at legal.uncc.edu/policies/up-501.

Accreditations

UNC Charlotte is accredited by the Southern Association of Colleges and Schools Commission on Colleges to award baccalaureate, master's, and doctorate degrees. Contact the Commission on Colleges at 1866 Southern Lane, Decatur, Georgia 30033-4097 or call 404-679-4500 for questions about the accreditation of UNC Charlotte. The following questions, comments, and complaints should be directed to the Southern Association of Colleges and Schools Commission on Colleges:

- 1) to learn about the accreditation status of the institution
- 2) to file a third-party comment at the time of the institution's decennial review
- 3) to file a complaint against the institution for alleged non-compliance with a standard or requirement

Other inquiries about the institution such as admission requirements, financial aid, educational programs, etc., should be addressed directly to the institution and not to the Commission's office.

College of Arts + Architecture

The Bachelor of Architecture and Master of Architecture are accredited professional degree programs as recognized by the National Architectural Accrediting Board (NAAB).

The Bachelor of Arts in Music and Bachelor of Music are accredited degree programs as recognized by the National Association of Schools of Music (NASM).

The Bachelor of Arts in Dance is an accredited degree program as recognized by the National Association of Schools of Dance (NASD).

College of Business

The programs in business and accounting are accredited by AACSB International - The Association to Advance Collegiate Schools of Business.

College of Education

The University's professional education programs for BK-12 teachers, counselors, and administrators are approved by the North Carolina Department of Public Instruction (NCDPI) and accredited by the National Council for Accreditation of Teacher Education (NCATE).

Counseling programs in Counselor Education are accredited by the Council for Accreditation of Counseling and Related Educational Programs (CACREP).

College of Engineering

The baccalaureate programs in civil, computer, electrical, mechanical, and systems engineering are accredited by the Engineering Accreditation Commission of the Accreditation Board for Engineering and Technology (ABET). The construction management program and the civil, electrical, and mechanical engineering technology baccalaureate programs are accredited by the Engineering Technology Accreditation Commission of ABET, <http://www.abet.org>.

College of Health and Human Services

The baccalaureate and master's programs in the School of Nursing are accredited by the Commission on Collegiate Nursing Education, One Dupont Circle, NW, Suite 530, Washington, DC 20036, 202-887-6791. The BSN program is approved by the North Carolina Board of Nursing. The Nursing Anesthesia program is accredited by the Council on Accreditation of Nurse Anesthesia Education Programs (COA). The Doctor in Nursing Practice program is seeking accreditation by the Commission on Collegiate Nursing Education (CCNE).

The Bachelor of Athletic Training program is accredited by the Commission on Accreditation of Athletic Training Education (CAATE). The Bachelor of Science in Exercise Science, the Bachelor of Science in Neurodiagnostic and Sleep Science, and the Clinical Exercise Physiology concentration within the Master of Science in Kinesiology programs are accredited by the Commission on Accreditation of Allied Health Education Programs (CAAHEP).

The Master of Health Administration program is accredited by the Commission on Accreditation of Healthcare Management Education (CAHME). The Public Health Programs (BSPH and MPH) in the Department of Public Health Sciences are accredited

by the Council on Education for Public Health (CEPH).

Both the Bachelor of Social Work (B.S.W.) and the Master of Social Work (M.S.W.) are accredited by the Council on Social Work Education (CSWE).

College of Liberal Arts & Sciences

The Department of Chemistry is on the approval list of the American Chemical Society.

The Public Relations program within the Department of Communication Studies is certified by the Public Relations Society of America (PRSA).

The Clinical Psychology program within the Ph.D. in Health Psychology is accredited by the American Psychological Association (APA).

The Master of Public Administration program is accredited by the National Association of Schools of Public Affairs and Administration (NASPAA).

Graduate School

The University is a member of the Council of Graduate Schools, the Conference of Southern Graduate Schools, and The North Carolina Conference of Graduate Schools.

Graduation Rate Disclosure Statement

Our data shows that 59.3% of the full-time new freshmen who entered UNC Charlotte in Fall 2009 have received a baccalaureate from this institution or another UNC institution as of Fall 2015. In addition, another 5.6% were enrolled at this or another UNC institution in pursuit of their baccalaureate degree as of Fall 2015. This information is provided pursuant to requirements of the Student Right-to-Know and Campus Security Act of 1990.

The Campus

Main Campus

The University of North Carolina at Charlotte is the largest institution of higher education in the Charlotte region and is a genuine urban university. The main campus is in University City, one of the fastest growing areas of the Charlotte region, located off WT Harris Boulevard on NC 49 near its intersection with

US 29, and only eight miles from the interchange of Interstates 85 and 77. Campus facilities are comprised of contemporary buildings, including many constructed in the past ten years and more on the way. In addition to classrooms and well-equipped laboratories, the University offers arts and athletic facilities, dining facilities, and residence accommodations. The campus is designed for the pedestrian, and facilities are generally accessible to students with disabilities.

Center City

UNC Charlotte Center City functions as a gateway to the entire University of North Carolina at Charlotte and as such embodies UNC Charlotte's urban identity in the heart of the greater Charlotte region. Architecturally, it reflects its mission as a premier institution of higher education; its context in this vibrant, rapidly urbanizing area; and its commitment to environmental sustainability.

Academically, UNC Charlotte Center City facilitates programs having an urban awareness and context, while providing vital learning opportunities for employees and residents of the urban center. Operationally, it incorporates the attributes we wish to instill in the entire University: excellence in programming, responsiveness to stakeholders, entrepreneurship, interdisciplinary productivity, inclusively, flexibility, and efficiency.

Campus Academic Buildings

Atkins Library

Atkins Library, the third building to be constructed on the UNC Charlotte campus, is named for J. Murrey Atkins, the son of a prominent Gastonia family, successful Charlotte businessman and one of the University's founding members.

Atkins, born in Russellville, Ky., graduated from Gastonia High School. At Duke University, he served as editor of the yearbook and earned a bachelor's degree in 1927. He attended Harvard Law School and Columbia University and spent five years in New York with the Irving Trust Co. before returning to Charlotte. In 1935, he joined the city's leading investment firm R.S. Dickson and Co., where he was president from 1954 until his death.

Atkins was involved with Charlotte College from its inception. He was chair of the college advisory

committee for eight years and chair of the Charlotte Community College System when it was authorized in 1958. When UNC Charlotte became a four-year college, he served as chair of the board of trustees.

Sensitive to the social and educational needs of the community, Atkins believed that the Charlotte region needed a public institution of higher learning to stay competitive with other cities in the state. He used his business, financial and political contacts to help Charlotte College become that institution. "Charlotte College was started to meet an emergency and has continued as a necessity," Atkins was fond of saying.

Charlotte College shared a library facility with Central High School. Mozelle Scherger was hired as the first full-time librarian in 1957, when a daytime instructional program was launched. When the college was formally accredited that fall, the number of volumes in the library exceeded 6,000.

Atkins believed the library should be central on the campus, central in student service and the very focal point of learning. When the library was first moved to the new campus, it was temporarily housed in the W. A. Kennedy Building.

The pioneering leader would not live to see the current library adorned with his name. He died Dec. 2, 1963, and the J. Murrey Atkins Library was dedicated on April 19, 1965. The state legislature appropriated \$20.5 million for an expansion in 1995. It was re-dedicated in 2001.

Dalton Library Tower

The Harry L. Dalton Library Tower was completed and dedicated in 1971, and re-dedicated in 2001. It is named in honor of Harry Lee Dalton, distinguished Charlotte business leader and patron of the arts, whose gifts stimulated the development of the Library's Special Collections.

Barnard

The Barnard Building was completed in 1969. It is named in honor of Bascom Weaver Barnard, a founder and first chairman of The Charlotte College Foundation, and first executive director of The Foundation of the University of North Carolina at Charlotte.

Bascom "Barney" Weaver Barnard established the Charlotte College Foundation and served as its first chair. His name features prominently in the early years of UNC Charlotte, and it adorns an 18,000 square-foot building completed in 1969, designed to serve as a facility for instruction and research.

Born Feb. 14, 1894, Barnard was a native of Asheville. He graduated from Trinity College (now Duke University) and completed a master's degree from Princeton University in 1917. He returned to his alma mater, where he taught economics and served as alumni secretary and graduate manager of athletics until 1922. He eventually left academia for the private sector.

Starting in 1939, Barnard worked as an executive for American Commercial Bank (later NCNB, now Bank of America), American Discount Company and the American Credit Corporation while maintaining a busy roster of civic activities. He served on the board the Family and Children Service, the Salvation Army and as chair of the National Affairs Committee of the Charlotte Chamber of Commerce. In 1966, he received one of Charlotte's highest civic honors - the Civitan Distinguished Citizenship Award.

In that same year, Barnard founded Charlotte College Foundation, which by 1971 had raised \$4.5 million for the fledgling University; since then, the foundation has since raised significantly more to support scholarship and academic programming at UNC Charlotte. He served as the foundation's secretary and executive director and established the University's Patrons of Excellence Program, which solicited gifts of \$10,000 or more from individuals, foundations and corporations.

On May 30, 1971, the UNC Charlotte Academic Council presented Barnard with a resolution stating "Scholarships, professorships, research grants, additions to the library collection, faculty recruitment – all these and more have flourished at his hand. In short, he has helped to provide the margin that leads to excellence." Barnard died Sept. 27, 1980.

Today, Barnard is home to the Department of Anthropology, Adult Students and Evening Services, and Veteran Student Services.

Burson

Sherman Burson Jr. was the first Charles Stone Professor of Chemistry and the inaugural dean of the then College of Arts and Sciences.

A native of Pittsburgh, Pa., Burson was born Christmas Eve 1923. His father, a Methodist minister, moved the family to Massachusetts, where Burson graduated from Harwich High School. Uncertain of his career goals, Burson considered becoming a surgeon, psychologist or medical researcher.

With little money for college, Burson took the advice of his high school principal and moved South where college costs were lower. He spent the 1941-42 academic year at the University of Alabama. When money ran out, he returned to Pennsylvania, where he worked in a steel mill during the day and attended the University of Pittsburgh at night. World War II was under way, and Burson entered the U.S. Army. A special program enabled him to continue studies at Louisiana State University; following the war, he returned to the University of Pittsburgh, where he completed a bachelor's degree in chemistry. He earned a doctorate in 1953.

In 1957, after nearly five years in private industry, Burson decided to pursue a career in academia. He joined the faculty of Pfeiffer College in Misenheimer. At the urging of Bonnie Cone, Burson accepted a position at Charlotte College in 1963. He was a professor of chemistry and chair of the department when Charlotte College became the fourth campus of the University of North Carolina in 1965. It was under Burson that the department achieved accreditation from the American Chemical Society.

UNC Charlotte's first chancellor, Dean Colvard, appointed Burson acting dean of the College of Science and Mathematics in 1973, and in 1980, Chancellor E.K. Fretwell named him dean of the newly formed College of Arts and Sciences (now the College of Liberal Arts & Sciences), formed by the merger of the College of Science and Mathematics with the College of Humanities and the College of Social and Behavioral Sciences. He held this post until retiring in June 1985.

Completed in summer 1985, the Sherman L. Burson Building was originally dedicated as the Physical Sciences Building. The 104,000-square-foot facility includes a 184-seat tiered lecture hall, a number of smaller lecture halls and laboratory space. Designed by Peterson Associates of Charlotte, the building was constructed by Butler and Sidbury Inc. for a little more than \$8 million. At the time of its re-dedication in April 1999, the building was noted for its planetarium platform mounted on vibration-resistant pedestals, an underground Van de Graaf linear accelerator and reinforced concrete radiation labs.

The building's design won a national architectural award and was included in the American School and Universities Architectural Portfolio for 1986.

Today, Burson is home to the Department of Chemistry.

Cameron

The C.C. Cameron Applied Research Center recognizes an individual whose civic and business leadership contributed to the development of UNC Charlotte and the entire UNC system.

Clifford Charles Cameron was born in Meridian, Miss. He later attended Louisiana State University, where he completed a bachelor's degree in chemical engineering in 1941. Following service in World War II, he worked as an engineer for Standard Oil Co. At the urging of a war buddy, Cameron changed careers and became a mortgage banker in 1949. He entered this relatively new field with the creation of Cameron Mortgage Co. in Raleigh. The company merged with Brown-Hamel Mortgage Co. of Greensboro in 1955 and acquired the Carolina Realty Co. of Charlotte. This was the beginning of the Cameron-Brown Co. that would later combine with First Union.

Following that merger, Cameron moved to Charlotte, where he became chief executive officer of First Union in 1968. His affiliation with UNC Charlotte dates to 1967, when Cameron became a member of the board of directors of the UNC Charlotte Foundation. In the early 1980s, Cameron co-chaired UNC Charlotte's first capital campaign and played a leadership role in the University's Silver Anniversary Campaign. He also served as on the UNC Charlotte Board of Trustees and the UNC Board of Governors.

Through his involvement with the UNC Charlotte Foundation, Cameron is credited with helping to create University Place and the subsequent economic development that resulted. He also played a part in the development of the Ben Craig Center.

Chancellor emeritus E.K. Fretwell noted in a magazine article that "Cliff Cameron personifies corporate responsibility... He is giving of his management expertise, his leadership, his great prestige and his personal attention to assist the University of North Carolina at Charlotte in its quest for excellence."

Before retiring as First Union chair in 1984, Cameron laid the groundwork for its growth as one of the nation's top 20 banks. Committed to public service, Cameron served as an advisor to North Carolina governors for four decades. He was a member of Gov. Luther Hodge's Business Development Corp., Gov. Dan Moore's Council for Economic Development; Gov. Bob Scott's Conservation and Development Board and Gov. Hunt's Advisory Budget Commission and Transportation Study Commission. Under Gov. James Martin, Cameron served as an assistant for budget and management.

One of the University's most prestigious scholarships bears the name of C.C. Cameron in recognition of First Union's and his personal contributions that made the financial assistance possible. In honor of his service to the University and the state, UNC Charlotte awarded Cameron an honorary Doctor of Public Service in 1983.

Completed in 1990 and dedicated on Sept. 25, 1991, the Cameron Applied Research Center contained roughly 74,000 square feet of laboratory, office and conference space to support world-class research. At the time, the center was the focal point for the University's outreach mission to the region. It provided businesses, agencies and organizations access to academic and applied research expertise. A multipurpose facility, the center was designed for maximum flexibility to accommodate evolving research projects. It features clean-room and vibration-free spaces, a 96-seat auditorium and a media center equipped for teleconference and distance learning.

In 2000, the center was renovated and expanded to add roughly 42,000 square feet of space.

Today, the building is known as Cameron Hall and is home to the University Writing Program, Writing Resources Center, and the Department of Systems Engineering and Engineering Management.

Cato

Dedicated May 6, 2004, Cato Hall is often the first point of contact for prospective students interested in enrolling at the state's urban research institution. Named for Wayland H. Cato Jr., the building houses Undergraduate Admissions, the Graduate School and the Chancellor's Office, as well as internal audit and legal affairs.

A distinguished business leader and philanthropist, Cato was born in Ridge Spring, S.C., in 1923. His father, Wayland Cato Sr. worked for United Merchants and Manufacturers (UM&M), a New York-based textile conglomerate. The elder Cato moved his family to Augusta, Ga., in 1937, where the younger Cato attended the Academy of Richmond County, a compulsory ROTC military public school. He graduated with honors in 1940.

Cato Jr. enrolled at UNC-Chapel Hill and was elected to Beta Gamma Sigma, a national honorary scholastic commerce fraternity. He also joined the Naval Reserve Officers Training Corps. In 1944, Cato graduated in the top three percent of his class with a

bachelor's degree in commerce.

During World War II, he served nearly three years on active duty in the U.S. Navy, stationed aboard minesweepers in the Pacific Theatre.

Following his discharge, Cato joined his father and other family members in Charlotte. The elder Cato had left UM&M to start his own business, which became the Cato Corporation, a chain of women's apparel stores. Cato Jr. became president and chief executive officer of the family business in 1960. He added the title chair of the board of directors in 1970. He retired as chair emeritus in 2004; his son John Cato was named CEO in 1999.

From 1995 to 2002, Cato Jr. was a director of the UNC Charlotte Foundation. Personally and corporately, he endowed a number of scholarship programs at the University. For his leadership in business in the Carolinas and service to the nation, state and community and for his commitment to learning and scholarship, Cato was awarded an honorary Doctor of Humane Letters during commencement in May 2002.

Conceived as the Humanities Office Wing, Cato Hall originally housed Undergraduate Admissions and the Graduate School, along with the Development Office and the departments of Communication Studies and Social Work. The three-story, 32,500-square-foot facility was built for \$5.1 million using bonds approved by state voters in 2000 and other University funds.

Today, Cato is home to Undergraduate, Graduate, and International Admissions; Graduate School; Academic Services; Chancellor's Office; Enrollment Management; Internal Audit; and Legal Affairs.

Colvard

The Colvard Building opened in 1979, and its steel-frame and curtain-wall construction and many energy saving features were considered progressive for its time. Harry Wolf of Wolf Associates designed the structure, and he won the 1980 South Atlantic Regional AIA Honor Award for his work. Among the energy-saving features Wolf utilized were vermiculite insulate roofing, insulated walls and a heat reclaimer. Also, the center arcade was designed for the horizontal and vertical movement of students in a space that did not need to be heated or cooled.

While many of Wolf's design techniques are common today, 30 years ago they were considered forward-thinking. It is appropriate such a building honors

Dean Wallace Colvard, UNC Charlotte's first permanent chancellor, a man considered ahead of his time in many respects.

Born in 1913, Colvard was raised in the mountains of western North Carolina in Ashe County. President and salutatorian of his high school class, Colvard was the first member of his family to attend an institution of higher learning. He started at Berea College in 1931, where he earned a scholarship. He also met Martha Lampkin; they would wed in the college's Danforth Chapel in 1939.

After completing his undergraduate degree, Colvard earned a master's degree in endocrinology from the University of Missouri and a doctorate in agricultural economics from Purdue University. He also served as superintendent of North Carolina Agricultural Research Stations from 1938-46. In 1948, Colvard was hired to run North Carolina State University's animal science program. Five years later, he became the dean of agriculture, a post he held until 1960, when he became president of Mississippi State University (MSU), where he unintentionally became part of college sports history. MSU had won three straight Southeastern Conference championships, but the institution declined to participate in the NCAA tournament rather than integrate, even briefly, on the basketball court. In 1963, Colvard defied a court injunction and allowed the MSU basketball team to compete in the tournament against a team with African-American players.

Colvard returned to his native state in 1966 after being named chancellor of UNC Charlotte. He embraced the challenge of turning a pioneering junior college into a university that had become the fourth member of the consolidated UNC system. As chancellor, he secured regional and national accreditation for University programs, helped create the University Research Park, added graduate programs, expanded the campus and oversaw the growth of the student body from 1,700 to 8,705 students.

He retired Dec. 31, 1978, but Colvard did not leave education behind. He helped build two other institutions: the School of Science and Mathematics at Durham and the hands-on museum Discovery Place. He died June 28, 2007.

Today, Colvard is home to the Departments of Communication Studies, Criminal Justice and Criminology, and Psychology; Public Policy program; Distance Education; Institutional Research; Multicultural Academic Services; Summer School; University Advising Center; University Center for

Academic Excellence; University College; and Urban Institute.

Cone University Center

Since first opening its doors in 1962, the Cone University Center has been a gathering place for students, faculty, staff, administrators, alumni and guests. As such, it is fitting that the facility bears the name of Bonnie Ethel Cone, the beloved mathematics teacher and visionary administrator who, perhaps more than anyone else, is credited as UNC Charlotte's founder.

Born June 22, 1907, in Lodge, S.C., "Miss Bonnie," as she was affectionately called, taught high school in South Carolina for 12 years before moving to Charlotte's Central High School in 1940. During World War II, she taught math to men enrolled in the navy's V12 program at Duke University, and she spent a year working as a statistical analyst for the Naval Ordnance Laboratory in Washington, D.C.

Cone's background made her the perfect person to head one of the new extension centers established in the late 1940s to serve returning war veterans. Cone directed the Charlotte Center and signed on as a part-time instructor in engineering and math.

Always a firm believer that Charlotte needed a public university, Cone was determined to see one built in the Queen City. She helped turn the temporary veteran's center into a permanent two-year college. In 1963, she played a key role in convincing the North Carolina General Assembly to make Charlotte College a part of the University of North Carolina system. On July 1, 1965, Bonnie Cone stood beside Gov. Dan Moore to ring the bell announcing the official creation of the University of North Carolina at Charlotte.

"Miss Cone has provided the faith on which the college many times found its primary ability to exist," said J. Murrey Atkins in a tribute. "She has stuck with it and never even thought of giving up when sometimes the sledding seemed pretty hard."

Cone served as acting chancellor for nine months and remained committed and loyal to UNC Charlotte. She served as vice chancellor for student affairs and community relations until she retired in 1973. On June 29, as part of her retirement service, the UNC Charlotte Board of Trustees named the University Center in her honor. In retirement, Cone continued to raise money and support the University until her death in 2003.

Today, Cone is home to Center for Graduate Life,

Honors College, University Scholarship Office, and Main Street Market.

Denny

In 1965, a new campus facility designed by Odell Associates was completed at a cost of \$569,000. Five years later, the building was dedicated in honor of Mary Rebecca Denny, chair of the UNC Charlotte English Department for 14 years.

Denny was born on Aug. 12, 1896, on the family farm near the small town of Red Springs, N.C. She attended Salem College and taught English in several public schools in eastern North Carolina after completing her bachelor's degree in 1917. She went on to earn a master's degree from Duke University and become associate professor of English at Queens College. She left Queens in 1946 to become the first full-time faculty member at the Charlotte Center of the University of North Carolina (now UNC Charlotte).

Although the Charlotte Center was created to serve in an emergency situation, Denny believed that it would eventually provide more than a temporary opportunity for its students. She was right as the Charlotte Center became Charlotte College, one of the first two-year community colleges in North Carolina, in 1949.

During the next 15 years, Denny completed an impressive list of initiatives, including the creation of the college newspaper, the literary magazine and the college catalog. When Charlotte College became a four-year institution, Denny relinquished her role as department head, but she remained active with the Curriculum Committee. She retired in 1964, with the distinction of being the institution's first professor emeritus.

At the Oct. 9, 1970, dedication ceremony naming what was then the largest classroom building in her honor, UNC Charlotte trustees enthusiastically paid tribute - "We transform glass, steel and stone into a monument to your spirit - forthright, steadfast, energetic and humanitarian. May this building forever serve as a reminder of your commitment to the ideals of sound scholarship, integrity and excellence."

Following her retirement, Denny returned to her family home in Red Springs, where she resided until her death in 1979.

Duke Centennial

Duke Centennial Hall was dedicated on September 8, 2006, in honor of Duke Energy's century of service and its commitment to leadership for the future.

Duke Energy's history in the Carolinas dates back to 1904, when its first power station was built on the Catawba River. Cheap hydroelectric power helped transform the regional economy from agriculture to manufacturing.

In the 21st Century, our economy continues to change. Duke Energy partnered with UNC Charlotte to help establish the Charlotte Research Institute to advance technology, foster innovation, and drive economic growth in our region.

Today, Duke Centennial is home to the College of Engineering and Department of Mechanical Engineering and Engineering Science.

Fretwell

The E.K. and Dorrie Fretwell Building honors the campus contributions of UNC Charlotte's second chancellor and his wife.

At the time of its dedication on May 23, 1996, the 162,000-square-foot facility was the largest academic structure on campus. It contains approximately 250 faculty offices and classroom seating for about 2,100 students. Built for \$18 million, the four-story facility was constructed with revenues from a bond issue approved by North Carolina voters in a November 1993 referendum.

The son of two teachers, E.K. Fretwell was born in New York City. He earned a bachelor's degree at Wesleyan University, a master's in teaching from Harvard University and a doctorate from Columbia University. An Associated Press correspondent, writer for the American Red Cross, vice consul for the American Embassy in Prague and middle and high school teacher, Fretwell entered education administration in 1956 as assistant commissioner for higher education for the New York State Board of Regents. He also served as dean for academic development at the City University of New York and president of the State University of New York College at Buffalo. In addition, he was president of the American Association for Higher Education and chair of the Carnegie Foundation for the Advancement of Teaching.

A national leader in education, Fretwell became UNC Charlotte's second chancellor in January 1979. At the time, the University's enrollment was around 8,700 students. By his retirement in June 1989, UNC Charlotte's enrollment topped 13,000.

During his tenure, Fretwell merged the colleges of Humanities, Social and Behavioral Sciences and

Science and Mathematics into the College of Arts and Sciences (now the College of Liberal Arts & Sciences) and created the Graduate School. Besides enhancing UNC Charlotte's national reputation for educational excellence, Fretwell increased the institution's links to the community through the expansion of the Urban Institute and University Research Park, the development of University Place and establishment of the C.C. Cameron Applied Research Center.

Throughout his career, Fretwell relied upon his wife Dorrie; he was quoted often as saying they were a team. Born in Chicago, Dorrie Shearer Fretwell grew up in Evanston, Ill. She earned bachelor's and master's degrees in applied music at Drake University. Before her marriage, Fretwell studied voice at the American School of Music in Fontainebleau, France, and began her career as a professional soprano, performing as a soloist with choral societies, musical clubs and opera productions on stage and television. During her husband's tenure in Buffalo, Fretwell served as vice chair of the board of the Buffalo Philharmonic Orchestra and vice president of the Girl Scouts. In Charlotte, she was on the board of Opera Carolina and the Charlotte Symphony. Among the initial enrollees of UNC Charlotte's graduate program in clinical psychology, she was its first graduate. She went into practice with Carolina Psychological Services and published a number of articles related to depression and headache management before retiring in 1996. She passed away December 30, 2011.

At the University's formal ceremony to dedicate the E.K. and Dorrie Fretwell Building, Allan Ostar, president emeritus of the American Association of State Colleges and Universities, noted "as a magnificent center of learning, it is a fitting tribute to a towering educational leader."

Today, Fretwell is home to the College of Liberal Arts & Sciences; Departments of English, Mathematics and Statistics, Political Science and Public Administration, and Sociology; American Studies, Liberal Studies, and Women's and Gender Studies programs; and Disability Services.

Friday

The Ida and William Friday Building houses the Belk College of Business, and it honors the many contributions of William C. Friday to the University of North Carolina system.

Born in Raphine, Va., Friday grew up in the Gaston County town of Dallas, where he played baseball and basketball. He attended N.C. State University, graduating with a bachelor's degree in textile

manufacturing. As a senior, Friday met Ida Howell from Lumberton who was pursuing a bachelor's degree in home economics at Meredith College. They married on May 13, 1942, and Bill Friday continued his education at UNC-Chapel Hill where he earned a law degree. Ida Friday also furthered her studies, obtaining a master's in public health from UNC-Chapel Hill.

Friday spent the majority of his career in higher education. He was assistant dean of students at UNC-Chapel Hill, assistant to the president of the Consolidated University of North Carolina and secretary of the University of North Carolina. At age 36, Friday was named acting president of the UNC system. He would lead the system until 1986. During his tenure, he became recognized as one of America's most respected and effective educational leaders. Through the 1963 Higher Education Act, Friday redefined the purpose of each institution of the UNC system (at the time, UNC-Chapel Hill, N.C. State University and UNC Greensboro; UNC Charlotte became the fourth member of the system in 1965). In 1972, he reorganized the entire system which had grown to include 16 campuses (now 17 after the addition of the N.C. School of Science and Mathematics).

On more than one occasion, Friday noted his achievements could not have been possible without his wife, Ida. He said, "It took two of us to do this." As "first lady" of the UNC System, Ida Friday was active in community service, including president of the Chapel Hill Preservation Society, member of the board of the North Carolina Symphony Society, chair of the YMCA and YWCA at UNC-Chapel Hill and a member of the League of Women Voters.

Dedicated in 1982, the Friday Building incorporated the best classroom designs for teaching future business leaders for its time. UNC Charlotte faculty and staff, along with the architect, visited a number of institutions recognized for having leading business programs, including Harvard University, the University of Virginia and the University of Tennessee. The Friday Building's classrooms are modeled after the case classrooms pioneered at the Harvard Graduate School of Business.

The 64,000-square-foot building was designed to accommodate a third floor, which was constructed in 1994-95 using \$3 million from a state bond referendum approved by voters in 1993. Changes in the building code required the University to make the facility more earthquake resistant. The columns that grace Friday Building contribute to its distinctive look; they were added during the expansion at the

suggestion of Chancellor Emeritus Jim Woodward.

Several other UNC institutions have honored the Fridays with buildings on their campuses, including N.C. State University (the William and Ida Friday Institute for Educational Innovation), UNC-Chapel Hill (the William and Ida Friday Center for Continuing Education) and UNC Wilmington (Friday Hall).

Today, Friday is home to the Belk College of Business and all of its academic departments.

Garinger

Elmer Henry Garinger was one of the visionary leaders who helped Charlotte College realize the dream of becoming a four-year, state-supported institution.

As superintendent of Charlotte City Schools, Garinger employed Bonnie Cone, UNC Charlotte founder, as a mathematics teacher at Central High School. Later, he would name her director of the Charlotte Center of the University of North Carolina, the institution that ultimately became UNC Charlotte.

Born July 13, 1891, in Mount Vernon, Mo., Garinger graduated from the local high school and continued his education at the University of Missouri. He completed a bachelor's degree in 1916, and eventually, he earned a master's degree and doctorate from Columbia University.

During his 40-year career with Charlotte City Schools that began in 1921, Garinger gained a national reputation as a leader in education. In 1949, he was named superintendent of Charlotte City Schools, and he took the lead in planning for the consolidation of the Charlotte and Mecklenburg County school systems, a goal achieved in 1959. Garinger served for a year as superintendent of the new system, retiring as superintendent emeritus.

Garinger's association with UNC Charlotte continued throughout his life. He was instrumental in requesting the Charlotte Center be founded, and he was among the Charlotte leaders who worked to change the Charlotte Center to Charlotte College in 1949. When the institution was placed under the community college system in 1958, Garinger was named secretary of the first Board of Trustees of the Charlotte Community College System; he served in this capacity until 1963, when Charlotte College became a four-year, state-supported institution.

After retiring from the Charlotte-Mecklenburg Schools, Garinger worked to improve public education as a

member of the N.C. House of Representatives, where he served two terms. In honor of Garinger's service to public education and the University, UNC Charlotte's Board of Trustees voted to name the first faculty building, constructed in 1965, in his honor. The Elmer Henry Garinger Building was dedicated in October 1970; a portrait of Garinger that hangs in the building was dedicated in March 1987.

He died in Charlotte on Aug. 21, 1982.

Today, Garinger is home to the Departments of Africana Studies and History.

Grigg

Dedicated on Sept. 8, 2006, William H. Grigg Hall is home to a number of Charlotte Research Institute offices and facilities, including the Center for Optoelectronics and Optical Communications.

Named for the chair emeritus of Duke Energy, Grigg Hall is a 96,820-square-foot, state-of-the-art academic and research facility. In 2002, the Duke Energy Foundation announced a \$10 million gift to the University's capital campaign in support of Charlotte Research Institute programs and initiatives. Construction of Grigg Hall began in 2003 with funding from the state's \$3.1 billion bond referendum approved by North Carolina voters in 2000.

Grigg, who grew up in Albemarle, completed a bachelor's degree from Duke University in 1954. After serving two years in the U.S. Marine Corps, he earned a law degree with distinction from Duke in 1958. After practicing law in Charlotte for five years, Grigg joined Duke Power in 1963 as assistant general counsel. He was promoted to vice president of finance in 1970 and vice president and general counsel in 1971. Elected to Duke Power's board of directors in 1972, Grigg eventually was named vice chair in 1991 and chair and chief executive officer in 1994. He retired in 1997.

During Grigg's tenure with Duke Power, he guided the corporation through some of the most challenging times in the electric utility industry. He helped expand and diversify the company's power plants and led the company's response to competition, including the merger with PanEnergy in 1997 to create Duke Energy. Grigg was named Electric Utility CEO of the Year for 1995 by Financial World magazine.

Committed to civic leadership and quality education, Grigg has served countless community groups, including the Charlotte-Mecklenburg Hospital Authority, Foundation for the Carolinas and the

Lynwood Foundation. In honor of his contributions to Charlotte and the greater community, UNC Charlotte awarded Grigg an honorary doctorate of public service in December 1997.

The architectural firm of Perkins-Will, which has offices nationwide, designed Grigg Hall. Constructed for roughly \$24 million, Grigg Hall features a 3,000-square-foot clean room, a controlled environmental space used for research and manufacturing. Clean, contamination-free rooms are used in variety of research settings – electronics and optics, as well as pharmaceuticals and DVD manufacturing.

Today, Grigg is home to the Department of Physics and Optical Science and Charlotte Research Institute.

Kennedy

The W.A. Kennedy Building was one of the first two facilities on campus. Designed by A. G. Odell Jr., the architect of Ovens Auditorium and Bojangles Coliseum, the building was named for Woodford A. "Woody" Kennedy. Sometimes called the "spiritual father of Charlotte College," Kennedy was a member of the first advisory board of the institution in 1947. He was named to its eight-member board two years later. Without Kennedy's perseverance, Charlotte College likely would have remained a two-year community college.

Kennedy believed that Charlotte deserved and needed a great university. He stated that a thousand additional high school graduates could go to college each year if the opportunities available in other parts of the state were available in Charlotte. With a zeal he once termed an obsession, Kennedy worked tirelessly to raise money and support to make that happen.

He encountered a lack of support among many of Charlotte's business executives and disinterest from politicians. His rhetoric sometimes became strident, characterizing critics of the project as naysayers and deriding the state's support as a 'sop.'

At the time, the school operated with a part-time faculty who taught in part-time classrooms, and it was financed almost entirely by tuition paid by student loans until Kennedy pushed for and obtained the initial state funding in 1955.

As a member of the college's site selection committee, he searched for a scenic location with room for growth and expansion; the committee ultimately settled on the present location of the UNC Charlotte campus. He told reporters, "I may not but you will live to see 10,000 students at Charlotte College."

The statement proved prophetic. Kennedy died on May 11, 1958, the eve of his installation as a trustee of Charlotte Community College. But his contribution was not forgotten. The trustees proposed that the first building on the new campus be named for him. The building was dedicated on Feb. 16, 1962.

When Kennedy Building first opened, it housed science laboratories (chemistry, physics, biology and geology), as well as labs for a variety of engineering courses. There were 10 classrooms, 12 faculty offices and a lecture room with elevated seating for 100. The building also served as a temporary library; its first floor contained 18,000 volumes while Atkins Library was being built.

Today, Kennedy houses the Center for Teaching and Learning and Information and Technology Services.

King

Arnold K. King may be one of the few individuals to have a building named in his honor on two UNC system campuses. Ten years before UNC Charlotte dedicated the King Building for him, UNC Wilmington put King's name on an administrative and classroom building. Such an honor is an indication of the vital role King played throughout the UNC system.

From his days as a student at UNC-Chapel Hill in the 1920s until his retirement as special assistant to UNC President William Friday, King was an integral part in the development of the University of North Carolina system. After receiving his bachelor's degree, he continued his education at the University of Chicago, completing a master's and doctorate. Returning to Chapel Hill, King served as a professor, graduate school administrator, head of summer sessions and vice president. He also was as acting chancellor for UNC Asheville in 1977.

King participated in a number of education-related study commissions, panels and boards across North Carolina and around the country. UNC President Friday and King were colleagues for more than 20 years. The UNC leader turned to King for his assessment when planning for the system's future. King served as a liaison between Friday and Charlotte College during the institution's transition to becoming the University of North Carolina at Charlotte. He later played the same role for UNC Asheville and UNC Wilmington.

In addition to his long service to the UNC system, King was one of the founders of N.C. Wesleyan College, and he was considered an expert on the

history of the UNC system. In retirement, he wrote "The Multi-campus University of North Carolina Comes of Age: 1956-1986," a historical bibliography of his three decades working in the system. He finished a 20-page manuscript on UNC's University Day celebration just two days before his death.

The architectural firm of Odell Associates Inc. designed the building, which was constructed by F.N. Thompson Inc. in 1966 at a cost of \$603,000. The King Building was originally named for Addison Hardcastle Reese. It was renamed for King following the dedication of Reese Building, which opened in 1982. Dr. King passed away on March 31, 1992, at the age of 90. A resolution in his memory noted, "Our University lost a part of its memory and conscience, and it lost a great friend."

Today, King is home to the Dean of Students Office, Human Resources, Office of the Registrar, SOAR, and Student Affairs.

Macy

The Macy Building was one of the first two facilities constructed on the UNC Charlotte campus. It was named for Pierre Macy, professor of French and chair of the-then Foreign Language Department. The 18,000-square-foot research and instructional facility was constructed concurrently with the Kennedy Building by Odell Associates in 1961 at a cost of \$418,000.

Macy was born in France in 1899 and received degrees from the University of Nancy, the University of Dijon, and the University of Paris before making the United States his adopted home.

The noted author and translator arrived at Charlotte College in 1949 and almost single-handedly established and maintained the fledgling college's Foreign Language Department (now the Department of Languages and Culture Studies). Before joining the faculty of Charlotte College, Macy was chair of the Romance Language departments at Kentucky Wesleyan College, the University of Tulsa and the College of William and Mary. He returned to his alma mater, the University of Nancy, for one year as a visiting professor.

An integral faculty member of the college, Macy served on the curriculum committee, chaired the concerts and lectures committee, advised the French Club and later served on the University's executive committee.

Students held Macy in such high regard that the 10th

edition of the yearbook was dedicated to him in 1960 "for his deep understanding, patient guidance and personal interest in the students of Charlotte College. He has inspired us to greater achievements through his teaching and counseling, and he will be fondly remembered in our memories of Charlotte College."

Macy served as the first commencement marshal for the newly established University. His dedication to UNC Charlotte went well beyond any specific position he held. He taught French three years after relinquishing the department chairmanship and stayed on the faculty two years after he reached retirement age.

At his 1969 retirement, he received the rare honor of being named a faculty emeritus from his colleagues. "The Foreign Language Department, carefully constructed by Dr. Macy over the years was clearly one of the solid blocks of the foundation of the new institution," read the tribute. He is further remembered today with the Pierre Macy Award for Excellence in French.

Today, Macy is home to the Department of Global, International, and Area Studies and Department of Religious Studies.

McEniry

Built to house the University's earth and life sciences programs, the McEniry Building is named for UNC Charlotte's first vice chancellor for academic affairs, William Hugh McEniry. The \$4 million, 103,000-square-foot facility was completed July 7, 1975, to house the Departments of Geography and Earth Science and Biology.

Chancellor Dean Colvard hired McEniry (pronounced My-Canary) in 1967; Colvard was searching for a top-notch administrator with an arts and sciences background. Based upon numerous recommendations, Colvard recruited McEniry away from Stetson University where he had spent 27 years and served as a university dean. Ready for a new challenge, McEniry and his wife, Mary, relocated to North Carolina and settled into a 17-acre plot of land between the University and Huntersville they dubbed "Rural Simplicity."

McEniry is credited with recruiting dedicated and talented faculty to UNC Charlotte, and he was active in a number of organizations, such as the North Carolina Association of Colleges and Universities and the College Entrance Board. He also served as president of the Southern Association of Colleges and Schools.

Dedicated to improving higher education for blacks, McEniry served as a trustee of Johnson C. Smith University. In addition, he personally financed scholarships for some black students and worked with the Ford Foundation to improve academics and the curricula for historically black colleges.

In 1973, McEniry agreed to serve as acting chancellor at Western Carolina University in Cullowhee until a permanent chancellor was hired. He passed away on March 15, 1974, at the age of 57.

The McEniry Building is just one lasting tribute to the University's pioneering vice chancellor. Each year, a member of the graduating class with the highest GPA receives the W. Hugh McEniry Award for Academic Excellence. The North Carolina Association of Colleges and Universities named its top honor for the trailblazing educator - the Hugh McEniry Award for Outstanding Service to North Carolina Higher Education. Following McEniry's death, Stetson University established the McEniry Award, a prestigious honor given a professor as selected by faculty members and students.

Today, McEniry is still home to the Department of Geography and Earth Sciences.

Memorial Hall

Memorial Hall is dedicated to fallen U.S. veterans. The building houses the Departments of Military Science and Aerospace Studies. It serves as a memorial to commemorate UNC Charlotte students who have served in any branch of the Armed Services and lost their lives in service to the country.

Reese

Around Charlotte, Addison Hardcastle Reese is probably better known as a titan of the banking industry rather than for his passionate commitment to UNC Charlotte.

Born in Baltimore County, Md., on Dec. 28, 1908, Reese attended Johns Hopkins University but left after his junior year to begin his lifelong career in banking. He worked as a clerk, a senior national bank examiner and a bank vice president all before serving in the U.S. Air Force during World War II.

Reese returned to banking after the war and was recruited to Charlotte in 1951 as executive vice president of American Trust Company. He was promoted to president in 1954 and organized a series of mergers that became the North Carolina National Bank, which has since evolved into the Bank of

America. He also served on the board of the Federal Reserve and as a director of the International Monetary Conference.

Named to the Board of Advisors of the Charlotte Community College System in 1957, Reese was later elected to the college's Board of Trustees. He chaired the Charlotte College Site Committee and worked with University founder Bonnie Cone and Pete McKnight to choose UNC Charlotte's current location.

In 1963, Reese was appointed vice chair of the Charlotte College Board of Trustees and took over as chair following the death of J. Murrey Atkins. He spent a year as a member of the North Carolina Legislative Study Commission on Student Financial Aid and was a member of the UNC Charlotte Foundation.

In 1968, UNC Charlotte awarded its first honorary degrees. One went to Reese and the other went to Frank Porter Graham, former University of North Carolina president, U.S. senator and United Nations mediator.

Reese's award recognized him as "a man of vision, who foresaw a university of excellence, where those of lesser vision saw only a struggling community college."

The North Carolina Citizens Committee presented Reese with the 1974 Distinguished Citizenship Award. Reese also served on the boards of trustees for both the University of North Carolina and UNC Charlotte, serving as the chair of the latter from 1972 until his death in 1977.

Like the Colvard Building, the Reese Administration Building was designed by Harry Wolf of Wolf Associates. It was completed in 1982, and is named in Reese's honor.

Today, Reese houses administrative offices, Financial Aid, and Student Accounts.

Robinson

Robinson Hall for the Performing Arts is a state-of-the-art venue that affords the campus and the community access to a slate of contemporary and classical dance, music and theater offerings.

Named for Russell and Sally Dalton Robinson, the three-story, 118,000-square-foot facility contains classrooms, offices and performance and rehearsal spaces for the departments of dance, music and theatre. It was built and equipped for \$28 million,

financed through the statewide bond referendum approved by voters in 2000.

The hall's first floor houses a 332-seat proscenium theater, which includes a 23-seat orchestra pit. The theatre has a 3,500-square-foot stage equipped with 18 trapdoors, a curtain 26 feet high and a 60-foot fly-loft for storing and changing scenery. There also is the Black Box Theatre. Throughout the building are rehearsal rooms and labs for costume, scenery and lighting design.

The Robinsons are both Charlotte natives, and they are considered among the most admired and effective community leaders. In addition to leadership roles at Christ Episcopal Church, they have supported professional, educational and charitable institutions, arts and cultural organizations and economic development services.

Russell Robinson II is founding partner of one of North Carolina's largest law firms - Robinson, Bradshaw and Hinson. According to an article in the Charlotte Observer, Robinson majored in English at Princeton University but transferred to Duke University after two years. He went on to obtain his law degree from Duke in 1956. His firm has represented numerous businesses and organizations, including Belk Store Services Inc., the Duke Endowment, Duke Power and the Charlotte Housing Authority. His book "Robinson on North Carolina Corporation Law" is considered a necessity for any aspiring Tar Heel corporate lawyer.

A member of the UNC Charlotte Board of Trustees from 1987-97, Robinson served as chair for eight years. During his board tenure, Robinson was regarded by observers as a "quiet power" for the University; he focused on increasing public and private funding and obtaining UNC system authorization for doctoral degrees beyond joint Ph.D. programs.

In addition to his role as a trustee, Robinson was a director of the UNC Charlotte Foundation. He also has been a trustee of the Duke Endowment and chair of Duke University's Board of Trustees.

Sally Dalton Robinson attended public schools in Charlotte, St. Mary's School in Raleigh and Duke University. She was a member of Phi Beta Kappa and earned a bachelor's degree in history. Among her many civic contributions, she served as an integral founding member of the Levine Museum of the New South and the St. Francis Jobs Program (now the BRIDGE Jobs Program). She also was on the board of the Charlotte Symphony, the Arts and Science

Council, McColl Center for the Visual Arts as well as other religious, charitable and economic organizations.

Dedicated November 3, 2004, Robinson Hall was designed by the Charlotte architectural firm of Jenkins Peer. Skanska and R.J. Leeper were general contractors, while the firm Biemann and Rowell was the mechanical contractor. Port City Electric served as the electrical contractor; the hall's lighting and acoustical controls were among the most sophisticated in modern theater design at the time of construction.

Today, Robinson Hall is home to the Departments of Dance, Music, and Theatre; the Anne R. Belk Theater; and the Lab Theater.

Rowe

The Oliver Reagan Rowe Arts Building honors one of UNC Charlotte's founding fathers. Completed in 1971, the 75,000 square-foot facility was constructed to house the then departments of Performing and Visual Arts. The building's focal point is an eight-sided theatre that seats 350. It also includes a recital hall, classrooms, offices, practice rooms and a large lobby-gallery.

Rowe was born Dec. 12, 1902, in Newport, Tenn. He and his wife Maria would become avid supporters of the Charlotte arts community and UNC Charlotte. Rowe's family moved to Charlotte when he was a child. After graduating from Central High School, Rowe attended UNC-Chapel Hill, where he completed a bachelor's degree in electrical engineering. He returned to Charlotte and began work with the R.H. Bouligny engineering firm. He eventually became president of R.H. Bouligny Inc., Powell Manufacturing Co. and Powell Agri-Systems Ltd.

In the 1950s, Rowe supported consolidation of city and county schools, which won him the Charlotte News "Man of the Year Award" in 1958. That same year, Gov. Luther Hodges appointed Rowe to the first Board of Trustees for the Charlotte Community College System. He chaired the board's finance committee, and he was instrumental in soliciting the largest single gift to the then Charlotte College Foundation (now the Foundation of the University of North Carolina at Charlotte).

Between 1961 and 1963, Rowe made numerous speeches championing the cause of higher education for the Charlotte region. In 1964, the Charlotte Civitan Club presented its Distinguished Citizenship

Award in recognition of Rowe's efforts on behalf of the University.

During the rest of the 1960s, Rowe continued to find new causes for his leadership. A long-time music lover, Rowe began to support the opera and symphony. Eventually, he was elected president of the Charlotte Symphony Orchestra Society, and in 1973, he established, nurtured and financially supported the "Rowe String Quartet" at UNC Charlotte.

In 1987, Rowe was awarded an honorary Doctor of Human Letters. The citation reads in part that "Oliver Reagan Rowe Sr. was a founding father of the University of North Carolina at Charlotte. He helped to dream the dream and to make it come true ... With his vision, he painted a picture of a major state university when others around him saw only the two-year college then existing."

Today, the Rowe Building is home to the Department of Art and Art History.

Smith

The Sheldon Phelps Smith Building honors an individual whose foresight helped to chart UNC Charlotte's educational course.

Smith, vice president and general manager of the Douglas Aircraft Company's Charlotte Division, served as a trustee of Charlotte College from 1958 to 1965. He is credited with bringing an engineering program to the institution. Through his generosity, Douglas Aircraft Co. engineers taught at Charlotte College on a released time basis; as many as nine part-time instructors from Douglas were in service at one time.

Born in Redlands, Calif., on March 26, 1910, Smith graduated from Pomona College in 1932 with a bachelor's degree in physics. During World War II, he served as a lieutenant with the Engineering Division of the Navy Bureau of Aeronautics and was assigned to the missiles branch. Following the war, he was a missile project engineer with the Douglas Aircraft Co. Prior to moving to Charlotte, he was an assistant design engineer for missiles at the company's Santa Monica facility.

In addition to starting the University's engineering program, Smith is credited with bringing graduate courses in mathematics and physics to the then Charlotte College through a cooperative agreement with N.C. State University.

As an advocate for the college, Smith once said, "If

we marry the manpower development of this Charlotte College area of some 1 million people to the tremendous demand of technical industries for engineers and scientists, we will accomplish two ends: to help satisfy the great national requirements for engineers and scientists and to improve the usefulness and economic standards of the residents of North Carolina.”

Smith left Charlotte to become vice president of Douglas Aircraft and vice president of Douglas United Nuclear Corp. in Hanford, Wash. He died April 28, 1966.

The Smith Building, completed in 1966, was originally called the Engineering Building. The 71,000 square-foot, \$1.6 million facility was the largest classroom and laboratory building on the campus at the time. When finished, it housed the Computer Center, Mathematics Department, the Geography and Geology Department (now Department of Geography and Earth Sciences) and the Engineering Program.

UNC Charlotte dedicated the building in honor of Smith on Dec. 15, 1968, in a ceremony held in the Cone University Center. The Smith family presented a portrait of the building’s namesake to be placed in the facility.

Today, Smith is home to the College of Engineering’s Office of Student Development and Success and Department of Engineering Technology and Construction Management.

Storrs

The Thomas I. Storrs Building resulted from the collaboration between Charlotte architectural firm Ferebee, Walters and Associates and New York architects Charles Gwaltney and Robert Siegel.

Since its completion in 1990, Storrs Building has been used as an “architectural education instrument,” because students and professionals can study its many unique features, as the building is considered a virtual textbook for use of materials and systems. This 87,000-square-foot facility features a complex roof design, natural and artificial lighting systems, double helix stairs and exposure of structural and environmental systems. Home to the School of Architecture in the College of Arts and Architecture, Storrs Building is appropriately named for an individual who dedicated himself to helping build the University.

Storrs, born in 1918, dropped out of high school during the Great Depression. At the age of 15, he

began work as a clerk at the Federal Reserve Bank of Richmond, Va. He would later resume his formal education, enrolling in the University of Virginia, where he completed undergraduate studies. He earned a master’s degree and doctorate in economics from Harvard University.

Originally from Nashville, Tennessee, Storrs joined the-then North Carolina National Bank (NCNB) in 1960 as executive vice president. He would later serve as one of the architects who laid the foundation for NCNB to emerge as NationsBank (now Bank of America). Following the retirement of Addison Reese, Storrs became chair and CEO, and he would follow his predecessor’s example as a member of the UNC Charlotte Board of Trustees for nearly 12 years – the last four years as chair. His civic involvement included serving as president of the Business Foundation of North Carolina, vice president of the North Carolina Engineering Foundation and director of the North Carolina Textile Foundation. In 1990, he was inducted in the North Carolina Business Hall of Fame.

A recipient of the UNC Charlotte Distinguished Service Award, Storrs also has a scholarship in his name at the University of Virginia.

Formal groundbreaking for the \$7.5 million Storrs Building was held Aug. 26, 1988. Dedication of the building was Oct. 29, 1990, and a ceremony to name the facility in honor of Storrs was held Sept. 16, 1992.

Today, the Storrs Building is home to the School of Architecture.

Winningham

If one person can be credited for launching the tradition of bringing prominent speakers to the UNC Charlotte campus, then it is Edyth Farnham Winningham, one of the University’s pioneering faculty members.

Winningham, born Jan. 26, 1900, in Arthur, N.D., earned a bachelor’s degree in modern languages from the University of North Dakota. She later earned a master’s in political science from UNC-Chapel Hill, reportedly the first woman in the state to complete the degree.

Beyond teaching high school in North Dakota and North Carolina, Winningham served as a faculty member at the University of Wyoming, the Women’s College of the University of North Carolina (now UNC Greensboro) and the UNC College Center in Wilmington (now UNC Wilmington). Her connection

to UNC Charlotte dates back to its time as Charlotte College. Winningham joined the faculty in 1947, and she spent the next two decades infecting everyone around her with her passion for politics and international affairs.

Winningham frequently stated that one of her dreams was to bring prominent thought-leaders to the campus to “open up windows” for the institution’s students. Her persistence paid off in 1966 with the establishment of the University Forum Council, which sponsored an event each year to bring noted speakers to the campus to address crucial issues facing contemporary society. She chaired the council until spring 1971, despite retiring in 1967 as professor emeritus. According to Special Collections, the final forum was held March 2, 1995. This 30th annual event focused on “Violence: Is Prevention the Key?”

Even after retiring, Winningham continued to lecture on world affairs and international education. She and her husband also established the James and Edyth F. Winningham Scholarship for undergraduate political science majors.

In 1970, Winningham’s service to the greater Charlotte community was recognized by the League of Women of Voters. The organization singled her out for her instrumental role in forming closer ties between the University and the Charlotte community at large, and she was named WBT Radio’s Woman of the Year. In 1985, UNC Charlotte awarded her an honorary Doctor of Humane Letters. She died May 27, 1994.

The 10,507-square-foot classroom building which bears her name was constructed in 1965 by F.N. Thompson Inc.; the architectural firm Odell Associates designed the facility.

Today, Winningham Hall is home to the Department of Philosophy.

Woodward

As students at UNC Charlotte attend classes in the science and technology building on campus, they are walking into the physical manifestation of the work done by Chancellor Emeritus James Woodward and his wife Martha. On November 16, 2005, the building was formally dedicated to recognize the Woodwards’ 16 years of service and devotion to the University.

The James H. and Martha H. Woodward Hall is a direct result of their vision to help elevate UNC Charlotte to a research institution. The Woodwards

worked together to raise awareness of the University’s vital role as an economic engine and build many new partnerships and friendships for the institution. As Chancellor from 1989 to 2005, Jim Woodward was the visionary, strategist, and master builder who guided UNC Charlotte’s development as a major research institution. Martha played a vital role in strengthening ties to UNC Charlotte through the hosting of thousands of guests regionally and nationally. Throughout their 16 years at the University, the Woodwards worked together to bring much needed attention to both the University’s strengths and to its resource needs.

Today, Woodward Hall is home to the College of Computing and Informatics; and Departments of Biological Sciences, Computer Science, and Software and Information Systems.

The 49ers

The nickname, the 49ers, was chosen in recognition of the importance of the year 1949 in the history of the University. UNC Charlotte, which began as an off-campus center of the University of North Carolina at Chapel Hill, would have died in 1949 had Bonnie Cone and her supporters not convinced the N.C. Legislature that Charlotte needed a permanent college. Charlotte College was established that year. Additionally, the campus is located on N.C. Highway 49, and Charlotte has a rich gold mining history -- the term “49ers” symbolizes gold mining. A bronze statue of the 49ers Gold Miner sits in front of the Reese Administration building on campus. The statue recalls the region’s history as a gold mining center and symbolizes the pioneering spirit and determination that has led to UNC Charlotte’s dramatic growth.

University Logo

UNC Charlotte’s logo has become one of the Charlotte region’s most distinctive insignia. The logo is suggestive of a “crown,” reminiscent of Queen Charlotte of England, for whom the city of Charlotte is named. The crown emphasizes



UNC Charlotte’s relationship with the Queen City, alludes to academics with shapes that resemble an open book, and exudes excellence with a torch-like shape at the top, which can also be interpreted as the top of a graduation cap.

University Seal

UNC Charlotte became the fourth campus of the University of North Carolina in July of 1965. In the fall of 1965, the new UNC Charlotte seal was chosen by a committee of students (the three upper-class presidents), three faculty members, and the school publicity director, who served as chair. Final approval was given by Acting Chancellor Bonnie Cone.

UNC Charlotte seal's elements are:

the modern arches (the tulip design from the canopy of the Kennedy Building) at the top to symbolize that this is a twentieth century university; two Cs in the middle to represent Charlotte College, from which the new campus sprang; and the pine cone at the bottom for the Old North State [land of the longleaf pine]. The date on the seal is 1946, the year in which the institution began as the Charlotte Center of the University of North Carolina.



University's Alma Mater in April 1992. It was sung for the first time at the following May Commencement and has been performed at every Commencement since.

Alma Mater

UNC Charlotte's Alma Mater has deep roots in the institution's history. It was part of an "Academic Festival March" composed for UNC Charlotte by James Helme Sutcliffe, a Charlotte composer and music critic who lived in Germany at the time. Dr. Loy Witherspoon, professor of religious studies, commissioned the March in 1965 when he learned that Charlotte College would become a campus of The University of North Carolina. The March was first performed in 1967 at the installation of Dean W. Colvard as UNC Charlotte's first chancellor. Afterwards, it was performed as a recessional at every Commencement during Dean W. Colvard's tenure as chancellor. When UNC Charlotte founder Bonnie Cone heard the March, she said, "I can hear an alma mater in it," referring to a hymn-like refrain. Dr. Robert Rieke, a professor of history, also heard an alma mater in it.

On a 1990 trip to Germany, Rieke visited Sutcliffe, picked up a recording of the March, and began writing words to fit the final refrain. On Christmas Eve 1991, he sent Bonnie Cone the words and music as a Christmas present to her and to the University, from which he had retired a year earlier. Chancellor James H. Woodward approved the composition as the



The Graduate School

graduateschool.uncc.edu
gradadmissions.uncc.edu

**Associate Provost for Graduate Programs
and Dean of the Graduate School:** *Dr. Thomas L. Reynolds*
Associate Deans: *Dr. Katherine Hall-Hertel*
Ms. Johnna W. Watson
Assistant Dean: *Dr. Alan Freitag*

The University of North Carolina at Charlotte was established in 1965 by the North Carolina General Assembly, which transformed Charlotte College, with beginnings in 1946, into a campus of The University of North Carolina. The Graduate School was established in 1985 with the appointment of the first Dean of the Graduate School, although graduate degree programs had been offered since 1969. Today, more than 800 members of the Graduate Faculty and over 5,000 graduate students participate in a broad array of graduate programs at the master's and doctoral levels and in graduate certificate programs.

The executive and administrative affairs of the Graduate School are carried out by the Associate Provost for Graduate Programs and Dean of the Graduate School, who acts in cooperation with the deans of the seven disciplinary colleges of Arts + Architecture, Business, Computing & Informatics, Education, Engineering, Health & Human Services, and Liberal Arts & Sciences.

Graduate Student Core Competencies

Unlike undergraduate education, graduate education is intended to develop independent, specialized skills and knowledge in a particular academic discipline. Graduate students completing a master's or doctoral degree should be able to claim competency in a range of skills, in addition to expertise in their academic discipline. The following "core competencies" are intended to reflect the broad range of skills a graduate

student at UNC Charlotte could expect to develop, depending on their specific program of study. The ways in which these competencies are taught or interpreted will vary by program and will reflect the expectations of the specific degree program in which the student is enrolled.

- 1) **Communication:** Graduate students at UNC Charlotte will further communication skills needed in order to effectively and persuasively write and speak in a variety of media and forums. This includes the preparation of scholarly and peer reviewed publications and grants, public speaking skills, facilitating group discussions, and facilitating positive interpersonal relationships through communication.
- 2) **Leadership:** Leadership skills are invaluable in academia and beyond. UNC Charlotte students will have wide ranging opportunities to develop the skills necessary in order to motivate, inspire, and manage others. The Graduate School will support the development of ethical, competent leaders in academia and practice, ensuring success in a variety of contexts. Mentorship, effective decision-making, problem solving and change management skills will be cultivated through graduate studies at UNC Charlotte.
- 3) **Teaching and Instruction:** Students who pursue careers in academia will be prepared to effectively teach in all types of settings, creating

engaging learning environments. They will have an understanding of the challenges presented in inclusive classrooms, and they will master the skills needed to create dynamic learning in any environment. UNC Charlotte graduates seeking academic careers will be competent with the most current teaching methods and technologies, enabling them to stimulate critical, innovative, and interdisciplinary learning in others.

- 4) **Personal and Professional Responsibility:** The Graduate School not only values and emphasizes the importance of academic rigor and progress, but also the holistic development of students. Graduate students at UNC Charlotte will be committed to lifelong learning and remain active in the search for knowledge. Additionally, they will exhibit fair and ethical conduct both personally and professionally, and engage in opportunities to expand their understanding and appreciation for all forms of diversity.
- 5) **Research and Scholarly Inquiry:** Graduate Students at UNC Charlotte will gain the technical research and scholarship skills needed for success in their chosen academic program, while maintaining a fierce commitment to ethical practices. These skills will reflect the commitment to diverse ideas, academic collegiality, and to continued student learning—concepts inherent in an interdisciplinary environment.

Graduate Council

The Graduate Council, whose voting members are elected by the Graduate Faculty, reviews, develops, and makes recommendations concerning Graduate School policy. All curricular proposals and all criteria for membership on the Graduate Faculty come before the Graduate Council. In addition, the Graduate Council serves in an advisory capacity to the Dean of the Graduate School.

Graduate Faculty

In accordance with criteria developed by each graduate program or unit and approved by the Graduate Council, the Dean of the Graduate School appoints members of the Graduate Faculty for renewable terms. Members of the Graduate Faculty offer courses and seminars, mentor graduate students, and supervise research at an advanced level of scholarship.

Graduate Program Directors

Each graduate program, and in some cases certain program areas within a discipline, has a Graduate Program Director. This individual is a member of the Graduate Faculty and is responsible for coordinating various functions of the graduate program. Directors,

along with a student's advisor, assist students with understanding program requirements and can answer program specific questions such as transfer credit, prerequisites, program specific admission requirements, etc.

Types of Graduate Programs

This section generally describes types of degrees and programs. See the "Academic Programs" section of this *Catalog* for a list of specific available graduate programs.

Doctoral and Master's Degree Programs

UNC Charlotte offers 21 doctoral and 61 master's degree programs. To be admitted to a degree program, an applicant must meet all the requirements for admission, be recommended for admission by the program in which he/she proposes to study and receive final approval for admission by the Graduate School. Acceptance into one graduate program does not guarantee acceptance into any other program.

Graduate Certificate Programs

UNC Charlotte offers 48 graduate certificate programs. Graduate certificate programs are designed for students who wish to complete a coherent program in a defined area to enhance their professional skills and/or academic knowledge. Most graduate certificate programs do not require a standardized test to apply for admission, thereby enabling prospective students to begin graduate study fairly quickly.

Students are admitted to a specific graduate certificate program and are advised by faculty in the unit offering the graduate certificate. Many of UNC Charlotte's graduate certificate programs are comprised of the courses in a master's degree. Since the graduate certificate is not a degree, students may apply the credits earned in the certificate program toward a single (master's or doctoral) degree that they pursue either concomitant with pursuing a graduate certificate or after the certificate has been awarded. *[Please note: time to degree limits do apply.]*

Post-Baccalaureate (Non-Degree) Program

Applicants seeking to take courses beyond the baccalaureate degree for license renewal, for transfer to another institution, as prerequisites for admission to a graduate degree program or for personal satisfaction may be admitted as post-baccalaureate/non-degree students. A post-baccalaureate student who is subsequently admitted to a graduate degree or

certificate program may, with the recommendation of his/her advisor and the approval of the Graduate School, apply a **maximum** of six graduate credit hours acceptably completed in the post-baccalaureate status toward a degree.

Readmission – All Students

Post-baccalaureate/non-degree, graduate certificate, and degree-seeking students whose enrollment is interrupted will remain eligible to register for one calendar year without having to reapply for admission to the University if they are in good standing and have not exceeded the four, six or eight-year limit for their academic program of study. After an absence of more than 12 months, the student's matriculation will be closed and the student must apply for readmission; acceptance is subject to department, program, and Graduate School approval. Students whose enrollment is suspended or terminated for academic reasons should consult the description of the procedures outlined in the "Academic Standing" section of the *Catalog*. Students whose enrollment is suspended or terminated for disciplinary reasons must have their readmission materials reviewed by the Admissions Campus Safety Review Committee; see the UNC Charlotte Code of Student Responsibility within this *Catalog*.

Accelerated Master's Programs

See "Registration" under the Degree Requirements and Academic Policies section of this *Catalog* for details.

Dual Undergraduate and Graduate Registration

See "Registration" under the Degree Requirements and Academic Policies section of this *Catalog* for details.

Early Entry to Graduate Programs

See "Registration" under the Degree Requirements and Academic Policies section of this *Catalog* for details.

Graduate Student Life

Center for Graduate Life

The Graduate School is committed to providing graduate students at UNC Charlotte with the highest caliber of graduate education. While academic instruction and scholarly research are the ultimate foundation of any graduate education, the Graduate School also recognizes the importance of providing students with the resources and services needed to develop themselves professionally. The Graduate

School's Center for Graduate Life (CGL) supports the success of all graduate students. Located in the Cone University Center, the CGL offers space for interdisciplinary exchange, a state-of-the-art classroom, and several computers for student use. In addition to offering a variety of academic, career development and personal wellness workshops for graduate students, the CGL also partners with other campus offices to provide students with individualized writing and data methodology assistance. See the most recent professional development brochure at gradlife.uncc.edu/what-we-offer/workshops-seminars. Post-doctoral researchers are invited to use the Center and attend these workshops and other events. The CGL also offers Ombuds support to graduate students facing complex issues.

Doctoral Writing Support

The Center for Graduate Life supports doctoral students who are actively writing their dissertations. The CGL's Faculty Associate for Graduate Writing is available to help dissertation students improve their academic writing skills, understand the dissertation process, work more effectively with their chairs and committee members, manage their time, set realistic writing goals, and deal with barriers to writing. Doctoral students are encouraged to participate in one of the CGL's four dissertation writing boot camps offered every year.

Graduate Life Fellows

Each year, the Center for Graduate Life appoints a group of master's and doctoral-level students from across degree disciplines to serve as Graduate Life Fellows (GLFs). The GLFs serve as ambassadors to the Graduate School and provide guidance to new and continuing graduate students. In exchange for their efforts toward enhancing the graduate community, each GLF receives an award for the academic year. For more information on the GLF program, or how to become a GLF, visit gradlife.uncc.edu/about-us/glfs.

New Graduate Student Orientation

The Graduate School conducts several University-wide orientation programs for new graduate and post-baccalaureate students during the course of the year. Information about the dates and times of these programs can be found online at gradlife.uncc.edu/resources/new-student-orientation. Information is also sent directly to newly enrolled students prior to the start of each semester. All Graduate Teaching Assistants are **required** to attend a specific orientation program prior to the start of the semester as part of their assistantship contract.

The orientation programs offer information about various University programs and services for graduate

students; highlight important policies and procedures; provide publications, including resources available to support graduate students academically and socially; various content workshops on issues relevant to graduate education and graduate student life; and provide opportunities for students to ask specific questions.

Many individual graduate programs conduct discipline-specific orientation programs for their new graduate students. Degree students should contact their major department for information on programs that may be available. In addition, the International Student/Scholar Office (ISSO) conducts orientation sessions specifically designed for international graduate students.

Student Involvement

Students at UNC Charlotte are encouraged to participate in co-curricular activities. UNC Charlotte acknowledges that graduate students have many, many priorities in their lives. However, as with so many other aspects of one's life, active involvement enhances the experience and helps individuals develop skills needed for professional success.

Graduate students are encouraged to participate in student leadership at some point during their academic career. In particular, graduate students may hone skills that will be useful in a variety of academic and industry professions. An active student body contributes to the vibrant community of graduate students and scholars at UNC Charlotte, making graduate education more relevant to students across disciplines.

Graduate and Professional Student Government

The Graduate and Professional Student Government (GPSG) is the governing and primary organization for graduate students to present their needs to the University. The purpose of the Graduate and Professional Student Government (GPSG), according to the by-laws, is to serve as an appropriate voice on campus for graduate students, to meet the various needs of graduate students, and to establish a liaison between graduate faculty, graduate students, and the University. All graduate students are members of the GPSG.

In the spring of 1998, the Graduate Student Association successfully petitioned the student body through a referendum on the spring student body elections. The results of this referendum provided a significant change in the student body constitution and provided for the Graduate and Professional Student Government to become a separate governing body and representative organization for graduate

students. In outlining the reasons for this separation, the GPSG cited the need for a GPSG office and the graduate student share of student activity fees to support: departmental graduate student associations, graduate student travel to read papers and present research at academic conferences, and developing a Graduate Student Research Fair.

During the 1998-1999 academic year, GPSG began functioning as its own governing body. In the 1999-2000 academic year, the recognition of current (and new) graduate student organizations and the funding of these groups, including the GPSG, became the responsibility of the Graduate and Professional Student Government. Since the inception of the GPSG in its current structure, the availability of student activity fees to graduate students directly have increased dramatically. With this new governing structure, the GPSG has been very successful in advocating for and supporting graduate student needs. An annual Research Symposium competition was begun in the spring of 2001 to showcase and reward excellence in graduate student research across all disciplines. GPSG continues to be active in new graduate student orientation, encouraging and recognizing graduate student organizations and increasing the amount of student activity fee support for graduate students. Each graduate program has the opportunity to be represented on the GPSG senate.

The GPSG Office is located in the Student Union. More information can be found online at <http://suar.orgsync.com/org/gpsguncc/home>.

Graduate Student Organizations

There are a number of graduate student organizations directly associated with academic programs. These include:

- American Society for Precision Engineering
- Advocates for Change
- Association of Biology Graduate Students (ABGS)
- Association of Chemistry Graduate Students
- Association of Nanoscience Graduate Students
- Bioinformatics Assembly of Students
- Black Graduate Student Organization (BGSO)
- CCI Grads
- Charlotte Healthcare Executive Student Organization
- Children's Literature Graduate Organization
- Communication Studies Graduate Student Association (CSGSA)
- English Graduate Student Association (EGSA)
- Gamma Theta Upsilon (Geography)
- Geography and Earth Science Graduate Organization
- Graduate Business Association
- Graduate Energy and Electromechanical Research Society

- Graduate History Association
- Graduate and Professional Student Government
- Graduate Public Health Association
- Graduate Public Policy Association
- Graduate Social Work Association
- Health Psychology Graduate Student Association
- Latin American Studies and Spanish Graduate Student Association
- Master of Architecture Student Society (MASS)
- Master of Public Administration Student Group (MPASG)
- Mathematics Graduate Student Association
- Mu Tau Beta (Counseling)
- Muslim Graduates at UNC Charlotte
- Organizational Science Graduate Association
- Philosophy Union
- Sociology Graduate Student Association
- SPIE/OSA Student Chapter at UNC Charlotte
- Urban Educators for Change

Information on each group is available from the individual academic program department. Some groups have information available on the Student Organizations website at studentorgs.uncc.edu.

Please see additional information on the various programs, offices, and services at UNC Charlotte in the “Student Resources and Services” section of this Catalog.

Admission to the Graduate School

Admissions Information

The University considers all applicants without regard to race, color, sex, sexual orientation, national origin, disability, age, or religion. All relevant factors are considered, including the academic history of the applicant, recommendations, standardized test scores, and professional experience. The intent of the Graduate School is to offer admission to those applicants whose credentials indicate a strong likelihood of success in their selected curricula.

The University reserves the right to withhold or rescind the admission of an applicant who: (1) fails to meet any of the requirements for admission at the time of matriculation, (2) has failed to maintain satisfactory academic performance in their course of study prior to enrollment, or (3) has provided incorrect or misleading information on the Application for Admission or supporting document set. Additionally, meeting the minimum admission requirements does not guarantee admission to a graduate program and the University reserves the right to restrict enrollments when necessary because of budgetary or other constraints.

Application Materials

A separate application, processing fee, statement of purpose, recommendations forms, and transcripts must be submitted for **each** graduate program of study for which a student applies. Questions about the application process should be directed to:

Office of Graduate Admissions
 UNC Charlotte
 9201 University City Boulevard
 Charlotte, NC 28223-0001
 Telephone: 704-687-5503
 Fax: 704-687-1668
 E-mail: gradadm@uncc.edu
 Web: gradadmissions.uncc.edu

Application Deadlines

Students are encouraged to apply and to submit all supporting documents well in advance of the published priority deadlines. Some programs have **earlier deadlines** and may only admit students to a particular term. Students should contact the department offering the program to which they are applying for specific deadline information and/or view the information on the academic program website. The Graduate School may alter the date for acceptance of applications without further notice in

accordance with available resources and/or the enrollment limitation established by the North Carolina General Assembly or the University. Note that applications received or applications that become complete after a program's deadlines or the Graduate School's priority deadlines are processed on a space-available basis.

Term of Entry	Application and Supporting Documents Submission Deadline	Final Application Deadline
Fall	March 1	August 15
Spring	October 1	January 1
1 st Summer Session	April 1	May 15
2 nd Summer Session	May 1	June 15

Note: International students who intend to enroll on an F-1 or J-1 visa status should apply for admission before the priority deadlines, if possible.

Application Processing

Applicants apply for admission online; instructions and the application are available online at mygradschool.uncc.edu. Applications of US Citizens, US Permanent Residents, Asylees, and Refugees are processed as "domestic" applications. Applications of students on, or intending to be on, temporary visa/status in the USA (i.e. F-1, H-1, H-4 etc) as well as Pending Permanent Residents are processed as "international applications." Applicants should follow application instructions accordingly.

Application Processing Fee

Submission of the online application for admission to graduate study requires online payment of the U.S. application fee by credit card. Note that the application fee may change and the amount required is accurately reflected in the application instructions available online. The fee is waived or refunded for certain full-time employed University employees and McNair Scholars.

Application Status

Applicants will receive an online confirmation of successful submission of their application for admission to graduate study. Applicants can monitor the status of their applications within the online system through which their application was submitted, utilizing the same username and password.

TYPES OF ADMISSION

(For Doctoral Degrees, Master's Degrees, and Graduate Certificates)

Full Standing

Applicants who meet the general requirements for admission to graduate study plus any additional requirements specified by the college or department of academic concentration for the degree sought may be offered admission.

Applicants to graduate programs who have not yet completed their undergraduate degree or who were admitted with unofficial transcripts will be allowed to register for one semester and can only continue after the Graduate School's receipt of official final transcripts (and/or diploma/degree certificates/mark sheets) indicating the award of the baccalaureate (bachelor's/undergraduate) degree from a regionally accredited institution or its equivalent. Students will have a maximum of one semester to enroll, after which time a hold will be placed on their accounts to prevent registration for future terms. Failure to submit the proper credentials during the first semester of enrollment will result in a hold on registration for subsequent terms.

Deferment Policy

An applicant who is admitted to a graduate program of study who fails to enroll for the term to which he/she has been admitted is presumed to have withdrawn his/her application. To be considered for admission to a future term, a person must submit a new application and supporting materials. Generally, official test scores are maintained on file in the Graduate School for one year. Applicants on, or intending to be on, F-1 or J-1 visa status will also be required to provide updated proof of legal status and financial resources.

Policy on Updating Applications

Applicants who do not submit their supporting documentation in time to be considered for admission to the requested term must submit a new application which includes updated data, processing fee, statement of purpose, recommendation forms, and transcripts. Generally, official test scores are maintained on file in the Graduate School for one year.

Students whose admission to UNC Charlotte was denied must reapply for admission to be considered for admission to a different term or program.

GENERAL APPLICATION REQUIREMENTS FOR ADMISSION

Doctoral Degree Programs

In order to be considered for admission to a doctoral program, an applicant must have a bachelor's degree (or its US equivalent) from a regionally accredited college or university. Some programs admit baccalaureate (bachelor's degree) students directly to the doctoral program, while others require applicants to have earned a master's degree.

To be admitted to a doctoral program after a master's program, an applicant should have earned an overall grade point average of at least 3.5 (on a 4.0 scale) in the master's degree program. To be admitted to a doctoral program after a bachelor's program, an applicant should have earned an overall GPA of at least 3.0 in the bachelor's degree program. Applicants must also be in good academic standing at the last institution of higher education attended.

Applications generally consist of the items listed below, some of which are submitted online, some by mail by the applicant or by the issuing entity. Any materials submitted in support of an application for admission to graduate study become the property of the University and cannot be returned to the applicant.

- 1) The application form must be submitted online through the Graduate School's application system. The online application system can be accessed via mygradschool.uncc.edu. Submission of the application form requires payment of an application fee for domestic and international applicants, which is paid online by credit card; the fee is neither deductible nor refundable.
- 2) A Statement of Purpose (essay) must be submitted online as part of the application submission process. Applicants must upload the Statement of Purpose into their application record. The Statement of Purpose describes the applicant's experience, objectives for undertaking graduate study and research interests, if known. *[Note: Some graduate programs request specific items to be included in the Statement of Purpose. Applicants should check the department's website or contact the department directly for further clarification on specific requirements related to the Statement of Purpose.]*
- 3) Generally, at least three recommendation forms from persons familiar with the applicant's academic and/or professional qualifications. The

recommendation forms must be submitted via the online application system; letters of reference in support of an individual's admission may also be uploaded directly to the online recommendation form. Recommendations or letters sent to the Graduate School in any other format, including surface mail and email, will not be processed.

- 4) Official (officially certified) transcripts/mark sheets/degree certificates of all academic work attempted beyond high (secondary) school are required of all students **offered admission who enroll** at UNC Charlotte. For the application and admission processes, *unofficial* transcripts of each academic institution of higher education ever attended must be submitted (and should be uploaded directly to the online application); transfer credit posted on the records of other institutions is unacceptable and transcripts of these credits must be supplied.
- 5) Official agency reports of satisfactory test scores as specified in the section on graduate programs in this *Catalog*. GRE/GMAT scores are reportable from ETS for a period of five years from the date of the exam. Likewise, the Graduate School accepts GRE/GMAT scores which are up to five years old as part of the application process. GRE/GMAT scores older than five years are therefore not acceptable since they cannot be officially reported. Likewise, MAT scores more than five years old are not accepted. MCAT scores are accepted by some graduate programs and should be no older than five years. For additional information regarding test score requirements, please see the "Test Information" section of this *Catalog*.
- 6) Official scores on the Test of English as a Foreign Language (TOEFL) or the International English Language Testing System (IELTS), if English is not the applicant's native language and he or she has not earned a post-secondary degree from a U.S. institution or graduated from an institution in an English-speaking country. Required is either a minimum score of 83 on the Internet-based TOEFL, a minimum score of 220 on the computer-based TOEFL, a minimum score of 557 on the paper-based TOEFL, or a minimum overall band score of 6.5 on the IELTS.

Notes:

- 1) *Applicants with records of high quality who do not fulfill these requirements should discuss with the Graduate Program Director other factors that may have a bearing on admission. Some programs have higher standards or additional admission requirements. Additionally, there may be prerequisites for certain programs and*

applicants should consult the Graduate Program Director to identify prerequisites. A separate application for admission is required for each graduate, post-baccalaureate, and certificate program of study at UNC Charlotte.

- 2) *All applicants submitting transcripts and degree certificates from non-U.S. educational institutions should note that bachelor's degrees awarded by non-U.S. schools may or may not be considered equivalent to the U.S. bachelor's degree. Recipients of degrees that are not at least equivalent to a U.S. bachelor's degree may not be eligible for graduate study at UNC Charlotte.*
- 3) *International Students should see the "Additional Admission Requirements for all International Applicants" section of this Catalog for additional requirements.*

Master's Degree Programs

The applicant must possess at least a bachelor's degree, or its U.S. equivalent, from a regionally accredited college or university, and must have attained an overall grade point average of at least 3.0 (based on a 4.0 scale) on all of the applicant's previous work beyond high school. If an applicant has earned or attempted a post-baccalaureate degree (i.e., a master's, doctoral, or other), grades in that program will also be taken into consideration. Applicants must also be in good academic standing at the last institution of higher education attended.

Applications generally consist of the items listed below, most of which are submitted online. Any materials submitted in support of an application for admission to graduate study become the property of the University and cannot be returned to the applicant.

- 1) The application form must be submitted online through the Graduate School's application system. The online application system can be accessed via mygradschool.uncc.edu. Submission of the application form requires payment of an application fee, which is paid online by credit card; the fee is neither deductible nor refundable.
- 2) A Statement of Purpose (essay) must be submitted online as part of the application submission process. Applicants must upload the Statement of Purpose into their application record. The Statement of Purpose describes the applicant's experience and objectives for undertaking graduate study. *[Note: Some graduate programs request specific items to be included in the Statement of Purpose. Applicants should check the department's website or contact the department directly for further clarification on specific requirements related to the Statement of*

Purpose.]

- 3) Generally, at least three recommendation forms from persons familiar with the applicant's personal, academic, and/or professional qualifications. The recommendation forms must be submitted via the online application system; letters of recommendation in support of an individual's admission may also be uploaded directly to the online recommendation form. Recommendations sent to the Graduate School in any other format, including surface mail and email, will not be processed.
- 4) Official (officially certified) transcripts / mark sheets / degree certificates of all academic work attempted beyond high (secondary) school are required of all students offered admission who enroll at UNC Charlotte. For the application and admission processes, unofficial transcripts of each academic institution of higher education ever attended must be submitted (and should be uploaded directly to the online application); transfer credit posted on the records of other institutions is unacceptable and transcripts of these credits must be supplied.
- 5) Official agency reports of satisfactory test scores as specified in the section on graduate programs in this *Catalog*. GRE/GMAT scores are reportable from ETS for a period of five years from the date of the exam. Likewise, the Graduate School accepts GRE/GMAT scores which are up to five years old as part of the application process. GRE/GMAT scores older than five years old are therefore not acceptable since the scores cannot be officially reported. Likewise, MAT scores more than five years old are not accepted. MCAT scores are accepted by some graduate programs and should be no older than five years. For additional information regarding test score requirements, please see the "Test Information" section of this *Catalog*.
- 6) Official scores on the Test of English as a Foreign Language (TOEFL) or the International English Language Testing System (IELTS), if English is not the applicant's native language and he or she has not earned a post-secondary degree from a U.S. institution or graduated from an institution in an English-speaking country. Required is either a minimum score of 83 on the Internet-based TOEFL, a minimum score of 220 on the computer-based TOEFL, a minimum score of 557 on the paper-based TOEFL, or a minimum overall band score of 6.5 on the IELTS.

Notes:

- 1) *Acceptance into each program must be approved by the department or college offering the program and by the Graduate School. Meeting minimum requirements for admission does not guarantee acceptance into a program. There may be prerequisites for certain master's programs and applicants should consult the coordinator for the master's program to identify prerequisites. A separate application for admission is required for each graduate, post-baccalaureate, and certificate program of study at UNC Charlotte.*
- 2) *All applicants submitting transcripts and degree certificates from non-U.S. educational institutions should note that bachelor's degrees awarded by non-U.S. schools may or may not be considered equivalent to the U.S. bachelor's degree. Recipients of degrees that are not at least equivalent to a U.S. bachelor's degree may not be eligible for graduate study at UNC Charlotte.*
- 3) *International Students should see the "Additional Admission Requirements for all International Applicants" section of this Catalog for additional requirements.*

Graduate Certificate Programs

The applicant must possess at least a bachelor's degree, or its equivalent, from a regionally accredited college or university and must have attained an overall grade point average of at least 2.75 (based on a 4.0 scale) on all previous work completed beyond high school (secondary school). If the applicant has earned or attempted a post-baccalaureate degree (i.e., master's, doctoral, or other), grades in that program will also be taken into consideration. Applicants must also be in good academic standing at the last institution of higher education attended.

Applications generally consist of the items listed below, some of which are submitted online, some by mail by the applicant or by the issuing entity. Any materials submitted in support of an application for admission to graduate study become the property of the University and cannot be returned to the applicant.

- 1) The application form must be submitted online through the Graduate School's application system. The online application system can be accessed online at mygradschool.uncc.edu. Submission of the application form requires payment of an application fee, which is paid online by credit card; the fee is neither deductible nor refundable.
- 2) A Statement of Purpose (essay) must be submitted online as part of the application submission process. Applicants must upload the Statement of

Purpose into their application record. The Statement of Purpose describes the applicant's experience and objectives for undertaking graduate study. [Note: Some graduate programs request specific items to be included in the Statement of Purpose. Applicants should check the department's website or contact the department directly for further clarification on specific requirements related to the Statement of Purpose].

- 3) Official (officially certified) transcripts/mark sheets/degree certificates of all academic work attempted beyond high (secondary) school are required of all students offered admission who enroll at UNC Charlotte. For the application and admission processes, unofficial transcripts of each academic institution of higher education ever attended must be submitted (and should be uploaded directly to the online application); transfer credit posted on the records of other institutions is unacceptable and transcripts of these credits must be supplied.
- 4) Official scores on the Test of English as a Foreign Language (TOEFL) or the International English Language Testing System (IELTS), if English is not the applicant's native language and he or she has not earned a post-secondary degree from a U.S. institution or graduated from an institution in an English-speaking country. Required is either a minimum score of 83 on the Internet-based TOEFL, a minimum score of 220 on the computer-based TOEFL, a minimum score of 557 on the paper-based TOEFL, or a minimum overall band score of 6.5 on the IELTS.

Some programs may also require:

- Standardized test scores such as GRE, GMAT or MAT.
- Recommendation forms.
- Additional admission requirements as specified in program descriptions available at the departments' websites.

Notes:

- 1) *There may be prerequisites for a graduate certificate program and applicants should consult the coordinator for the graduate certificate program to identify prerequisites. Admission to a graduate certificate program does not ensure admission into a master's or doctoral degree program. A separate application for admission is required for each graduate-level program of study, whether master's, doctoral certificate or post-baccalaureate (non-degree) programs.*
- 2) *All applicants submitting transcripts and degree certificates from non-U.S. educational institutions*

should note that bachelor's degrees awarded by non-U.S. schools may or may not be considered equivalent to the U.S. bachelor's degree. Recipients of degrees that are not at least equivalent to a U.S. bachelor's degree may not be eligible for graduate study at UNC Charlotte.

- 3) "Additional Admission Requirements for all International Applicants" section of this Catalog for additional requirements.

Post-Baccalaureate (Non-Degree) Program

The applicant must possess a bachelor's degree, or its US equivalent, from a regionally accredited college or university. Applicants must also be in good academic standing at the last institution of higher education attended.

Applications generally consist of the items listed below and should be submitted online. Application materials submitted in support of an application for admission to graduate study, including non-degree study, become the property of the University and cannot be returned to the applicant.

- 1) The application form must be submitted online through the Graduate School's application system. The online application system can be accessed via mygradschool.uncc.edu. Submission of the application requires payment of an application fee, which is paid online by credit card; the fee is neither deductible nor refundable.
- 2) Students seeking **K-12 teacher licensure** through the **Regional Alternative Licensure Center (RALC)** may apply for admission as a post-baccalaureate/non-degree student and must also submit a copy of their RALC plan of study directly to the Office of Graduate Admissions.

Notes:

- 1) *A separate application for admission is required for each graduate-level program of study, whether post-baccalaureate (non-degree), certificate, master's, or doctoral programs. A post-baccalaureate (non-degree) student who subsequently applies and is admitted to a graduate degree program may, with the permission of his/her advisor and the Graduate School, apply a maximum of six credit hours acceptably completed in the post-baccalaureate (non-degree) status toward a graduate degree or certificate program.*
- 2) *International Students should see the "Additional Admission Requirements for all International Applicants" section of this Catalog for additional requirements.*

Additional Admission Requirements for all International Applicants and/or Applicants Whose Native Language is Not English

The following items must be submitted as part of the application process and are required before an admission decision can be rendered.

- 1) Official scores on the Test of English as a Foreign Language (TOEFL) or the International English Language Testing System (IELTS), if English is not the applicant's native language and he or she has not earned a post-secondary degree from a U.S. institution or graduated from an institution in an English-speaking country. Required is either a minimum score of 83 on the Internet-based TOEFL, a minimum score of 220 on the computer-based TOEFL, a minimum score of 557 on the paper-based TOEFL, or a minimum overall band score of 6.5 on the IELTS. (An English language proficiency test is not required for those applying to post-baccalaureate non-degree study.)
- 2) For international students already in the USA: Proof of legal status in the USA (i.e., copy of visa, I-94 or BCIS Change-of-Status Approval Notice etc.)

Additional Enrollment Requirements for International Applicants on, or Intending to be on, F-1 or J-1 Visa Status

Upon admission, students will be asked to confirm their enrollment and attest to their financial and immigration status via an online Financial Solvency Form. The Graduate School will request from UNC Charlotte's International Student and Scholar Office Form I-20 or DS-2019 for students on, or intending to be on, F-1 or J-1 visa status. The International Student and Scholar Office is responsible for issuing I-20s and DS-2019s after the Graduate School submits the Financial Solvency Form information to them.

Test Information

Applicants should have their test scores sent directly from the testing agency to the Office of Graduate Admissions (not to the department in which they wish to study). **For the GRE and TOEFL, UNC Charlotte's institution code is 5105. For the MAT, UNC Charlotte's institution code is 1370. For the GMAT, please visit gradadmissions.uncc.edu/apply-now/application-requirements/test-scores to determine the code of the program to which you plan to apply for admission.**

A student who has already earned a Ph.D., M.D., or J.D. from a U.S. institution will not be required by the Graduate School to take a standardized test. The Graduate Program Director, however, has the right to

request that the student take a test and submit official scores. This policy does not apply to the TOEFL/IELTS.

A student who has already earned a Master's degree will not be required by the Graduate School to retake a standardized test **IF** the student can demonstrate that he or she has completed the test in the past. In such cases, the Graduate School will accept the official Student's Copy of the official test scores (note that a photocopy is not acceptable) or an official university transcript on which the scores are printed or a letter on official university letterhead attesting to the score. The Graduate Program Director, however, has the right to request that the student re-take the test and submit official scores. Please note that the above exception does not apply to the TOEFL/IELTS.

A student who has taken the GRE, GMAT, MCAT, or MAT but has not earned a Ph.D., M.D. or J.D. from a US institution or a Master's degree (see above) must submit official scores that are less than five years old. If the student has not taken the test within five years, he or she must re-take the test.

Graduate Record Examination (GRE)

The GRE is not administered by UNC Charlotte. To obtain information about and schedule a test for the GRE, please visit the GRE website at gre.org. UNC Charlotte's school code is 5105.

Miller Analogies Test (MAT)

Harcourt Assessment, Inc administers the MAT. For additional information on the MAT, please visit milleranalogies.com. To register for the test at UNC Charlotte, please visit counselingcenter.uncc.edu/our-services/miller-analogies-test, email matapp@uncc.edu, or call 704-687-4399. To register in another city or for more information, visit milleranalogies.com or call 1-800-622-3231.

Graduate Management Admission Test (GMAT)

The GMAT is sponsored, owned, and directed by the Graduate Management Admission Council (GMAC) and is administered by Pearson VUE. Visit the GMAC website at mba.com for additional information and to register for the GMAT. The GMAT Customer Service Telephone in the Americas is 1-800-717-GMAT (4628). See the Graduate Admissions website at gradadmissions.uncc.edu/apply-now/application-requirements/test-scores for the school codes.

Test of English as a Foreign Language (TOEFL)

The TOEFL is offered at Educational Testing Service (ETS) Centers. To obtain additional information about the TOEFL or to register for the TOEFL online, please visit the TOEFL website at toefl.org.

International English Language Testing System (IELTS)

The IELTS assesses the complete range of English language skills which students studying in English commonly encounter. For further information, visit ielts.org.

Appeal Procedure for Applicants Denied Admission

Applicants denied admission may appeal the decision but only on the grounds that the denial was based on a violation of Section II of the University's Admissions Policy. Essentially, the policy maintains that if an applicant is denied admission to the Graduate School, he or she may appeal the decision based solely on the grounds that the denial violates University admissions policy not to discriminate in offering access to its educational programs and activities on the basis of age, gender, race, color, national origin, religion, creed, disability, veteran's status, sexual orientation, gender identity, or gender expression.

The appeal must be in writing, must set forth with specificity the grounds for the appeal, and must be directed and delivered to the Dean of the Graduate School. Upon receipt of the appeal, the Dean will review the applicant-appellant's file and appeal letter and will communicate his decision to the applicant-appellant in writing within thirty (30) calendar days of receipt of the appeal. Appeals must be received prior to the term for which the applicant is seeking admission. If there is insufficient time to complete the appeal process before the beginning of the term for which the applicant seeks admission, the Dean of the Graduate School may decline to review the appeal. For more information, see Appendix A to University Policy 207 online at legal.uncc.edu/policies/up-207/appendix-a.

HEALTH REQUIREMENTS

Health Insurance Requirements

Health insurance is required of all degree-seeking undergraduate students with six or more on-campus credit hours; all degree- or certificate-seeking graduate students with three or more on-campus credit hours; and all international students with an F-1 or J-1 visa, regardless of credit hours.

Students who are currently uninsured may enroll in the Student Health Insurance Plan by completing the enrollment form found on the Student Health Center website at studenthealth.uncc.edu. Pricing is available on the site as well.

Students with existing health insurance coverage must supply this information online to the Student Health

Center every Fall and Spring semester by the posted due date. See the Student Health Center website above for details. Failure to comply will result in automatic enrollment in the Student Health Insurance Plan for the semester.

Immunization Requirements

To protect all students at UNC Charlotte, North Carolina state law requires proof of immunizations upon entering the University or within thirty calendar days of the start of a student's first semester. Under North Carolina regulations, students not in compliance will be dropped from all courses. **Upon learning of admission to the University, students should submit their immunization records immediately.** Although a health physical is not required for admission to the University, students are strongly encouraged to contact their healthcare provider or local health department to discuss additional recommendations for vaccinations. Further details regarding the immunization requirements including exemptions are available online from the Student Health Center at studenthealth.uncc.edu. Please consult the website for more detail about the requirements and before submitting records to the University.

COLLEGE/UNIVERSITY VACCINES AND NUMBER OF DOSES REQUIRED

Vaccines Required	Diphtheria, Tetanus, and/or Pertussis ¹	Polio ²	Measles ³	Mumps ⁴	Rubella ⁵	Hepatitis B ⁶
Doses Required	3	3	2	2	1	3

FOOTNOTE ¹– DTP (Diphtheria, Tetanus, Pertussis), DTaP (Diphtheria, Tetanus, acellular Pertussis), Td (Tetanus, Diphtheria), Tdap (Tetanus, Diphtheria, Pertussis): 3 doses of tetanus/diphtheria toxoid of which one must have been within the past 10 years.

Those individuals enrolling in college or university for the first time on or after July 1, 2008 must have had three doses of tetanus/diphtheria toxoid and a booster dose of tetanus/diphtheria/pertussis vaccine if a tetanus/diphtheria toxoid or tetanus/diphtheria/pertussis vaccine has not been administered with the past 10 years.

FOOTNOTE ²– An individual attending school who has attained his or her 18th birthday is not required to receive polio vaccine.

FOOTNOTE ³– Measles vaccines are not required if any of the following occur: Diagnoses of disease prior to January 1, 1994; An individual who has been documented by serological testing to have a protective antibody titer against measles; or An individual born prior to 1957. An individual who enrolled in college or university for the first time before July 1, 1994 is not required to have a second dose of measles vaccine.

FOOTNOTE ⁴– Mumps vaccine is not required if any of the following occur: An individual who has been documented by

serological testing to have a protective antibody titer against mumps; An individual born prior to 1957; or Enrolled in college or university for the first time before July 1, 1994. An individual entering college or university prior to July 1, 2008 is not required to receive a second dose of mumps vaccine.

FOOTNOTE ⁵– Rubella vaccine is not required if any of the following occur: 50 years of age or older; Enrolled in college or university before February 1, 1989 and after their 30th birthday; An individual who has been documented by serological testing to have a protective antibody titer against rubella.

FOOTNOTE ⁶– Hepatitis B vaccine is not required if any of the following occur: Born before July 1, 1994.

International Students

Vaccines are required as noted above. Additionally, International students are required to have a TB skin test and negative result within the 12 months preceding the first day of classes (chest x-ray required if test is positive).

Freshman and Transfer Students

Immunization records are not sent with other admission records from your previous school. You must request your immunization records be sent directly to the Student Health Center.

Withdrawal for Non-Compliance and Reinstatement

Students who are not in compliance as determined by the Student Health Center (SHC) will be withdrawn from all of their classes by the Office of the Registrar at the end of the thirty (30) day period. Students are therefore strongly encouraged to submit their immunization records prior to the start of the semester. The SHC will also monitor students who are not in compliance but have been approved by the SHC for an extension to receive the necessary immunizations as indicated by a physician's letter. Once the date for the extension expires, and if the student is still not in compliance, the SHC will notify the Office of the Registrar that the student has failed to comply with Immunization Requirements. The Office of the Registrar will then withdraw the student from their classes.

If a student is able to provide evidence to the SHC documenting compliance before the end of the last class day of the semester, he/she will be reinstated into their classes. This reinstatement pertains only to student enrollment status and does not in any way guarantee that the academic, financial, and/or other consequences of noncompliance with Immunization Requirements will be remedied. Such consequences may include, but are not limited to, impact on immigration status, financial aid eligibility, University housing, and 49er ID card accounts. Additionally, reinstated students might not be eligible to make up class work, assignments, tests, or exams as faculty are not obligated to allow make-up work. Furthermore,

class work, assignments, tests, or exams missed as a result of being withdrawn for noncompliance with Immunization Requirements will not be a valid basis for a grade appeal.

Decisions under this policy cannot be appealed, and students will not be reinstated if they become compliant after the last class day of the semester.

Contact Information

Questions regarding this mandatory requirement may be directed to the Student Health Center Immunizations Department at 704-687-7424.

Please mail your records to:

UNC Charlotte Student Health Center
Attn: Immunization Department
9201 University City Blvd
Charlotte, NC 28223

Courses Offered by the Graduate School (GRAD)

GRAD 6001. Teaching at the University Level. (3)

Cross listed as GRAD 8001. Designed for graduate students who teach or intend to teach in the future. Topics include: developing a teaching philosophy, constructing a syllabus, using student demographics and learning styles in course design, managing controversial topics, incorporating active learning and critical thinking, constructing rubrics, assessment, and applying theories of cognitive development, learning, and motivation to the classroom. Students lecture throughout the semester in order to gain teaching experience and to benefit from peer review.

GRAD 6002. Responsible Conduct of Research. (2)

Cross-listed as GRAD 8002. An introduction to several aspects of a successful professional career emphasizing research. Designed to benefit graduate students across the University. Focuses on practical skills and critical thinking about the responsible conduct of research, highlighting the nine areas of instruction required by the National Institutes of Health (NIH) and National Science Foundation (NSF). Features several different speakers with expertise in various areas of professionalism and research ethics.

GRAD 6009. Topics in Graduate Studies. (3) Cross-listed as GRAD 8009. Specialized topics in graduate studies. *May be repeated for credit with change in topic.*

GRAD 6010. Graduate-Level Writing for

International Students. (3) Cross-listed as GRAD 8010. Designed to benefit English as a Second Language (ESL) graduate students and serves as an introduction to concepts central to graduate-level writing in the United States, such as academic integrity, audience awareness, discipline-specific variation in writing norms and culture, and rhetorical purpose. *Graded on a Pass/Unsatisfactory basis.*

GRAD 6011. Teaching at American Colleges or Universities: Perspectives for International Students. (3)

Cross-listed as GRAD 8011. This course, which offers the same curriculum and pedagogy as GRAD 6001 and GRAD 8001, is designed for and offered to international graduate students who wish to teach at American colleges or universities. The unique perspectives and cultural experiences of international graduate students are sought and utilized in covering such topics as developing a teaching philosophy, constructing a syllabus, understanding American students' demographics and learning styles, incorporating active learning and critical thinking, constructing rubrics for use in testing and grading, and applying theories of learning and motivation to the classroom. From this foundation, students teach during class meetings to gain experience and benefit from peer review. Language support is offered as needed.

GRAD 6020. Career Lab: Developing Core Career Competencies. (2)

Cross-listed as GRAD 8020. Students gain practice and knowledge around non-cognitive skills such as grit, leadership, lateral thinking, innovation, professional branding, effective communication, and organizational evaluation as it relates to their professional career. Developing and practicing these core career competencies contribute to the student's overall career brand, confidence level around their career path, and their connection to their targeted industries of choice. Students participate in weekly sessions on identified topics, contribute to discussions and complete reflections and assignments that correlate to each unit. Each unit, including related discussions and assignments, is designed to build upon the last in order to help students create a strategic career action plan and provide valuable skills for long-term success.

GRAD 6030. Workplace Communications. (2) The principles of good communication in the workplace, focusing on the special needs of writing in technical fields such as health, the sciences, and business. Emphasis is placed on communicating effectively in an increasingly diverse world.

GRAD 6100. Basic Statistics and Probability. (3)

Basic statistics and probability theory that prepares

students for linear regression. Students are expected to learn SAS, STATA, and R during the course of the semester by participating in modules offered by Project Mosaic. By the end of the semester, students should know the steps that need to be taken to clean data prior to analysis, strategies for combining data, basic descriptive statistics. They will also understand sampling theory, inferential statistics, and sampling distributions. *May not be repeated for credit.*

GRAD 6101. Linear Regression. (3) Cross-listed as GRAD 8101. Prerequisite: GRAD 6100 or equivalent. Linear regression models, and the ordinary least squares (OLS) estimators that are often used to estimate them, are robust tools employed by social scientists to both explain and predict social phenomena. Moreover, basic linear regression and OLS are part of the foundation one must have to understand more sophisticated variants of the linear model (e.g., time series, structural equations), as well as non-linear models (e.g., logistic regression, multinomial logit, Poisson regression). As such, the class has two primary purposes: 1) conveying a basic understanding of the linear regression model so that students are able to both employ the technique in their own research and comprehend research employing the technique; and 2) provide a strong foundation in the underlying model such that they will have little difficulty in future classes that move beyond the OLS framework. *May not be repeated for credit.*

GRAD 6102. Categorical Outcomes. (3) Cross-listed as GRAD 8102. Prerequisite: GRAD 6101 or equivalent. While linear models like ordinary least squares regression are robust and useful, they are only applicable when your dependent variable is continuous and uncensored. Unfortunately, social scientists often want to explain phenomena that are "limited" in that they are not continuous and/or uncensored. Fortunately, there are alternative estimation techniques for analyzing most models with non-continuous (e.g., dichotomous, nominal, ordinal) and/or censored (e.g., event count or event history) dependent variables. A variety of techniques are examined for estimating models with "limited" dependent variables. *May not be repeated for credit.*

GRAD 6103. Classificatory Methods and Time Series. (3) Cross-listed as: GRAD 8103. Prerequisite: GRAD 6101 or equivalent. Introduction to three methods for analyzing quantitative data that are used frequently in social science and policy research. These are two classificatory methods, factor analysis and cluster analysis, and an extensive overview of time series analysis. Students are required to be familiar with the principles of statistical analysis and, in particular, with regression analysis to be enrolled in this class. *May not be repeated for credit.*

GRAD 6104. Spatial Statistics. (3) Cross-listed as GRAD 8104. Prerequisite: GRAD 6101 or equivalent. Introduction to modern spatial statistics methods and their applications for the analysis of spatial data. Fundamental characteristics of spatial data, including spatial dependence, stationarity, and isotropy are covered. Three main categories of spatial statistics are given focus: spatial point pattern analysis, spatial prediction and geostatistics, and spatial regression. Hands-on practices are given to facilitate the understanding of theories and methods of spatial statistics. *May not be repeated for credit.*

GRAD 6151. Professional Communications. (1) Cross-listed as GRAD 8151 and BINF 8151. Principles and useful techniques for effective oral presentations, poster presentations, scientific writing, use of references and avoiding plagiarism. Students critique and help revise each other's presentations and learn how to avoid common pitfalls. In addition, students learn how to properly organize and run a meeting. Students prepare a CV, job application letter, and job talk.

GRAD 6240. Research Ethics in the Biological and Behavioral Sciences. (3) Cross-listed as PHIL 6240. Designed to identify the fundamental elements that characterize not only methodologically grounded but also morally appropriate scientific research. Class discussion and readings focus on key issues in biological and behavioral research including informed consent, privacy and confidentiality, risk-benefit assessments, mechanisms for protecting animal and human research subjects, international research, vulnerable populations, conflicts of interest and data management, publication ethics, intellectual property issues and the politics of research.

GRAD 7999. Master's Graduate Residency Credit. (1) Prerequisite: Permission of the Graduate School. Meets Graduate School requirement for continuous enrollment during final term prior to graduation when all degree requirements (including thesis and/or project) have been completed. This course is non-graded, and credit for this course does not count toward the degree. *May be repeated once. (Fall, Spring, Summer)*

GRAD 8001. Teaching at the University Level. (3) Cross listed as GRAD 6001. Designed for graduate students who teach or intend to teach in the future. Topics include: developing a teaching philosophy, constructing a syllabus, using student demographics and learning styles in course design, managing controversial topics, incorporating active learning and critical thinking, constructing rubrics, assessment, and applying theories of cognitive development, learning, and motivation to the classroom. Students lecture

throughout the semester in order to gain teaching experience and to benefit from peer review. *Graded on a Pass/Unsatisfactory basis.*

GRAD 8002. Responsible Conduct of Research. (2) Cross-listed as GRAD 6002. An introduction to several aspects of a successful professional career emphasizing research. Designed to benefit graduate students across the University. Focuses on practical skills and critical thinking about the responsible conduct of research, highlighting the nine areas of instruction required by the National Institutes of Health (NIH) and National Science Foundation (NSF). Features several different speakers with expertise in various areas of professionalism and research ethics. *Required course for all doctoral students. Graded on a Pass/Unsatisfactory basis.*

GRAD 8009. Topics in Graduate Studies. (3) Cross-listed as GRAD 6009. Specialized topics in graduate studies. *May be repeated for credit with change in topic.*

GRAD 8010. Graduate-Level Writing for International Students. (3) Cross-listed as GRAD 6010. Designed to benefit English as a Second Language (ESL) graduate students and serves as an introduction to concepts central to graduate-level writing in the United States, such as academic integrity, audience awareness, discipline-specific variation in writing norms and culture, and rhetorical purpose. *Graded on a Pass/Unsatisfactory basis.*

GRAD 8011. Teaching at American Colleges or Universities: Perspectives for International Students. (3) Cross-listed as GRAD 6011. This course, which offers the same curriculum and pedagogy as GRAD 6001 and GRAD 8001, is designed for and offered to international graduate students who wish to teach at American colleges or universities. The unique perspectives and cultural experiences of international graduate students are sought and utilized in covering such topics as developing a teaching philosophy, constructing a syllabus, understanding American students' demographics and learning styles, incorporating active learning and critical thinking, constructing rubrics for use in testing and grading, and applying theories of learning and motivation to the classroom. From this foundation, students teach during class meetings to gain experience and benefit from peer review. Language support is offered as needed. *Graded on a Pass/Unsatisfactory basis.*

GRAD 8020. Career Lab: Developing Core Career Competencies. (2) Cross-listed as GRAD 6020. Students gain practice and knowledge around non-cognitive skills such as grit, leadership, lateral thinking, innovation, professional branding, effective communication, and organizational evaluation as it

relates to their professional career. Developing and practicing these core career competencies contribute to the student's overall career brand, confidence level around their career path, and their connection to their targeted industries of choice. Students participate in weekly sessions on identified topics, contribute to discussions and complete reflections and assignments that correlate to each unit. Each unit, including related discussions and assignments, is designed to build upon the last in order to help students create a strategic career action plan and provide valuable skills for long-term success. *Graded on a Pass/Unsatisfactory basis.*

GRAD 8100. Accelerated Introduction to Quantitative Techniques. (2) Prerequisite: Enrollment in doctoral program at UNC Charlotte. A two week course intended to prepare students for required core economics and statistics courses. Covers math basics, a brief introduction to calculus (single variable derivatives and integrals), fundamentals of probability and an introduction to statistical software. *May not be repeated for credit.*

GRAD 8101. Linear Regression. (3) Cross-listed as GRAD 6101. Prerequisite: GRAD 6100 or equivalent. Linear regression models, and the ordinary least squares (OLS) estimators that are often used to estimate them, are robust tools employed by social scientists to both explain and predict social phenomena. Moreover, basic linear regression and OLS are part of the foundation one must have to understand more sophisticated variants of the linear model (e.g., time series, structural equations), as well as non-linear models (e.g., logistic regression, multinomial logit, Poisson regression). As such, the class has two primary purposes: 1) conveying a basic understanding of the linear regression model so that students are able to both employ the technique in their own research and comprehend research employing the technique; and 2) provide a strong foundation in the underlying model such that they will have little difficulty in future classes that move beyond the OLS framework. *May not be repeated for credit.*

GRAD 8102. Categorical Outcomes. (3) Cross-listed as GRAD 6102. Prerequisite: GRAD 8101 or equivalent. While linear models like ordinary least squares regression are robust and useful, they are only applicable when your dependent variable is continuous and uncensored. Unfortunately, social scientists often want to explain phenomena that are "limited" in that they are not continuous and/or uncensored. Fortunately, there are alternative estimation techniques for analyzing most models with non-continuous (e.g., dichotomous, nominal, ordinal) and/or censored (e.g., event count or event history) dependent variables. A variety of techniques are

examined for estimating models with "limited" dependent variables. *May not be repeated for credit.*

GRAD 8103. Classificatory Methods and Time Series.

(3) Cross-listed as: GRAD 6103. Prerequisite: GRAD 8101 or equivalent. Introduction to three methods for analyzing quantitative data that are used frequently in social science and policy research. These are two classificatory methods, factor analysis and cluster analysis, and an extensive overview of time series analysis. Students are required to be familiar with the principles of statistical analysis and, in particular, with regression analysis to be enrolled in this class. *May not be repeated for credit.*

GRAD 8104. Spatial Statistics. (3) Cross-listed as GRAD 6104. Prerequisite: GRAD 8101 or equivalent. Introduction to modern spatial statistics methods and their applications for the analysis of spatial data. Fundamental characteristics of spatial data, including spatial dependence, stationarity, and isotropy are covered. Three main categories of spatial statistics are given focus: spatial point pattern analysis, spatial prediction and geostatistics, and spatial regression. Hands-on practices are given to facilitate the understanding of theories and methods of spatial statistics. *May not be repeated for credit.*

GRAD 8151. Professional Communications. (1)

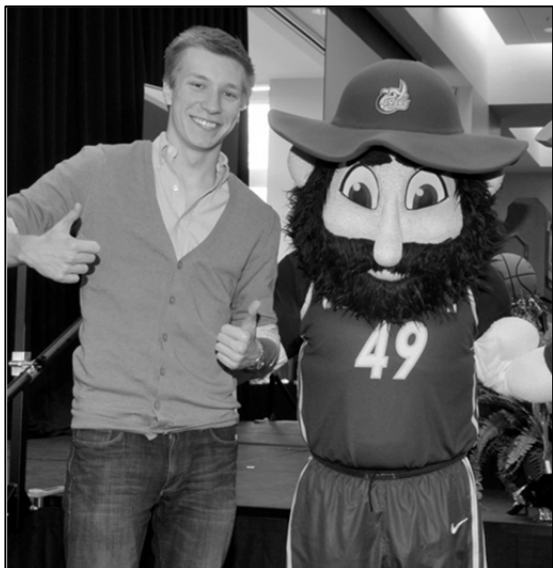
Cross-listed as GRAD 6151 and BINF 8151. Principles and useful techniques for effective oral presentations, poster presentations, scientific writing, use of references and avoiding plagiarism. Students critique and help revise each other's presentations and learn how to avoid common pitfalls. In addition, students learn how to properly organize and run a meeting. Students prepare a CV, job application letter, and job talk.

GRAD 8240. Research Ethics in the Biological and Behavioral Sciences. (3) Cross-listed as PHIL 8240. Designed to identify the fundamental elements that characterize not only methodologically grounded but also morally appropriate scientific research. Class discussion and readings focus on key issues in biological and behavioral research including informed consent, privacy and confidentiality, risk-benefit assessments, mechanisms for protecting animal and human research subjects, international research, vulnerable populations, conflicts of interest and data management, publication ethics, intellectual property issues and the politics of research. *Graded on a Pass/Unsatisfactory basis.*

GRAD 8990. Academic Integrity. (0) Online training addressing issues of academic integrity and the University's policy and procedures related to violations. Required of all new doctoral students. No credit, non-graded.

GRAD 9999. Doctoral Graduate Residency Credit.

(1) Prerequisite: Permission of the Graduate School. Meets Graduate School requirement for continuous enrollment during final term prior to graduation when all degree requirements (including dissertation) have been completed. This course is non-graded, and credit for this course does not count toward the degree. *May be repeated once.*



University Regulation of Student Conduct

As students willingly accept the benefits of membership in the UNC Charlotte academic community, they acquire obligations to observe and uphold the principles and standards that define the terms of the UNC Charlotte community.

The University of North Carolina at Charlotte has enacted two codes governing student conduct: *The Code of Student Academic Integrity* and *The Code of Student Responsibility*. The University has also enacted a program for the prevention of the use of illegal drugs and alcohol abuse, as well as a policy regulating smoking on campus. All UNC Charlotte students are obligated to be familiar with these codes and policies and to conduct themselves in accordance with the standards set forth.

Additionally, the Student Government Association has created a code called *The Noble Niner* that solidifies the high standard of morals, principles, and integrity that all students should strive to uphold to bolster the growing reputation of excellence at UNC Charlotte.

The Code of Student Academic Integrity

The Code of Student Academic Integrity governs the responsibility of students to maintain integrity in academic work, defines violations of the standards, describes procedures for handling alleged violations of the standards, and lists applicable penalties. The following conduct is prohibited in the *Code* as violating those standards:

- A. Cheating.** Intentionally using or attempting to use unauthorized materials, information, notes, study aids or other devices in any academic exercise. This definition includes unauthorized communication of information during an academic exercise.
- B. Fabrication and Falsification.** Intentional and unauthorized alteration or invention of any information or citation in an academic exercise.

Falsification is a matter of altering information, while fabrication is a matter of inventing or counterfeiting information for use in any academic exercise.

- C. Multiple Submission.** The submission of substantial portions of the same academic work (including oral reports) for credit more than once without authorization.
- D. Plagiarism.** Intentionally or knowingly presenting the work of another as one's own (i.e., without proper acknowledgment of the source). The sole exception to the requirement of acknowledging sources is when the ideas, information, etc., are common knowledge. (NOTE: For more information regarding plagiarism, see [PLAGIARISM Appendix at legal.uncc.edu/policies/up-407#appendix](http://legal.uncc.edu/policies/up-407#appendix))
- E. Abuse of Academic Materials.** Intentionally or knowingly destroying, stealing, or making inaccessible library or other academic resource material.

F. Complicity in Academic Dishonesty.

Intentionally or knowingly helping or attempting to help another to commit an act of academic dishonesty.

- G. Group Work.** For group work, responsibility for ensuring that academic integrity standards are followed is shared by all members of the group. In cases where an individual student is able to demonstrate that he/she neither knew of nor participated in academic dishonesty, that individual student is not guilty of academic dishonesty.

A full explanation of these definitions, and a description of procedures used in cases where student violations are alleged, is found in the complete text of University Policy 407, The Code of Student Academic Integrity. This Code may be modified from time to time. Students are advised to contact the Dean of Students Office or visit legal.uncc.edu/policies/up-407 to ensure they consult the most recent edition.

The Code of Student Responsibility

Conduct Rules and Regulations (Code Chapter 5)

The University of North Carolina at Charlotte strives to assist students in their development by creating a community that values scholarship, integrity, respect, accountability, dignity, honor, compassion, character, and nobility. The purposes of the student conduct process are to:

1. Maintain an environment that supports and enhances the educational purpose of the University;
2. Protect the health, safety, welfare, and property of all persons in the University community;
3. Encourage appropriate standards of individual and group responsibility to the University community; and
4. Foster the personal, social, and ethical development of members of the University community.

In accordance with The University of North Carolina Board of Governors' Policy [700.4.2](#):

1. The University embraces and strives to uphold the freedoms of expression and speech guaranteed by

the First Amendment of the U.S. Constitution and the North Carolina Constitution. The University has the right under appropriate circumstances to regulate the time, place, and manner of exercising these and other constitutionally protected rights.

2. All students are responsible for conducting themselves in a manner that helps enhance an environment of learning in which the rights, dignity, worth, and freedom of each member of the academic community are respected.
3. Violations of University policies, rules or regulations, or federal, state, or local law may result in a violation of this Code and imposition of Conduct Procedures.

The following conduct, or an attempt to engage in the following conduct, is subject to conduct action:

[Note: Letters r and u have been intentionally omitted for continuity in record-keeping.]

a. Acts of Harm

1. *Physical Injury* – Inflicting, attempting to inflict, or assisting in inflicting physical injury upon a person.
2. *Fear/Risk* – Placing a person in fear of or at risk of imminent physical injury or danger.
3. *Harassment/Intimidation* – Inflicting Substantial Emotional Distress upon a person through harassment, intimidation, abuse, or disparagement.
4. *Fighting Words* – Engaging in "fighting words" harassment, as that term is defined in [University Policy 503, Fighting Words](#)
5. *Relationship Violence* – Engaging, attempting to engage, or assisting in engaging in Relationship Violence, including:
 - i. *Dating Violence* – Committing violence against a person with whom the Student is or has been in a social relationship of a romantic or intimate nature. The existence of such a relationship shall be determined based on a consideration of the following factors: (a) the length of the relationship; (b) the type of relationship; and (c) the frequency of interaction between the persons involved in the relationship. Dating Violence includes, but is not limited to, sexual or physical abuse or the threat of such abuse. Dating Violence does not include acts covered under the definition of Domestic Violence.
 - ii. *Domestic Violence* – Committing violence that may constitute a felony or misdemeanor crime of violence against a person (a) who is a current or former spouse or intimate partner; (b) with whom the

Student shares a child in common; (c) with whom the Student cohabitates or has cohabitated as a spouse or intimate partner; (d) who is similarly situated as a spouse under the domestic or family violence laws of the jurisdiction in which the crime of violence occurred; or (e) who is a youth or adult and is protected from that Student's acts under the domestic or family violence laws of the jurisdiction in which the crime of violence occurred.

6. *Stalking* – Engaging in a course of conduct (two or more acts, including, but not limited to, acts in which the stalker directly, indirectly, or through third parties (by any action, method, device, or means) follows, monitors, observes, surveils, threatens, or communicates to or about a person, or interferes with a person's property) directed at a specific person that would cause a reasonable person (under similar circumstances and with similar identities to the victim) to (a) fear for his or her safety or the safety of others; or (b) suffer Substantial Emotional Distress.
7. *Unwanted Contact* – Engaging in unwanted physical touching of or bodily contact with another person other than Sexual Contact without Consent.

With regard to this Chapter 5, Paragraph (a), the following additional regulations (see The University of North Carolina Board of Governors' Policy 700.4.2) apply:

- A. No Student shall threaten, coerce, harass or intimidate another person or identifiable group of persons, in a manner that is unlawful or in violation of a constitutionally valid University policy, while on University premises or at University-sponsored activities based upon the person's actual or perceived race; color; religion; age; national origin; ethnicity; gender, gender identity or expression; sexual orientation; disability; or veteran status.
- B. No Student shall engage in unlawful harassment leading to a hostile environment. Unlawful harassment includes conduct that creates a hostile environment by meeting all of the following criteria: It is:
 1. directed toward a particular person or persons;
 2. based upon the person's actual or perceived race; color; religion; age; national origin; ethnicity; gender, gender

identity or expression; sexual orientation; disability; or veteran status;

3. unwelcome;
4. severe or pervasive;
5. objectively offensive; and
6. so unreasonably interferes with the target person's employment, academic pursuits, or participation in University-sponsored activities as to effectively deny equal access to the University's resources and opportunities.

- C. In determining whether Student conduct violates these provisions, all relevant facts and circumstances shall be considered. Care must be exercised in order to preserve freedoms of speech and expression, as articulated in current legal standards. Advice should be sought from the Office of Legal Affairs, as appropriate.
- b. **Weapons** – Using, possessing, or storing any Weapon, dangerous chemical, fireworks or explosive without University authorization, except as explicitly permitted by law and University Policy 702, Weapons on Campus.
- c. **False Report** – Initiating or causing to be initiated any false report, warning or threat of fire, explosion, or other emergency.
- d. **Disruption of Normal University Activities** – Interfering with normal University activities including, but not limited to, teaching, studying, research, the expression of ideas, University administration, speeches and other public or private events, and fire, police or other emergency services. Acts prohibited by this rule include, but are not limited to, those acts prohibited in University Policy 601.13, Interference with University Operations, which prohibits Student action taken "with intent to obstruct or disrupt any normal operation or function of the University," and University Policy 802, Conduct at Speech Events, which prohibits certain disruptive activities at speech events on campus.
- e. **Violating Sanctions** – Knowingly violating the terms of any sanction imposed in accordance with this Code.
- f. **Drugs**
 1. *Possession/Consumption/Use* – Possessing, consuming, or using any controlled substance under the North Carolina Controlled Substances Act (NCGS Chapter 90, Article 5).

2. *Paraphernalia* – Possessing or using drug paraphernalia.
3. *Manufacturing/Distribution/Delivery* – Manufacturing (including growing marijuana), distributing, delivering, or taking delivery of any controlled substance, or attempting to manufacture, distribute, deliver, or take delivery of any controlled substance.
4. *Possessing with Intent to Manufacture/Distribute/Deliver* – Possessing with intent to manufacture (including growing marijuana), distribute, or deliver any controlled substance.
5. *Huffing/Sniffing* – Huffing or sniffing any substance not intended for such use.

Standard sanctions and certain other requirements apply where controlled substance offenses are at issue, pursuant to University Policy 711, Program to Prevent Use of Illegal Drugs and Alcohol Abuse.

- g. **Fire Safety** – Setting, attempting to set, or assisting in setting a fire, or misusing or damaging fire safety equipment or elevators.

h. **False Information**

1. *Furnishing* – Furnishing false information to the University.
2. *Failing to Report Felony Convictions* – Failing to report to the Office of Student Conduct any criminal felony convictions that are entered against one (a) between application for admission to the University and acceptance of admission or (b) at any time between acceptance of admission and the granting of a degree or other termination of association with the University (see Chapter 4, Section 1 of this Code).
3. *Misrepresenting Organizational Affiliation* – Misrepresenting or concealing one's organizational affiliation(s) or sponsorship(s) for the purpose of enticing another person into joining or participating in a Group or Organization.
4. *Misrepresenting University Affiliation* – Misrepresenting to a third party one's affiliation with the University.

i. **Fake Identification**

1. *Forgery/Unauthorized Use* – Forging, misusing, or using/altering without authorization any document or instrument of identification (ID).
2. *Displaying* – Displaying, possessing, or using an ID that is not one's own or is fictitious, canceled, revoked, suspended, or altered.

3. *Counterfeiting/Loaning/Selling* – Counterfeiting, loaning, or selling an ID to another person not entitled thereto.

- j. **Unauthorized Electronic Recording** – Using without authorization any electronic or other devices to make an audio, photographic, or video record of any person without his/her knowledge or without his/her effective consent when such a recording is likely to cause injury, embarrassment, or distress. This includes, but is not limited to, secretly taking audio, video, or photographs of another person in a gym, locker room, restroom, or residence hall room.

k. **Theft and Unauthorized Possession/Use**

1. *Theft/Attempted Theft* – Theft, attempted theft, or assisting in the theft of University or individual property or services.
2. *Breaking and Entering* – Breaking and entering, attempted breaking and entering, or assisting in breaking and entering into University property or the property of others (including, but not limited, to private vehicles).
3. *Confidential Information* – Using or accessing private or confidential information in any medium without authorization.
4. *Unauthorized Possession* – Possessing property that is not your own without owner authorization.

- l. **Vandalism** – Destroying, defacing, tampering with, or damaging the property of others or University property, including, but not limited to, chalking, spray painting, or otherwise marking without appropriate University approval.

- m. **Failure to Comply** – Failing to comply with the reasonable directions of or meeting requests by University officials, including, but not limited to, Dean of Students Office staff, Office of Student Conduct staff, Police and Public Safety officers or other designated security or law enforcement agents, or Housing and Residence Life Staff, acting in performance of their duties.

- n. **Violation of University Policies or Regulations** – Violating, aiding in violation of, or concealing evidence of violation of published University policies or regulations. Such policies or regulations include, but are not limited to, all Housing and Residence Life policies, the residence hall contract, and the Resident Handbook (collectively referred to as “Residence Life Policies”).

o. **Alcohol**

1. *Underage Possession/Consumption* – Possessing or consuming alcoholic beverages by Students less than 21 years of age.
2. *Driving Under the Influence* – Operating a motor vehicle under the influence of alcohol or while impaired by the consumption of alcohol.
3. *Providing to Minors* – Furnishing or selling any alcoholic beverages to any person less than 21 years of age.
4. *Public Intoxication* – Being intoxicated in public attributable in part or in whole to the use of alcohol.
5. *Violation of University Policy* – Violating University Policy 706, Alcoholic Beverages, including, but not limited to (a) failing to abide by the provisions of an "Acknowledgment of Responsibility for Service of Alcoholic Beverages" form; or (b) making any sale of any alcoholic beverage on the University campus.

p. **Sexual Misconduct**

1. *Sexual Act without Consent* – Engaging, attempting to engage, or assisting another in engaging in sexual intercourse, cunnilingus, fellatio, or anilingus, or knowingly inserting an object or part of one's body into another's mouth, genital, or anal opening without Consent.
2. *Sexual Contact without Consent* – Deliberately touching, attempting to touch, or assisting another in touching a person's intimate parts (including genitalia, groin, breast, mouth; buttocks or any other orifice or clothing covering any of those areas), touching another with one's intimate parts, or causing a person to touch their own or another person's intimate parts without Consent. Sexual Contact includes any intentional bodily contact in a sexual or unwanted manner, even if the contact does not involve contact with/of/by genitalia, groin, breast, buttocks, mouth or any other orifice.
3. *Sexual Exhibitionism without Consent* – Engaging, attempting to engage, or assisting another in engaging in a sexual activity or exposing one's intimate parts (including genitalia, groin, female breast (other than when breastfeeding a child) or buttocks) in the presence of others without their Consent.
4. *Sexual Exploitation without Consent* – Taking, attempting to take, or assisting another in taking abusive sexual advantage of a person or sexual advantage of a person without Consent for his/her own advantage or benefit, or to benefit or advantage anyone other than the

one being exploited, and that behavior does not otherwise constitute one of the other Sexual Misconduct or Relationship Violence offenses. Sexual Exploitation includes, but is not limited to, impairing or attempting to impair another person's ability to provide Consent in order to gain a sexual advantage; prostituting another person; recording, photographing or transmitting identifiable images of a private sexual activity and/or the intimate parts (including genitalia, groin, breasts or buttocks) of another person; allowing third parties to observe private sexual activity; or engaging in voyeurism.

5. *Sexual or Gender-Based Harassment* – Engaging, attempting to engage, or assisting another in engaging in unwelcome conduct of a sexual nature, which is so severe, persistent or pervasive that it unreasonably interferes with a person's University employment, academic performance or participation in University programs or activities (i.e. creates a hostile environment). Gender-based harassment is another form of sexual harassment and refers to unwelcome conduct based on an individual's actual or perceived gender, including harassment based on gender identity or non-conformity with gender stereotypes, and does not necessarily involve conduct of a sexual nature.
6. *Incest* – Engaging, attempting to engage, or assisting another in engaging in sexual intercourse between persons who are related to each other within the degrees wherein marriage is prohibited by law.

- q. **Trespassing** - Trespassing, including being present in or using, or aiding and abetting another in being present in or using University premises, facilities, or property without University authorization, or the premises or property owned or controlled by another without authorization.

- r. *[Intentionally omitted for continuity in record-keeping]*

s. **Disorderly Conduct**

1. *Public Disturbance* – Engaging in disorderly conduct, such as fighting, threatening behavior, public disturbance, or drunk and disorderly conduct.
2. *Disruption of Classroom Environment* – Engaging in conduct, such as loud, aggressive, or combative behavior, that disrupts or interferes with the normal functions of a class, including, but not limited to, failure to conform to the instructor's announced

expectations for classroom decorum. Disruptive conduct also includes use of cell phones or other electronic devices for voice or text communication in class, unless permitted by the instructor. (A Student who persists in disruptive conduct as described of this Code is subject to Interim Suspension set forth in [Chapter 10, Section III](#) of this Code.)

- t. **Hazing** – Engaging in Hazing, as defined by [University Policy 405, Hazing](#).
- u. *[Intentionally omitted for continuity in record-keeping.]*
- v. **Computer Abuse** - Engaging in computer abuse, including, but not limited to, violation of [University Policy 302, Web Communications; Standard for Communications Security; University Policy 304, Electronic Communication Systems; Standard for Responsible Use; University Policy 601.14, Proprietary Software; or University Policy 311, Data and Information Access and Security](#) and its related supplemental University Policies 311.2 through 311.9.
- w. **Gambling** – Gambling for money or other things of value, except as permitted by law. Prohibited gambling includes, but is not limited to, betting on, wagering on, or selling pools on any athletic or other competitive event; possessing any card, book, or other device (including that which uses the Internet) for registering bets; or bookmaking in connection with betting.
- x. **Presence During Prohibited Conduct** – Being present during any conduct by another person that is prohibited by this Code that condones, supports, or encourages such prohibited conduct. Students who are present during a violation of this Code are expected to remove themselves from the situation and are encouraged to report the violation to a University official.
- y. **Violation of Law** – Committing an act, attempting to commit an act, or assisting another in committing an act that violates state or federal law or local ordinances that is not otherwise a violation of this Code. Such acts will be adjudicated as if they are violations of this Code. The University reserves the right to proceed with a hearing and the possible imposition of a sanction under this Code prior to, concurrent with, or subsequent to, civil litigation, criminal arrest, and/or criminal prosecution as set forth in [Chapter 4, Section III](#) of this Code.

- z. **Retaliation** – Retaliating against a person who has engaged in protected activity, including but not limited to reporting an alleged violation, providing a statement or testimony as a witness in a Conduct Procedure, or participating in an investigation into an alleged violation of this Code. Retaliatory acts may include threats, intimidation, coercion, or harassment and will be investigated and processed separately from the original Code violation(s) that are the subject of the Retaliation.

A full explanation of prohibited conduct, and a description of procedures used in cases where violations are alleged, is found in the complete text of The Code of Student Responsibility. **This Code may be modified from time to time. Students are advised to contact the Dean of Students Office or visit legal.uncc.edu/policies/up-406 to ensure they consult the most recent edition.**

The Program to Prevent Use of Illegal Drugs and Alcohol Abuse

Below is a brief summary of University Policy 711, Program to Prevent Use of Illegal Drugs and Alcohol Abuse. Visit legal.uncc.edu/policies/up-711 for a full version of that policy.

In keeping with efforts to maintain an environment that supports and encourages the pursuit and dissemination of knowledge, it is the policy of The University of North Carolina at Charlotte to consider the use of illegal drugs or alcohol abuse by students, faculty and staff or by others on premises under University control to be unacceptable conduct that adversely affects the educational environment.

To remind students, faculty, and staff of their responsibilities for maintaining a drug-free environment, this Policy will be distributed throughout the University community each year. Further, the University considers a sound awareness, education, and training program indispensable in combating illegal use of drugs and alcohol abuse, both as a preventive measure and as a remedy. The scope of the University program addresses the awareness needs of students, faculty, administrators,

and other staff members and includes the following minimum components.

- The health hazards associated with the use of illegal drugs and alcohol abuse.
- The incompatibility of the use of illegal drugs or abuse of alcohol with maximum achievement of personal, social, and educational goals.
- The potential legal consequences (including both criminal law and University discipline) of illegal drug abuse and alcohol abuse.
- The effective use of available campus and community resources in dealing with illegal drug use and alcohol abuse problems.

The University's program emphasizes collaboration with local resources such as the Substance Abuse Prevention Services of the Carolinas, Chemical Dependency Center of Charlotte-Mecklenburg, Mecklenburg County Substance Abuse Services, McLeod Center, Alcoholics Anonymous, Narcotics Anonymous, Al-Anon, Nar-Anon, etc. To this end, the University shall participate in the Charlotte-Mecklenburg Drug-Free Coalition and will work with local advisory boards to further collaborate between the University and the Charlotte Community.

The University's awareness, education, and training efforts stress prevention. The goal of these efforts is (1) to encourage non-users of illegal drugs and alcohol to continue to be non-users, (2) to encourage users of alcohol to do so safely and responsibly, and (3) to encourage users of illegal drugs to stop such use.

The use of illegal drugs and the abuse of alcohol are considered by the University to be problems that can be overcome. Therefore, the educational and rehabilitative services cited above are available on a confidential basis. However, the possession, sale, delivery, or manufacture of illegal drugs will not be tolerated on campus or off campus in the event that the interests of the University may be affected.

The University will cooperate fully with law enforcement agencies and will apply appropriate disciplinary procedures should a student, faculty member, or staff member violate criminal statutes with regard to illegal drugs. Violations may subject a student, faculty member, or staff member to prosecution and punishment by civil authorities **and** to disciplinary action by the University. It does not constitute "double jeopardy" for the University to initiate its own disciplinary proceedings for the same offense when the alleged conduct is deemed to affect the interests of the University.

Under federal law, employees convicted of any criminal drug offense occurring in the workplace are required to notify the University by informing the appropriate Vice Chancellor's office no later than five (5) days after such conviction. Disciplinary action and/or participation in a drug rehabilitation/education program as a result of University disciplinary proceedings must commence within 30 days of notice of conviction.

Upon receiving notice of a violation of this Policy, the University will initiate disciplinary procedures applicable to one's status as a member of the University community.

The use of illegal drugs may result in a variety of sanctions, from written warnings with probationary status to expulsion from enrollment or discharge from employment.

Smoking on University Property

Below is a brief summary of University Policy 707, Smoking on University Property. Visit legal.uncc.edu/policies/up-707 for a full version of that policy.

The University of North Carolina at Charlotte has a vital interest in maintaining a healthy and safe environment for its students, faculty, staff and visitors while respecting individual choice about smoking. Consistent with these concerns and with North Carolina law, the following Policy establishes restrictions on smoking on University Property and provides procedures for accommodating the preferences of both smokers and nonsmokers.

For the purposes of this Policy:

- A. "Smoking" is defined as the use or possession of a lighted cigarette, lighted cigar, lighted pipe, or any other lighted tobacco product, or the use of an electronic inhaler that employs a mechanical heating element, battery, or electronic circuit to heat a liquid nicotine solution contained in a vapor cartridge, such as an electronic cigarette, electronic cigar, electronic cigarillo, or an electronic pipe.
- B. A "Building" is defined as any permanent or temporary structure utilized for the support, shelter or enclosure of people, animals, or property. "Buildings" include, but are not limited to: residence halls, classroom and office

buildings, workshops, gymnasiums, shuttle stops, athletic fields, parking decks, stairwells, inside and outside dining areas, vending areas, breezeways, and connectors.

- C. A "University Building" is defined as any Building owned, leased as lessor, or the area leased as lessee and occupied by UNC Charlotte.
- D. "University Property" means University Buildings and grounds owned, leased, operated, controlled, or supervised by UNC Charlotte.
- E. A "University Vehicle" is defined as a vehicle owned or leased by UNC Charlotte.
- F. A "Designated Smoking Area" is defined as an exterior area on the UNC Charlotte campus designated by the Chancellor or the Chancellor's designee as a place for smoking. Designated Smoking Areas will be marked by proper signage, and are subject to the provisions in Section III of this Policy.

The following restrictions apply to smoking on University Property:

- A. Smoking is prohibited within all University Buildings.
- B. Smoking is prohibited within 100 linear feet of any University Building unless otherwise allowed under subsection III. D.
- C. Smoking in University Vehicles is prohibited.
- D. Smoking is permitted on University Property in Designated Smoking Areas.

Additional smoking restrictions required for safety reasons may be imposed by the University on a case-by-case basis. Areas with such restrictions will be identified by signage.

Violation of this Policy may subject a member of the campus community to disciplinary action appropriate to his or her status as faculty, staff, or student.

Noble Niner Code

The Noble Niner Code was authored by the Student Government Association and describes the ideals which every Charlotte 49er student can ideally reach as he or she becomes a fully actualized individual.

It was approved by the UNC Charlotte Board of Trustees on April 20, 2007, and is now adopted as an official document of the University.

Scholarship

A Niner shall strive for academic excellence in and out of the classroom while maintaining academic honesty and ethical values.

Integrity

A Niner shall act to uphold and improve one's self, the community, and the high standards of the institution.

Respect

A Niner shall welcome all aspects of individuality and self-worth while embracing the learning opportunities that diversity provides.

Accountability

A Niner shall hold others responsible for their actions while accepting responsibility for one's own.

Dignity

A Niner shall appreciate the intrinsic value of the institution and work to preserve the 49er environment.

Honor

A Niner shall appreciate students, faculty, administration, and staff as contributing members of the University community.

Compassion

A Niner shall demonstrate genuine consideration and concern for the needs, feelings, ideas, and well-being of others.

Character

A Niner shall exemplify all qualities and traits that promote fellowship and camaraderie among the student body, faculty, staff, and administration.

Nobility

A Niner shall exhibit the virtues and values listed above which befit all members of our Niner Nation.



Degree Requirements and Academic Policies

Registration

The Office of the Registrar is responsible for the management of the registration process by which students enroll in, drop, and withdraw from courses. Through the registration process, students assume academic and financial responsibility for the courses in which they enroll. They are relieved of these responsibilities only by formally terminating enrollment by dropping or withdrawing in accordance with deadlines specified in the Academic Calendar and the corresponding prorated refund schedule available on the Student Accounts website at finance.uncc.edu/student-accounts/refunds.

Registration Deadlines

University policies determine when students may enroll or adjust their enrollment in courses. General deadlines are shown below and specific deadlines for a given term are available online at registrar.uncc.edu/printable-calendar.

Add/Drop Period

The Add/Drop period runs through the eighth calendar day of the Fall and Spring semesters (the second instructional day for the first and second Summer sessions).

During the Add/Drop Period, students can:

- Register for courses
- Drop a course(s) without record (and remain enrolled in other courses)

- Drop all courses without record
- Change the grade type to Audit or Pass/Unsatisfactory (refer to Auditing a Course and Pass/Unsatisfactory Option sections)
- Elect to retake a course with Grade Replacement (refer to Repeating Courses section)

After the Add/Drop Period, students can withdraw from one or more courses in accordance with the Withdrawals policy.

Prerequisites and Permits

All students, including visitors and non-degree students, are required to meet course prerequisites and to obtain the required permissions to enroll in courses through the department which sponsors the course.

Auditing Courses

With the permission of the instructor and Graduate School, a Graduate Student may audit any course in which space is available. Fees and procedures for this non-credit enrollment are the same as those for a credit enrollment. The procedure for adding, dropping, or withdrawing from an audit course is the same as for credit enrollments. In order to audit a class, a student must complete a Graduate Academic Petition and receive approval from the instructor and the Graduate School by the eighth calendar day of a semester.

No student will be allowed to change the designation of a course from audit to credit or from credit to audit

after the eighth calendar day of a semester (or a proportional period for Summer sessions). Participation of auditors in course discussions and in tests or examinations is optional with the instructor. Students who audit receive no University credit, but they are expected to attend the course regularly.

Early Entry to Graduate Programs

Exceptional undergraduate students at UNC Charlotte may be accepted into some certificate, master's, and doctoral programs and begin work toward a graduate certificate or degree before completion of the baccalaureate degree. In those programs offering this option, an applicant may be accepted at any time after completion of 75 or more credit hours of their undergraduate coursework, although it is expected that at least 90 credit hours of undergraduate coursework will have been earned by the time the first graduate course is taken. These students will have provisional acceptance status in the graduate program, pending the award of the baccalaureate degree.

To be accepted to this program, the student must complete an application for the given graduate program and be approved for it. In addition, the student must complete the Early Entry Program Form and have it approved by the Undergraduate Advisor, the Graduate Program Director, and the Graduate School. ***[Note: The Early Entry Program Form must be approved by the Graduate School before the student begins the Early Entry graduate coursework. Failure to obtain prior Graduate School approval negates the ability to "double count" courses in an accelerated Early Entry Program.]*** An undergraduate student must have at least a 3.2 overall GPA and have taken the appropriate graduate standardized test and earned an acceptable score. A given program may have more rigorous admissions criteria. If an Early Entry student has not met the normal admission requirements of a 3.0 overall undergraduate GPA at the end of his/her baccalaureate degree, she/he will be dismissed from the graduate program.

Students accepted into an Early Entry Program will be considered subject to the same policies that pertain to other matriculated graduate students. However, the undergraduate program will remain the student's primary program. **Early Entry students are eligible only for undergraduate-level financial aid, grants, and tuition awards.*** Early Entry students are restricted to 15 credit hours of graduate level coursework prior to the completion of the baccalaureate degree. No courses taken before admission to the graduate program may be applied to a graduate degree.

Some Early Entry Programs are also accelerated.

Under this model, ordinarily up to 6 credit hours earned at the graduate level may be substituted for required undergraduate hours. In other words, up to 6 credit hours of graduate coursework may be "double counted" toward both the baccalaureate and graduate degrees. Individual programs may allow additional credit hours at the graduate level to be substituted. In no case may more than 12 credit hours be double-counted. Students use the Early Entry Program Form to detail which courses they plan to "double count" and which courses will be taken solely for graduate credit. Only those graduate-level courses which are applied towards the undergraduate degree are eligible for undergraduate-level financial aid.

More than 45 graduate programs have an Early Entry Program. A list of Early Entry Programs may be found on the Graduate Admissions website at gradadmissions.uncc.edu/programs/early-entry.

**Note: Students admitted to an Early Entry Program are not eligible to hold a graduate assistantship since they have not completed a baccalaureate degree. Students admitted into an Early Entry Program pay undergraduate fees and undergraduate tuition for all courses (graduate and undergraduate) for which they register until such time that the baccalaureate degree is completed (typically within two semesters).*

Accelerated Master's Programs

Exceptional undergraduate students may be accepted into an Accelerated Master's Program whereby they simultaneously pursue the baccalaureate and master's degrees and gain invaluable mentoring and research experience along the way. The Accelerated Master's Program may also be accelerated in which up to 12 hours earned at the graduate level may be substituted ("double counted") for required undergraduate hours. A list of Accelerated Master's Programs may be found on the Graduate Admissions website at gradadmissions.uncc.edu/programs/accelerated-masters.

In the programs offering this option, an applicant may be accepted to the Pre- Accelerated Master's Program directly from high school with a minimum GPA 3.75 or above (on a 4.0 scale) and a minimum score of 1700 on the SAT. Enrolled students apply for full admission to the Accelerated Master's Program in the spring semester of their freshmen year. They must submit an online application for graduate admission and Statement of Purpose as well as three (3) strong recommendations in support of the application; at least one recommendation must be provided by a high school teachers and another from a UNC Charlotte faculty member who taught the applicant in the fall semester. The application and supporting

documents must be submitted to the Graduate Admissions Office in the freshman year. Enrollment is based on program capacity, and certain programs may have more stringent admission policies.

Note: Students admitted to an Accelerated Master's Program (undergraduate + graduate degrees) are not eligible to hold a graduate assistantship until their final year of study when they are only taking graduate courses. In the Accelerated Master's Program of study, when only graduate courses are taken (typically the final year of study), students are considered "graduate" students and are charged graduate tuition and fees.

Dual Undergraduate and Graduate Registration

First undergraduate degree students at UNC Charlotte who are required to take fewer than 12 credit hours of undergraduate work to fulfill all requirements for the bachelor's degree may be allowed during their final semester to enroll in certain courses for the purpose of obtaining graduate credit. Dually enrolled students will continue to be considered undergraduate students and be charged for the courses taken at the undergraduate level. To be considered for dual enrollment, students should submit the online graduate application for admission as a post-baccalaureate student, submit a Special Request to the Graduate School requesting permission to be considered for dual enrollment, and attach to the Special Request a program of study outlining the requirements of the first undergraduate degree. The total credit hours to be carried in this status shall not exceed 12 credit hours, of which no more than nine may be for graduate credit. On the basis of work attempted prior to the final semester, such students must meet the grade point criteria for admission to a graduate degree program at the University. No course for which credit is applied to an undergraduate degree may receive graduate credit. Permission to take graduate courses under dual registration does not constitute admission to any graduate degree program at the University. (Undergraduate students may also take graduate courses if admitted to an Early Entry Program or an Accelerated Master's Program.)

Note: Only UNC Charlotte students pursuing their first undergraduate degree are eligible for dual undergraduate and graduate registration. Fifth year undergraduate students (i.e., students pursuing a second undergraduate degree) are not eligible for dual undergraduate and graduate enrollment.

Inter-Institutional Registration

An inter-institutional registration program is available, for a limited number of undergraduate and graduate students, with the University of North Carolina at

Greensboro, North Carolina State University, University of North Carolina at Chapel Hill, Duke University, and North Carolina Central University. The registration process is initiated in the Office of the Registrar and requires the approval of the student's College Dean and the Associate Dean of the Graduate School. Enrollment for Inter-Institutional is normally limited to the following:

- Fall and Spring terms: two courses per term for a graduate or professional student provided that the student is also registered for the balance of his/her normal load at UNC Charlotte.
- Summer sessions: one course per summer session provided the student is also registered for at least three hours per session at UNC Charlotte.

Tuition will be billed by UNC Charlotte for all courses taken, including the Inter-Institutional courses, at the prevailing tuition rate. Fees will be waived at the visiting institution unless there is a special fee associated with a particular course. In such a case, the student is responsible for payment of the fee. Students must adhere to the academic calendar for all adds, drops, and withdrawals at both institutions.

UNC Online Registration

Graduate students at UNC Charlotte are eligible to enroll in both graduate and undergraduate courses via UNC Online at online.northcarolina.edu. UNC Charlotte students who enroll in a course through UNC Online are billed by UNC Charlotte. However, courses taken through UNC Online are not considered residence credit. In order to receive credit at UNC Charlotte for coursework taken through UNC Online, students must request to transfer the credit back to UNC Charlotte upon completion of the course. Such requests are subject to the Transfer Credit policies outlined herein. Students are advised to consult with their program before registering for a course through UNC Online.

Continuous Registration

Students in graduate degree programs are required to maintain continuous registration (Fall and Spring semesters) for thesis, dissertation, project, or directed study until work is completed. Students are not required to enroll in any Summer term unless they are using University resources or they are completing degree requirements in that term. Students using University resources should enroll in the number of graduate credit hours that best reflects the amount of resources being used (typically three (3) or more graduate credit hours). The continuous registration requirement begins with the semester in which the student first registers for his/her thesis, dissertation, project, or directed study.

Note: Students must be enrolled during the term (semester or summer) in which they graduate from the University.

Leave of Absence

Current students who are not enrolled and are not using University resources may apply for a leave of absence. Students choosing this option must file a Graduate Academic Petition for a leave of absence that states they will not use University resources during the leave period. If the leave of absence extends beyond one calendar year, the student's matriculation is closed and the student must re-apply for active status in the graduate program. International students on F-1 visa/status must remain continuously enrolled until the thesis, dissertation, project or directed study is completed. Those international students who wish to apply for a leave of absence are advised to consult with the International Student/Scholar Office prior to filing the Graduate Academic Petition for leave of absence. Students experiencing a medical emergency or other crisis should contact the Dean of Students Office. Students with questions about the leave of absence option can contact The Graduate School.

Transfer Credit

The student's Graduate Program Director is responsible for determining the applicability of transferred credits to graduate program requirements. See the appropriate "Degree Requirements" sections of this *Catalog* for program-specific policies. General rules governing transferred credit are:

- 1) To obtain approval to receive transfer credit, the student must submit an *Application for Transfer of Credit into a Graduate Degree Program* form (available online at graduateschool.uncc.edu/current-students/forms), approved by the graduate program coordinator, to the Graduate School. If the courses being transferred are from another institution, the student must include an **official** copy of the transcript along with the request, as well as valid course descriptions from that institution. **The University is not obligated to accept any courses for transfer credit.**
- 2) **No more than six semester hours of transfer credit will be considered for acceptance into a master's degree program.** The amount of transfer credit that may be accepted into a doctoral program varies by program. See program specific policies in this *Catalog*.
- 3) Undergraduate courses are not transferable for graduate credit.
- 4) Graduate courses that appear in the undergraduate section of a transcript are only

transferable if the Registrar of the institution where the credit was received can verify in writing that the graduate courses in question were not counted toward the student's undergraduate degree requirements.

- 5) Courses which have been taken as part of any graduate program at UNC Charlotte or another institution for which the student has received a master's or doctorate degree are not transferable into a certificate program or a second master's degree program. The transferability of master's degree or doctoral coursework into a doctoral program varies by program. See program specific policies in this *Catalog*.
- 6) The grade in any course accepted for transferred credit must be A or B, as defined by UNC Charlotte (a 3.0 or above on a 0.0-4.0 grade point scale). **Coursework that has been graded on a Pass/No Credit or Satisfactory/Unsatisfactory basis will not be accepted for transfer.** In some cases, the Graduate School will allow completed thesis credit (graded on a Pass/No Credit scale) to be transferred into a doctoral program. It should be noted that, although the credit for a course may transfer, the grade will not be used to calculate the graduate GPA at UNC Charlotte.
- 7) Courses accepted for transfer are subject to the same time limitation as courses taken in residence.
- 8) To be considered for transfer credit, the courses must have been undertaken at a regionally accredited institution.
- 9) Courses taken at an accredited institution using the quarter system may be transferred but the quarter hours will be converted to semester hour credit.
- 10) Courses in which credit is accepted must be appropriate for approved University programs and curricula in which the student is enrolled.
- 11) Transfer credit is not awarded for non-degree seeking graduate students (i.e., post baccalaureate students).
- 12) Students may transfer the credits earned in a graduate certificate program toward a single degree that they pursue either in conjunction with the graduate certificate or after the certificate has been awarded. However, students may not transfer credits earned in one certificate program toward the satisfaction of requirements in a second certificate program.

Credit by Examination

A student currently enrolled at UNC Charlotte may pass a specially prepared challenge examination and receive credit for a University course without having to do the normal coursework. The student contacts the program in which credit is sought to request administration of an examination. Since it may not be

appropriate to award credit by examination for some courses, the decision to offer an examination is that of the program. If the graduate program authorizes an examination, the student is instructed to pay the fee for credit by examination and to bring the receipt of payment to the examination. Credit by examination will be indicated on the transcript, but no grade points will be awarded. Failure on such an examination will incur no grade-point penalty. No student may challenge a course for which either a passing or failing grade has been received at UNC Charlotte.

Change of Degree Program

To change from one degree program to another, a graduate student must complete the application for admission to the new program, pay the requisite application fee, submit a Statement of Purpose, and provide supporting documentation as specified in this *Catalog* in a timely manner and be recommended by the Graduate Program Director for admission to the new program of study, with the Graduate School rendering the final decision. The student should also provide the Graduate School with a letter indicating withdrawal from the initial degree program. Contact the Office of Graduate Admissions for additional information.

Note: Students on F-1 or J-1 visa status who change from one degree program to another may be required to submit proof of sufficient financial resources, especially if the change to another degree program requires the issuance of a new Form I-20 or DS-2019.

Application for the Degree and/or Graduate Certificate

All graduate students, including certificate students, must submit the Online Graduate Application no later than the published deadline in the term of graduation. The Online Graduation Application can be found via My UNC Charlotte at my.unccl.edu under "Student Records"). Degrees and certificates are conferred at commencement exercises held at the end of the Fall and Spring semesters; however, the diploma, graduate certificate, and/or transcript will reflect the term in which all requirements were completed. Master's diplomas and graduate certificates are mailed directly to the student after graduation clearance has been completed.

Students completing their degree and/or certificate requirements in May participate in the May commencement ceremony. Students completing degrees and/or certificates in a summer term, as well as those completing in December, participate in the December commencement ceremony. Doctoral students may be accompanied by one faculty member, typically their advisor, during the commencement ceremony.

Degree Audits

DegreeWorks (available via my.unccl.edu) contains the definitive degree audit for each graduate student. Students are encouraged to review their individual audit each semester to ensure they are making sufficient progress towards graduation. In the term of graduation, each candidate's DegreeWorks audit will be reviewed for accuracy by the graduate program and the Graduate School. All program requirements specified in DegreeWorks must be met before the degree or certificate will be awarded.

Earning a Second Degree

A student is permitted to earn a second graduate degree subject to the following conditions:

- 1) no work applied to a previously awarded degree may be applied to the new degree program
- 2) the student must be admitted to a degree program different from that of his/her previous graduate degree(s)
- 3) the student must successfully meet all requirements for the new degree

Dual Master's Degrees

In certain instances it may be possible for a student to obtain dual degrees in two master's programs through the development of an integrated curriculum. It is important to remember that a dual master's degree requires a special arrangement and should be viewed as atypical to standard practice. No degree program is obligated to enter into such an arrangement.

Although other restrictions may apply, basic admission and degree requirements are specified below:

The student must apply to each program separately and be admitted to both by the start of the third semester. No admission requirements established by the Graduate School or by either individual program may be waived. For example, if one degree requires acceptable scores for the GRE and the other the MAT, the applicant must take each standardized exam to be considered for admission to both degrees.

- 1) Once admitted, the student must develop a suitable plan of study that is acceptable to both programs and to the Graduate School. **This plan of study must be done within the first semester of a student's matriculation in the Graduate School and in conjunction with Graduate Program Directors.** The plan of study must be forwarded to the Graduate School for review and approval.
- 2) The student's advisory committee must have representation from both degree programs. If

there is no advisory committee, the student must have two advisors; one from each program.

- 3) The number of required credit hours for both degrees must not be less than 75% of the total minimum hours required to complete each degree separately. For instance, if degree program X requires 30 credit hours and Y 30 credit hours, a proposed dual degree should at a minimum require 45 credit hours.
- 4) The director of each degree program must agree on which courses may be applied to both sets of graduation requirements.
- 5) The student must complete the capstone requirements for both programs. For example, if program X requires a written thesis and program Y requires a comprehensive exam, the student must meet both degree obligations.
- 6) If there is a compulsory qualifying exam in each curriculum, it may be possible for the student to take a single exam as long as the examination committee agrees that the assessment covers sufficient background information for each discipline. If only one program requires a qualifying exam, the student is obligated to take the exam.
- 7) If the student withdraws or is suspended from one of the participating programs, the dual degree arrangement is automatically nullified.
- 8) All standard policies relating to transfer of courses, time to degree, residency requirements, and minimum GPA required to graduate, apply to any dual degree arrangement.
- 9) All of the coursework in the combined program of study must be completed before the student can apply for either of the degrees.
- 10) No dual degrees will be awarded retroactively.

Termination of Enrollment

Dropping or Withdrawing from a Course(s) while Maintaining Enrollment in Other Courses

A student may terminate enrollment in a course(s) but continue enrollment in other courses by dropping or withdrawing from a course by the respective deadlines specified on the Academic Calendar. A student enrolled in only one course must withdraw officially from the University by dropping or withdrawing from a course by the respective deadlines specified on the Academic Calendar.

Officially Withdrawing from All Courses and from the University

Students seeking to withdraw from all courses in a term, after the Add/Drop period as defined in the Registration section earlier in this *Catalog*, must officially withdraw to terminate enrollment for that term. A student may withdraw from the University by going online and using Banner Self-Service by the

deadline for that term. A withdraw is effective when the withdrawal action is submitted through Banner to the Office of the Registrar. A student who withdraws from the term will receive a grade of W for all courses in progress; any student who leaves the University before the close of a term without withdrawing officially will receive a failing or unsatisfactory grade (F for undergraduate courses and U for graduate courses) in each course for which he/she is registered. A graduate student who receives a U is automatically suspended or terminated from the University and must appeal to the Associate Dean of the Graduate School, if suspended, and the Dean of the Graduate School, if terminated, for reinstatement. Students who experience a personal or medical crisis have the option of requesting a leave of absence or withdrawal from all courses via the Dean of Students Office during the term the crisis begins. The Dean of Students Office will notify the student's academic department(s). *Note: In addition to withdrawing from all courses, students must terminate all financial obligations with the University such as financial aid, housing, dining, etc., by completing necessary paperwork in each office.*

International students on F-1 or J-1 visa status must carry a full course load each academic semester. (Some exceptions apply. See the International Student/Scholar Office for further information.) Students who withdraw from UNC Charlotte are advised to consult the International Student/Scholar Office for information on maintaining valid F-1 or J-1 status, or reinstatement to valid F-1 or J-1 status.

Termination by the University

The University maintains the right to terminate a student's enrollment in a course for a variety of reasons including, but not limited to: course schedule changes, course cancellation due to low enrollment, or the student's nonfulfillment of course prerequisites. The University maintains the right to terminate a student's enrollment in all courses in a term for a variety of reasons including, but not limited to: academic suspension, suspension for violation of the Code of Student Responsibility, or suspension in violation of the Code of Student Academic Integrity. Students who have been suspended for academic or disciplinary reasons must reapply for admission as described in the Readmission of Former Students policy.

Course Descriptions

Related course descriptions are provided with each degree/non-degree program in the Catalog. Course descriptions provide the following information: subject prefix; course number; course title; semester credit hours assigned to the course; prerequisites and/or corequisites (if any); and a brief description of the course content. The description may specify the number of class (lecture) and/or laboratory sessions and hours. If no class hours are given, the number of class hours per week is the same as the number of credit hours credit assigned to the course.

For example:

SUBJ 6234. Title of Course. (Credit Hours)

Pre/corequisites. Brief description of course content.

Course Numbering System

Courses are identified by four-digit numbers. The first digit indicates the level of the course:

- 5000-5999 = graduate courses with parallel undergraduate courses listed at the 4000 level
- 6000-7999 = graduate certificate and master's level courses
- 8000-9999 = doctoral level courses

The following second digits designate special types of courses:

- 0 for topics
- 4 for internships and practicum
- 5 for cooperative education
- 6 for seminars
- 7 for Honors courses
- 8 for independent study
- 9 for research

Prerequisites and Corequisites

A *prerequisite* is a requirement that must be met (or a course that must be passed) before enrolling in a more advanced course. A *corequisite* is a course which should be taken in the same semester as another.

Cross-Listed Courses

A cross-listed course is a single course which is simultaneously listed in the schedule of course offerings by two or more academic departments. They share the same meeting times, room, instructor(s), and curriculum. Students may only receive credit for the single section of the cross-listed course for which they are registered. Credit will not be awarded for a course where credit has been awarded for a cross-listed course.

Frequency

The frequency of offering a course is listed in parentheses at the end of the course description. Courses offered every year are designated by semester(s) only. Courses offered every other year are designated by semester and/or odd or even years. "On demand" courses are offered as needed and if a qualified instructor is available.

Changes

Course descriptions and numbers are accurate at the time of publication of the *Catalog*. For the most current information, please consult the department or the most current online version of the *Graduate Catalog* at catalog.uncc.edu.

Course Load

An appropriate course load is dependent upon two factors: the scholastic ability of the student as reflected by his/her academic history and the time available for study. For students without a graduate assistantship, a course load of 9 semester hours constitutes a normal full semester program for a graduate student. This is lower than the normal undergraduate load because of the extensive reading, independent thinking, and individual research required of graduate students. Generally, graduate students should not register for more than 12 semester hours during a semester.

A graduate assistant must register for at least six graduate-level semester hours during each semester in which an assistantship is awarded. Graduate assistants enrolled in the Graduate Assistance Support Plan (GASP) must register for a minimum of 9 graduate credit hours each term until they graduate, even if they exhaust all GASP funding before their final term.

International students on F-1 visa/status are required, by immigration regulations, to pursue a full course load during each academic semester, except during official school breaks (e.g., summer vacation and winter holidays) or unless a reduced course load is approved in advance by the Designated School Officer (DSO) at the International Students/Scholar Office. Failure to enroll for a full course load without prior approval is considered a violation of the F-1 legal status.

Classroom Attendance and Policies

Each instructor determines the classroom policies (including attendance regulations) for his or her courses. In general, students are expected to attend punctually all scheduled sessions in the courses for which they are registered, to demonstrate civil behavior while in class, and to complete all of the course requirements. Instructors may outline additional and more specific standards in the course syllabus, especially when attendance is part of the grading criteria for the class. For online synchronous classes, instructors can choose to take attendance with any technology available to them. Absences from class may be excused by the instructor for such reasons as personal illness or participating as an authorized University representative in an out-of-town event. Whenever possible, students are expected to seek the permission of the instructor prior to absences. Absences for religious holidays fall under University Policy 409, Religious Accommodation for Students; see legal.uncc.edu/policies/up-409 for details.

Grading and Related Policies

Instructors assign grades on the basis of their evaluation of the academic performance of each student enrolled in their courses. At the end of the term, the grades are reported to the Office of the Registrar which is responsible for maintaining student academic records and making grades available to students.

Grades

Letters are used to designate the quality of student academic achievement.

Graduate Grades		
Grade	Definition	Grade Points per Semester Hour
A	Commendable	4
B	Satisfactory	3
C	Marginal	2
U	Unsatisfactory	0

Grade	Definition	Grade Points per Semester Hour
I	Incomplete	
IP	In Progress	
W	Withdrawal	
WE	Withdrawal with Extenuating Circumstances	
P	Pass	
N	No Credit	
AU	Audit	
NR	No recognition given for audit	

Grade of I (Incomplete)

The grade of I is assigned at the discretion of the instructor when a student who is otherwise passing has not, due to circumstances beyond his/her control, completed all the work in the course. The missing work must be completed by the deadline specified by the instructor, but no later than 12 months. If the I is not removed during the specified time, a grade of U as appropriate is automatically assigned. Time extensions for the completion of an I beyond one year cannot be approved except by a Graduate Academic Petition to the Graduate School under extraordinary circumstances. The grade of I cannot be removed by enrolling again in the same course, and students should not re-enroll in a course in which they have been assigned the grade of I.

Grade of IP (In Progress)

The grade of IP is based on coursework for courses that extend over more than one semester. For example, a course that requires enrollment for two consecutive semesters would be eligible for an IP grade in the first term (i.e., Certificate Project, Master's Thesis, Master's Project, Doctoral Dissertation, etc.). The grade in the second term is also awarded for the course in the first semester. A grade of IP should not be given for coursework to be completed in one given term. It cannot be substituted for a grade of I. For a student in good standing in a certificate program, an IP grade expires after four years, and if no final grade has been awarded by that time, the IP grade will default to a grade of N (no credit). For a student in good standing in a master's degree program, an IP grade expires after six years, and if no final grade has been awarded by that time, the IP grade will default to a grade of N (no credit). For a student in good standing in a doctoral program, an IP grade expires after eight years, and if no final grade has been awarded by that time, the IP grade will default to a grade of N (no credit).

Grade of W (Withdrawal)

No grade will be given for a course dropped on or before the last day to drop a course without record. After this period, a student is permitted to withdraw from a course with a grade of W. The deadline to withdraw from one or more courses (including withdrawing from all courses) is 60% of the way through the term, which for Fall or Spring semesters is during the 9th week. The precise date for each term is published in the Academic Calendar. After this deadline, withdrawal is only allowed for approved extenuating circumstances. Unsatisfactory academic performance itself is not an extenuating circumstance. The date of withdrawal is determined when the "Withdrawal" notification is received by the Office of the Registrar. The grade of W is posted on the academic transcript.

Grade of WE (Withdrawal for Extenuating Circumstances)

After the deadline to withdraw from a course, a student may, in certain circumstances, request to withdraw from his or her courses based on an extenuating circumstance (i.e., a medical emergency, a death in the immediate family, or other serious event). The student must provide documentation to support his/her request. WE requests for the current term are submitted through the Office of the Dean of Students. If approved, a grade of WE is noted on the student's transcript.

Grade of N (No Credit)

The grade of N (No Credit) is used in very special circumstances. The N grade signifies that there is no credit given for the course. Therefore, any course that receives the N grade does not enter into the student's grade point average. The N grade is used for the master's and doctoral level, resident and non-resident, and graduate student continuing registration courses (GRAD 7999 or GRAD 9999). The N grade is also used to replace IP grades which have expired, and for GRAD 8990. These are the only three uses for the N grade.

Pass/Unsatisfactory Option

Certain graduate courses, such as research seminars, tutorials, internships, theses or dissertations, may be designated for Pass/Unsatisfactory grading upon recommendation of the offering department and approval of the Graduate Council. The grade of P (Pass) in such a course shall be considered as evidence of satisfactory performance. A grade of U (Unsatisfactory) will affect eligibility for continued enrollment and will not apply toward requirements for the degree. Graduate students may not take the Pass/Unsatisfactory option for a standard graded course, with the exception of GRAD courses.

Grade Point Average (GPA)

The grade point average for a graduate student is based only on those graduate courses taken at UNC Charlotte. It is determined by multiplying the number of grade points for each grade (A=4, B=3, C=2, U=0) by the number of semester hours credit received in that courses adding all accumulated grade points together, and then dividing by the total number of semester hours the student has attempted except those for which the student received a grade of I, IP, W, P, N, AU, or NR. When a course not listed as "May be repeated for credit" is repeated, no additional credit hours attempted accrue and the hours earned and grade points of the previous grade are replaced by those of the current grade.

Graduate students must have a 3.0 GPA in the courses on their degree plan of study in order to graduate. However, the grades for all courses attempted will remain on the transcript and will be included in the calculation of the student's GPA as it is reported on the transcript (except as described in the above paragraph).

Repeating Graduate Courses

Graduate students are allowed to repeat a maximum of two courses in which the student has been assigned a grade of C or U (but not an I). If the course grade has resulted in suspension or termination of enrollment, the student must appeal to be reinstated in order to repeat the course. A given course may be repeated one time only. Each grade earned in a repeated course is shown on the student's transcript. The record of the first attempt remains a part of the student's permanent record and counts in the number of marginal (C) grades accumulated. However, the hours earned and grade in the first attempt are not computed in the GPA. Successfully repeating a course does not change the number of marginal (C) grades accumulated. Enrollment will be terminated if a student receives a grade of U in a repeated course for which the student previously earned a U.

Final Grades

Final grades are available through the secure student access pages of My UNC Charlotte online at my.uncc.edu.

Final Grade Changes and Appeals from Final Course Grades

When a final course grade other than Incomplete (I) is officially reported by the instructor at the end of an academic term, the grade is recorded by the Office of the Registrar and can be changed only if the grade has been assigned arbitrarily or impermissibly as defined in University Policy 410, *Policy and Procedures for*

Student Appeals of Final Course Grades, available online at legal.uncc.edu/policies/up-410.

For guidelines on applying this policy, please visit University Policy 411, *Request for Review of a Final Course Grade Guidelines for Students*, online at legal.uncc.edu/policies/up-411.

Students should follow the procedures outlined in that policy if they believe that the final course grade that has been assigned is incorrect. The policy encourages the student to discuss the grade with the instructor as soon as possible after the grade is received. Students should note, however, that the University is not obliged to respond to a grade appeal unless the student files it with the appropriate department chairperson or interdisciplinary program director within the first four weeks following the last day of the regular semester or the summer term in which the grade was received. When a grade is assigned consistent with University policy, only the instructor has the right to change the grade except as provided in the Incomplete grade policy. When an instructor reports a grade change for a grade other than I, the Change of Grade request must be approved by his/her Department Chairperson and the Graduate School.

Academic Standing

Requirements for Continued Enrollment

All graduate students whether degree seeking or non-degree seeking (post baccalaureate) must maintain satisfactory grades. In addition, students enrolled in any graduate program must maintain satisfactory progress toward the degree. Students are expected to achieve a commendable or satisfactory grade (A or B) in all coursework attempted for graduate credit. Students who fail to maintain satisfactory progress toward their degree or who do not achieve commendable or satisfactory grades in all their graduate coursework are subject to suspension and/or termination from their program of study and/or the Graduate School.

International students on F-1 or J-1 visa status must carry a full course load each academic semester (Some exceptions apply. See International Student/Scholar Office for further information.) Students who are suspended or terminated from their program of study are advised to consult the International Student/Scholar Office for information on maintaining valid F-1 or J-1 status, or reinstatement to valid F-1 or J-1 status.

Academic Suspension

All graduate students (degree/certificate seeking and post baccalaureate) are subject to academic suspension. An accumulation of three marginal C grades in any graduate coursework will result in suspension of the student's enrollment. If a student makes a grade of U in any graduate course, enrollment will be suspended. A graduate student whose enrollment has been suspended because of grades is ineligible to register in any semester or summer session unless properly reinstated through the appeal process.

Note: Some departments and/or programs have stricter regulations on suspension than those of the Graduate School. See the academic regulations presented in the program specific sections of this Catalog.

Appeal Procedure

Graduate students may appeal a suspension or termination using the procedures described in the following paragraphs. Other grievances relating to academic status are to be addressed to the Graduate School.

Appeal of Academic Suspension for the Purpose of Reinstatement

A student who has been suspended from the Graduate School and/or a program of study may appeal his/her suspension and must be reinstated in order to continue his/her studies. After notification of suspension is received, the student initiates the appeal procedure by submitting a Suspension Appeal Form to the Graduate Program Director of his/her academic program explaining any extenuating circumstances. The Graduate Program Director will forward this form to the Graduate School with a recommendation regarding reinstatement. Non-degree seeking licensure students in the College of Education, submit the Suspension Appeal Form to the Associate Dean of the College of Education. All other non-degree seeking students submit the Suspension Appeal Form in Banner Self-Service. The Associate Dean of the Graduate School makes the decision on the suspension appeal and notifies the student of the decision in writing.

A student readmitted to a graduate program through reinstatement will be expected to complete the degree program with satisfactory or commendable performance (A or B grades). Should a student receive a grade of C or U in a graduate course after being reinstated to the program, enrollment in the graduate program will be terminated.

A student who is denied readmission through the suspension appeal process is considered to be

terminated from the Graduate School and/or the graduate program. Terminated students may appeal their termination as identified in the section entitled "Appeal of Academic Termination for the Purpose of Reinstatement."

Academic Termination of Non-Degree Seeking Students

Academic termination of non-degree seeking (post-baccalaureate) students may occur in two ways.

- 1) A student's graduate status will be terminated if, after receiving an initial suspension (see "Academic Suspension") and subsequent reinstatement (see "Appeal of Academic Suspension for the Purpose of Reinstatement"), the student receives a grade of C or U in a graduate-level course.
- 2) A student's graduate studies may be terminated if he/she fails to maintain the general standards of the Graduate School (e.g., accumulation of more than one C grade in a term resulting in a total of four or more C grades in his/her graduate academic record, three C grades and one U, or two or more U grades in a single term).
- 3) Students who are suspended from the Graduate School and are denied re-admittance through the suspension appeal process (see "Appeal of Academic Suspension for the Purpose of Reinstatement") are considered terminated from the Graduate School.

Academic Termination of Degree/Certificate Seeking Students

Academic termination of a degree/certificate graduate student's program of studies may occur in four ways.

- 1) Students may be required to terminate their graduate studies if they fail to maintain satisfactory academic progress. One example of failure to maintain satisfactory academic progress is non-adherence to the schedule of "Time Limits for Degrees."

When a program determines that a student is making unsatisfactory progress, the program notifies the student in writing of the program's concern about the student's performance. Such a warning specifies the source of the concern, the applicable program and/or Graduate School rules, and the proposed action. Warnings specify when and on what basis a recommendation for academic termination will be considered by the program. A probationary period of one academic semester is normal.

Following the probationary period, a student who fails to meet the provisions of the warning is subject to termination from the program. If the program believes that termination is warranted, the graduate program director or coordinator communicates to the Associate Dean of the Graduate School in writing the specific reasons involved, all warnings communicated to the student, the program and/or advisory committee procedures and actions leading to the recommendation, and the mailing address of the student. After considering all of the information, the Associate Dean will make a decision. If the decision is to terminate, the Associate Dean will notify the student of his/her termination from the Graduate School.

- 2) A student's graduate studies may be terminated if he/she fails to maintain the specific standards of the student's academic program as described in the program specific sections of the *Graduate Catalog* (e.g., a doctoral program may indicate that the accumulation of two C grades or one U grade is grounds for termination from the program) or the general standards of the Graduate School for termination (e.g., accumulation of more than one C grade in a term resulting in a total of four or more C grades in his/her graduate academic record, three C grades and one U, or two or more U grades in a single term).

Note: A graduate student may be terminated without prior suspension if he/she receives four C grades, regardless of the semester in which the grades were received.

- 3) A student's graduate studies will be terminated if, after receiving an initial suspension (see "Academic Suspension") and subsequent reinstatement (see "Appeal of Academic Suspension for the Purpose of Reinstatement"), the student receives a grade of C or U in a graduate level course.
- 4) Students who are suspended from a graduate program and are denied re-admittance through the suspension appeal process (see "Appeal of Academic Suspension for the Purpose of Reinstatement") are considered terminated from their graduate program.

Readmission of Terminated Graduate Students

Students who have been academically terminated from the Graduate School and/or a UNC Charlotte graduate program are not eligible for readmission as either a degree seeking or non-degree seeking graduate student. However, if **after two years** the

student can demonstrate the potential for academic success and/or personal and professional development since leaving the University, the student may initiate a request for readmission to the Graduate School. The student may initiate the request for readmission to the program from which he/she was terminated, to a different graduate program, or as a post-baccalaureate student. Students seeking readmission must submit a new application package which includes the full set of materials identified in the section entitled "General Application Requirements for Admission." In addition, the student must include within his/her essay (Statement of Purpose) a section explaining the circumstances that led to his/her termination from the UNC Charlotte Graduate School and a discussion of the academic and/or personal and professional development since last attending the University that has prepared him/her for a successful return to graduate studies.

Appeal of Academic Termination for the Purpose of Reinstatement (Post-Baccalaureate Students)

While an action of termination is considered final, a post-baccalaureate student who is terminated may appeal that termination to the Graduate School if there are unusual or extenuating circumstances.

To initiate an Appeal of Academic Termination, the student must send a written letter to the Graduate School requesting consideration of his/her case by the UNC Charlotte Graduate School Appeals Committee. In the written request, the student must make his/her case for reinstatement. If appropriate, the student may include two letters from UNC Charlotte faculty or academic administrative personnel who are knowledgeable of the student's academic capabilities and are supportive of the student's reinstatement to the Graduate School. A termination appeal request and the supporting documentation must be received by the Graduate School within 30 days of the date on the letter of termination.

Once the Graduate School receives the Appeal of Termination, it will be forwarded to the Chair of the Graduate School Appeals Committee. This Committee will review all relevant materials and make a recommendation to the Dean of the Graduate School. The Dean of the Graduate School makes the decision on the Appeal of Termination case and his/her decision is final.

Appeal of Academic Termination for the Purpose of Reinstatement (Degree-Seeking Students)

While an action of termination is considered final, a student who is terminated from a graduate program

may appeal that termination to the Graduate School if there are unusual or extenuating circumstances. The type of academic termination will determine the permissible grounds for the appeal and the specific procedure utilized.

Category 1: Academic Termination Based on Failure to Maintain Commendable or Satisfactory Performance in Coursework

Category 1 appeals are available to students who have been terminated for receiving a U or C grade after an initial suspension and students who fail to maintain the specific grading standards of an academic program. In these cases, an Appeal of Academic Termination submitted to the Graduate School must be supported by the student's graduate program. Without support from the student's graduate program, academic termination of this type is always considered a final action.

To initiate a Category 1 Appeal of Academic Termination, the student must send a written letter to the Graduate School requesting consideration of his/her case by the UNC Charlotte Graduate School Appeals Committee. In the written request, the student must make his/her case for reinstatement. Included with the student's letter must be at least two letters of support for reinstatement from the student's academic program. For master's degree students, the termination appeal should include a letter from the program coordinator/director and a letter from the department chair, major advisor and/or the thesis/project advisor. For a doctoral student, a termination appeal should include a letter from the program coordinator/director and the advisory committee or dissertation committee chair. The letters from the program must specify what expectations must be met by the student if he/she is readmitted to the program. A termination appeal request and the supporting documentation must be received by the Graduate School within 30 days of the date on the letter of termination.

Once the Graduate School receives a Category 1 Appeal of Termination, it will be forwarded to the Chair of the Graduate School Appeals Committee. This Committee will review all relevant materials and make a recommendation to the Dean of the Graduate School. The Dean of the Graduate School makes the decision on the Appeal of Termination case and his/her decision is final.

Category 2: Academic Termination Based on Programmatic Action

Category 2 appeals are for students who have been terminated for failure to maintain satisfactory progress in an academic program and for students who have been denied re-admittance through the suspension appeal process. Academic decisions based on the

disciplinary expertise and judgment of graduate faculty members and program coordinators/directors in a particular field are not subject to appeal. The fact that a programmatic decision goes against a student's desire for continuation in an academic degree program is not grounds for a termination appeal. However, a Category 2 appeal may be brought on the grounds that there was "procedural error" or "discrimination" in the termination decision.

To initiate a Category 2 Appeal of Academic Termination, the student must send a written letter to the Graduate School requesting consideration of his/her case by the UNC Charlotte Graduate School Appeals Committee. In the written request, the student must make his/her case for reinstatement. If the student is alleging "procedural error," the student must specify what procedures were utilized and how the program deviated from the specified procedures. If the basis of the appeal is "discrimination," the student must show how his/her case was handled substantially different from those of other students in similar circumstances. A termination appeal request and the supporting documentation must be received by the Graduate School within 30 days of the date on the letter of termination.

Once the Graduate School receives a Category 2 Appeal of Termination, it will be forwarded to the Chair of the Graduate School Appeals Committee. The Chair of the Appeals Committee will contact the program in question and request a response to allegations of "procedural error" and/or "discrimination." The program will have two weeks to respond to the request of the Appeals Committee Chair. Once all relevant information had been received, the Committee will review the materials and make a recommendation to the Dean of the Graduate School. The Dean of the Graduate School makes the decision on the Appeal of Termination case and his/her decision is final.

Graduate School Appeals Committee

The Graduate School Appeals Committee is authorized to review appeals for reinstatement from graduate students who have been academically terminated. The Committee does not hear grade appeals, for which a separate procedure exists. The Appeals Committee is comprised of four members. The Associate Dean of the Graduate School serves as the ex officio, non-voting chair of the committee. The three voting members of the Appeals Committee are graduate faculty members named by the Dean of the Graduate School.

Disciplinary Suspension

Readmission is not automatic for graduate students suspended for disciplinary reasons. To be considered for readmission, a graduate student must reapply to the Graduate Admissions Office using the online application. An explanation of the circumstances surrounding any disciplinary suspension must be included in the Campus Safety section of the application for admission. Similarly, the applicant must meet all requirements established by the academic program and/or the University before readmission will be considered. (See the "UNC Charlotte Code of Student Responsibility" for a more complete discussion of disciplinary suspension.)

Master's Degree Requirements

Residence Requirements

No more than six credit hours of transferred credit are accepted toward a master's degree. All other work must be residence credit.

Residence credit is credit that is earned under the conditions specified herein and may be applied toward the attainment of graduate degrees at UNC Charlotte. These conditions must be satisfied regardless of the location (on campus, online, or distance) in which the course is given.

Instruction

The instructor must be a member of the UNC Charlotte Graduate Faculty.

Course(s)

The content of each course must be approved by regularly established college, Graduate School and University curricular processes before the course is scheduled or offered.

Residence credit may also be awarded by virtue of an examination administered by the Graduate Faculty of the department offering credit. A student may also, with the prior approval of the appropriate UNC Charlotte department and the Dean of the Graduate School, take graduate courses for residence and course credit at other regionally accredited institutions.

Advisory Committee

All students in graduate programs must have a graduate advisor who is a regular member of the Graduate Faculty in the student's major program. The graduate program coordinator/director appoints the graduate advisor. In the case of master's programs requiring theses and/or final oral examinations, the graduate advisor serves as chair or co-chair of the committee.

In all master's programs requiring a committee, the committee will consist of at least three graduate faculty members, one of whom is designated as chair. The committee must be filed with the Graduate School prior to the student's defense. In programs not requiring a committee, only a major advisor is necessary.

Program Approval

Each student's individual program of study must be approved by his/her department/college. A maximum of six hours of transferred credit may be included in the approved program of study.

Minimum Hours and Quality

A student is expected to satisfactorily complete a minimum of 30 to 60 credit hours of approved graduate level courses, depending upon his/her individual program, with an overall GPA of 3.0 or above in courses on the degree plan of study. Grades in all courses attempted, whether or not on the plan of study, will remain on the transcript and will be included in the calculation of the student's GPA as it is reported on the transcript. No more than six hours evaluated as C may be counted toward the minimum hours required for the master's degree.

Culminating Experience

Each student must pass a graduate culminating experience which may take the form of a comprehensive exam, thesis defense, project presentation, or other appropriate capstone evaluation. Students must be enrolled during the semester in which they take the comprehensive examination or any other type of culminating experience.

Comprehensive Assessment

The plan of study for a master's degree may or may not include a comprehensive assessment. Comprehensive assessments are administered written and/or orally by graduate program faculty. Students who fail a comprehensive assessment are subject to termination and should discuss options with their graduate program director. With program approval, a comprehensive assessment may be retaken one time. If the student fails the exam a second time, the program may, in rare circumstance and with

compelling evidence, allow a student to, within four months, retake the exam (or portion of the exam). In such cases, the program must document the circumstances under which the student is allowed to retake portions of the exam and demonstrate that the student's committee unanimously supports the decision. Documentation must be submitted to the Graduate School for review prior to the exam date. In no instance will the student be allowed to take the exam (or portion of the exam) a fourth time. Students may only appeal a termination to the Graduate School if their appeal to retake the exam is based on a procedural error or discrimination (please see the Category 2 appeal description under *Appeal for Academic Termination*) and their initial appeal to the program was denied.

Thesis

The plan of study for a master's degree may or may not include completion of a thesis. The thesis and non-thesis approaches are designed to meet the needs of students preparing for different types of careers and represent qualitatively different educational experiences. Consequently, the academic departments and the Dean of the Graduate School discourage any switching from one plan to another. If a switch from a thesis to non-thesis plan is approved, the grade of I for the thesis work will be changed to W on the transcript with no refund of tuition for the course(s). Students pursuing the thesis option must successfully defend a proposal of his/her thesis topic. Upon successful defense of the proposal, students should submit the Proposal Defense for Doctoral Dissertation and/or Master's thesis form to the Graduate School. This form is available on the Graduate School website.

The thesis should be submitted for final approval by the student's thesis committee at least three weeks before the date of the oral examination in which the thesis is defended. Following the successful completion of this defense, the master's candidate must submit a copy of the approved and error-free thesis to the Graduate School (via ProQuest) no later than the filing date indicated in the University Calendar. Guidelines for the preparation of the thesis are available online at gradlife.uncc.edu/resources/dissertation-thesis-formatting. Additionally, the student must submit the Defense Report for Doctoral Dissertation and/or Master's thesis form and the original thesis title page to the Graduate School (with original signatures).

Time Limit

No course older than six years may be applied towards a master's degree (including transfer credit). This policy is in place because of the University's interest in a degree being current when it is awarded.

Courses that exceed this time limit must be revalidated or retaken, whichever the graduate program decides necessary, if they are to count in a degree program.

To revalidate a course, the student, along with the program coordinator and the course instructor, prepare a revalidation plan that must be reviewed and approved by the Graduate School. This plan often involves taking a special examination designed by the faculty of the graduate program. Once the plan has been completed, the program coordinator must notify the Graduate School in writing. The Revalidation Form is available on the Graduate School website at graduateschool.uncc.edu/current-students/forms.

Students may not revalidate courses with a grade of C or lower, courses that are internships or other forms of practica, or courses taken at other institutions.

Additionally, no more than 25% of the courses on a student's program of study may be revalidated and for master's students no course older than eight years may be revalidated.

Courses and Other Requirements

The courses and other requirements for specific degree programs are presented in each of their individual sections throughout this *Catalog*. Students are encouraged to review their individual DegreeWorks audit prior to registration to ensure they are making sufficient progress towards graduation.

Application for Degree

Students should submit the Online Graduation Application at the beginning of the term in which they anticipate completion of the master's program. Adherence to Graduate School deadlines is expected. Students are encouraged to review their individual DegreeWorks audit to ensure they have met all graduation requirements.

Ph.D. Degree Requirements

A doctoral degree is conferred by the University after the student has demonstrated outstanding scholarship in an approved program of study. Candidates must satisfy all University degree requirements in addition to all standards established by the doctoral faculty of their particular program. Specific program degree requirements are listed under the respective doctoral programs in this *Catalog*. In some cases, requirements in a given program are more stringent than the minimum requirements established by the Graduate

School.

Ordinarily, a student must complete at least 72 post-baccalaureate credit hours in order to earn the Ph.D.

Advisory Committees

All students in graduate programs must have a graduate advisor who is a regular member of the Graduate Faculty in the student's major program. The graduate program director appoints the graduate advisor. When there is a compelling reason to do so, another faculty member may serve as "co-chair."

For doctoral students, the dissertation committee will consist of at least four Graduate Faculty members, one of whom is appointed by the Dean of the Graduate School as the Graduate Faculty representative. Dissertations are chaired by graduate faculty and are selected by agreement between the student and the faculty member. A doctoral student may select only one faculty member as chair of the committee.

The committee for doctoral students is indicated on the Appointment of Doctoral Dissertation Committee form (available in the Graduate School office or online). At the time that the Appointment of Doctoral Dissertation Committee form is approved, the Graduate School appoints the Graduate Faculty Representative to serve on the doctoral committee.

Graduate Faculty Representative

The graduate faculty representative is a member of the doctoral student's advisory committee appointed by the Graduate School. This faculty member's role is primarily but not totally procedural. He/she must 1) assure that the doctoral student is treated fairly and impartially by his or her advisory committee, and 2) assure that University standards and policies are upheld. For these reasons, it is helpful for faculty serving in this role to have prior experience serving on a dissertation committee. The faculty member may also participate in the development and evaluation of the student's research to the extent appropriate for the faculty member's background. The Graduate Faculty Representative is a full voting member of the committee. This representative is generally appointed prior to the student's dissertation proposal defense and must participate in the formation of the student's topic and in the final dissertation examination. A student's advisor may consult with the Graduate School regarding selection of this representative.

Program of Study

Although the maximum amount of credit past the baccalaureate degree that a Ph.D. student may transfer towards a doctorate is 30 semester hours, only courses appropriate for the approved program and curriculum in which the student is enrolled may be

transferred. Appropriate courses should be determined by the student's supervisory committee and approved by the program coordinator before the request is submitted to the Graduate School. This rule applies whether the courses were taken at UNC Charlotte or elsewhere and whether a master's degree was earned or not. However, no more than six hours taken when the student was in post-baccalaureate (non-degree seeking) status may be applied toward the doctoral degree.

Course and Other Program Requirements

The course and other requirements for each degree program are indicated in the program descriptions in the following pages.

Time Limit

No course older than eight years may be applied towards a Ph.D. (excluding transfer credit). Courses that exceed this time limit must be revalidated or retaken, whichever the graduate program decides necessary, if they are to count in a degree program.

To revalidate a course, the student, along with the program coordinator and the course instructor, prepare a revalidation plan that must be reviewed and approved by the Graduate School. This plan often involves taking a special examination designed by the faculty of the graduate program. Once the plan has been completed, the program coordinator must notify the Graduate School in writing. The Revalidation Form is available on the Graduate School website at graduateschool.uncc.edu/current-students/forms.

Students may not revalidate courses with a grade of C or lower, courses that are internships or other forms of practica, or courses taken at other institutions.

Additionally, no more than 25% of the courses on a student's program of study may be revalidated, and no course older than ten years may be revalidated.

Residence

All doctoral students are required to complete a substantial residency requirement during which they have sustained contact with the graduate faculty. This requirement is specified in the program descriptions.

Qualifying Examination

Each student must complete a qualifying examination. Ordinarily students who enter a Ph.D. program directly from a baccalaureate program sit for this examination before the end of their third post-baccalaureate year in the program while students who enter a Ph.D. program from a master's degree program take the examination before the end of their first year in the doctoral program. To sit for this examination, the student must have at least a 3.0 GPA and must have removed any conditions upon

admission. Qualifying assessments are administered by graduate program faculty. Students who fail a qualifying assessment are subject to termination and should discuss options with their graduate program director. With program approval, a qualifying assessment may be retaken one time. If the student fails the exam a second time, the program may, in rare circumstance and with compelling evidence, allow a student to, within four months, retake the exam (or portion of the exam). In such cases, the program must document the circumstances under which the student is allowed to retake portions of the exam and demonstrate that the student's committee unanimously supports the decision. Documentation must be submitted to the Graduate School for review prior to the exam date. In no instance will the student be allowed to take the exam (or portion of the exam) a fourth time. Students may only appeal a termination to the Graduate School if their appeal to retake the exam is based on a procedural error or discrimination (please see the Category 2 appeal description under *Appeal for Academic Termination*) and their initial appeal to the program was denied.

Candidacy

The dissertation topic may be proposed after the student has passed the qualifying examination. The dissertation topic proposal must be defended at a meeting of the student's advisory/dissertation committee. A written dissertation proposal must be submitted to the advisory/dissertation committee at least two weeks prior to the scheduled defense. A doctoral student advances to candidacy after the dissertation proposal has been approved by the student's advisory/dissertation committee and the Graduate School. Results of the dissertation proposal defense should be submitted to the Graduate School via the Proposal Defense for Doctoral Dissertation and/or Master's thesis form directly after the defense. Candidacy must be achieved at least one term prior to the term of graduation.

Dissertation

The doctoral program of study must include 18 hours of research credit including dissertation credit. The doctoral candidate must be continuously enrolled in dissertation credit hours (Also see: *Student Responsibility - Continuous Registration*) beginning with the semester after the dissertation topic proposal is approved until the semester of graduation.

It is generally expected that all dissertation committee members be physically present for the dissertation proposal defense and for the dissertation final defense. If there is an exceptional case in which one committee member needs to participate in the proposal or final defense from a remote location, the student and all committee members must assure that

all the conditions listed on the Approval of Remote Committee Participation Form are met. (No more than one committee member may participate from a remote location.) This form, which may be obtained from the Graduate School, must be completed and returned to the Graduate School at least two weeks prior to the scheduled proposal or final defense.

The dissertation must be submitted for final review by the student's committee at least three weeks before the date of the final examination in which the dissertation is defended. Following the successful completion of this defense, the doctoral candidate must submit one electronic copy of the approved error-free manuscript to the Graduate School (via ProQuest) no later than the filing date indicated in the University calendar. Guidelines for the preparation of the dissertation are online at gradlife.uncc.edu/resources/dissertation-thesis-formatting. Each student must submit the Defense Report for Doctoral Dissertation and/or Master's thesis form, the Submission and ETD Signature form, and the original dissertation title page to the Graduate School (with original signatures).

The Graduate School requires publication of the dissertation through ProQuest, an online database of dissertations. The student is responsible for paying the optional copyrighting fees. Any other arrangements for publications of the dissertation must not interfere with publication through ProQuest. It may be appropriate for some students to restrict access to their dissertation temporarily (such as when a patent application is pending). In these cases, the student and his/her committee must submit a sequester request to the Graduate School explaining why restricted access is needed.

Final Examination

Each candidate must pass a final examination over the contents of the dissertation. Sometimes called the "dissertation defense" or the "dissertation oral," this meeting is open to all members of the University community and must be announced to campus. The announcement of the final defense can be uploaded by the advisor to the Graduate School website at least 10 days prior to the date and disseminated through the Academic Affairs listserv. The announcement of the dissertation defense should include identification of the student's full name, the date of the defense, the location of the defense, the time of the defense, the title of the dissertation, the name of the Chair of the dissertation committee, and a brief Abstract of the dissertation. **The defense constitutes the final exam for a doctoral student. The decision of the faculty advisory committee is final. In the rare event of a split decision, typically the faculty come to an agreement as to whether the student defense is acceptable.** No student is permitted to take the final

examination more than twice.

Application for Degree

Students should submit the Online Graduation Application at the beginning of the term in which they anticipate defending their dissertation. Adherence to Graduate School deadlines is expected. Degree requirements are completed when students successfully defend their dissertation and file the final copy of the dissertation in the Graduate School. Students are encouraged to review their individual DegreeWorks audit to ensure they have met all graduation requirements.

Ed.D. Degree Requirements

The Doctor of Education (Ed.D.) degree is conferred by the University after the student has successfully completed all requirements in an approved doctoral program of study in the College of Education. Specific program degree requirements are described in the College of Education section of this *Catalog*.

Program of Study

Although the maximum amount of credit past the master's degree that an Ed.D. student may count towards a doctorate is 9 credit hours, only educational administration courses approved by the program coordinator may be transferred. This rule applies whether the courses were taken at UNC Charlotte or elsewhere; however, no more than six hours taken when the student was in post-baccalaureate (non-degree seeking) status may be applied toward the doctoral degree.

Time Limit

No course older than eight years may be applied towards an Ed.D. (including transfer credit). Courses that exceed this time limit must be revalidated or retaken, whichever the graduate program decides necessary, if they are to count in a degree program.

To revalidate a course, the student, along with the program coordinator and the course instructor, prepare a revalidation plan that must be reviewed and approved by the Graduate School. This plan often involves taking a special examination designed by the faculty of the graduate program. Once the plan has been completed, the program coordinator must notify the Graduate School in writing. The Revalidation Form is available on the Graduate School website at graduateschool.uncc.edu/current-students/forms.

Students may not revalidate courses with a grade of C or lower, courses that are internships or other forms of practica, or courses taken at other institutions.

Additionally, no more than 25% of the courses on a student's program of study may be revalidated, and no course older than ten years may be revalidated.

Qualifying Assessment

Students are required to successfully pass a written and oral examination. Qualifying assessments are administered by graduate program faculty. The examination is based upon the core areas of educational leadership, educational research, and instructional technology. Students who fail a qualifying assessment are subject to termination and should discuss options with their graduate program director. With program approval, a qualifying assessment may be retaken one time. If the student fails the exam a second time, the program may, in rare circumstance and with compelling evidence, allow a student to, within four months, retake the exam (or portion of the exam). In such case s, the program must document the circumstances under which the student is allowed to retake portions of the exam and demonstrate that the student's committee unanimously supports the decision. Documentation must be submitted to the Graduate School for review prior to the exam date. In no instance will the student be allowed to take the exam (or portion of the exam) a fourth time. Students may only appeal a termination to the Graduate School if their appeal to retake the exam is based on a procedural error or discrimination (please see the Category 2 appeal description under *Appeal for Academic Termination*) and their initial appeal to the program was denied.

Admission to Candidacy Requirements

Students are recommended for admission to candidacy after successfully completing the written and oral comprehensive examination. A student may not achieve candidacy and graduate in the same term. Candidacy must be achieved at least one term prior to the term of graduation.

Dissertation

Students must complete and defend a dissertation focused on a specific problem or question relevant to K-12 or higher education organizations, administration, or leadership. Students must be continually enrolled in ADMN 8999 (3 credit hours; (Fall, Spring, and Summer semesters) for dissertation research credit, beginning with the semester following completion of the comprehensive examination and continuing through the semester of their graduation. Defense of their dissertation is conducted in a final oral examination that is open to members of the University community. The announcement of the final defense can be uploaded by the advisor to the

Graduate School website at least 10 days prior to the date and disseminated through the Academic Affairs listserv. The announcement of the dissertation defense should include identification of the student's full name, the date of the defense, the location of the defense, the time of the defense, the title of the dissertation, the name of the Chair of the dissertation committee, and a brief Abstract of the dissertation.

The defense constitutes the final exam for a doctoral student. The decision of the faculty advisory committee is final. In the rare event of a split decision, typically the faculty come to an agreement as to whether the student defense is acceptable. No student is permitted to take the final examination more than twice.

For doctoral students, the committee will consist of at least four Graduate Faculty members, one of whom is appointed by the Dean of the Graduate School as the Graduate Faculty Representative.

The committee for doctoral students is indicated on the Appointment of Doctoral Dissertation Committee form (available in the Graduate School office or on-line). At the time that the Appointment of Doctoral Dissertation Committee form is approved, the Graduate School appoints the Graduate Faculty Representative to serve on the doctoral committee.

It is generally expected that all dissertation committee members be physically present for the dissertation proposal defense and for the dissertation final defense. If there is an exceptional case in which one committee member needs to participate in the proposal or final defense from a remote location, the student and all committee members must assure that all the conditions listed on the Approval of Remote Committee Participation Form are met. (No more than one committee member may participate from a remote location.) This form, which may be obtained from the Graduate School, must be completed and returned to the Graduate School at least two weeks prior to the scheduled proposal or final defense.

The dissertation must be submitted for final review by the student's committee at least three weeks before the date of the final examination in which the dissertation is defended. Following the successful completion of this defense, the doctoral candidate must submit one electronic copy of the approved error-free manuscript to the Graduate School (via ProQuest) no later than the filing date indicated in the University calendar. Guidelines for the preparation of the dissertation are online at gradlife.uncc.edu/resources/dissertation-thesis-formatting. Each student must submit the Defense Report for Doctoral Dissertation and/or Master's thesis form, the Submission and ETD Signature form, and the original dissertation title page to the Graduate School

(with original signatures).

The Graduate School requires publication of the dissertation through ProQuest, an online database of dissertations. The student is responsible for paying the optional copyrighting fees. Any other arrangements for publications of the dissertation must not interfere with publication through ProQuest. It may be appropriate for some students to restrict access to their dissertation temporarily (such as when a patent application is pending). In these cases, the student and his/her committee must submit a sequester request to the Graduate School explaining why restricted access is needed.

Graduate Faculty Representative

The graduate faculty representative is a member of the doctoral student's advisory committee appointed by the Graduate School. This faculty member's role is primarily but not totally procedural. He/she must 1) assure that the doctoral student is treated fairly and impartially by his or her advisory committee, and 2) assure that University standards and policies are upheld. For these reasons it is helpful for faculty serving in this role to have prior experience serving on a dissertation committee. The faculty member may also participate in the development and evaluation of the student's research to the extent appropriate for the faculty member's background. The Graduate Faculty Representative is a full voting member of the committee. This representative is generally appointed prior to the student's dissertation proposal defense and must participate in the formation of the student's topic and in the final dissertation examination. A student's advisor may consult with the Graduate School regarding selection of this representative.

Application for Degree

Students should submit the Online Graduation Application at the beginning of the term in which they anticipate defending their dissertation. Adherence to Graduate School deadlines is expected. Degree requirements are completed when students successfully defend their dissertation and file the final copy of the dissertation in the Graduate School. Students are encouraged to review their individual Degree Works audit to ensure they have met all graduation requirements.

DNP Degree Requirements

The Doctor of Nursing Practice (DNP) degree is conferred by the University after the student has

successfully completed all requirements in an approved doctoral program of study in the School of Nursing. Specific program degree requirements are described in the College of Health and Human Services section of this *Catalog*.

Program of Study

No more than 6 credit hours will be accepted for transfer into the DNP program. This rule applies whether the courses were taken at UNC Charlotte or elsewhere. Eligibility of courses for transfer is determined jointly by the School of Nursing and the Graduate School.

Time Limit

No course older than six years may be applied towards the DNP degree (including transfer credit). Courses that exceed this time limit must be revalidated or retaken, whichever the graduate program decides necessary, if they are to count in a degree program.

To revalidate a course, the student, along with the program coordinator and the course instructor, prepare a revalidation plan that must be reviewed and approved by the Graduate School. This plan often involves taking a special examination designed by the faculty of the graduate program. Once the plan has been completed, the program coordinator must notify the Graduate School in writing. The Revalidation Form is available on the Graduate School website at graduateschool.uncc.edu/current-students/forms.

Students may not revalidate courses with a grade of C or lower, courses that are internships or other forms of practica, or courses taken at other institutions.

Additionally, no more than 25% of the courses on a student's program of study may be revalidated, and no course older than ten years may be revalidated.

Qualifying Assessment

Upon approval of the DNP Scholarly Project topic, the student begins to develop the project. Once the project development is complete, the student presents to the committee the final proposal for the project. The student's DNP Scholarly Project proposal serves as the primary component of the qualifying assessment for the DNP program. Students who fail a qualifying assessment are subject to termination and should discuss options with their graduate program director. With program approval, a qualifying assessment may be retaken one time. If the student fails the assessment a second time, the program may, in rare circumstance and with compelling evidence, allow a student to, within four months, retake the exam (or portion of the exam). In such cases, the program must document the circumstances under which the student is allowed to retake portions of the

exam and demonstrate that the student's committee unanimously supports the decision. Documentation must be submitted to the Graduate School for review prior to the exam date. In no instance will the student be allowed to take the exam (or portion of the exam) a fourth time. Students may only appeal a termination to the Graduate School if their appeal to retake the exam is based on a procedural error or discrimination (please see the Category 2 appeal description under *Appeal for Academic Termination*) and their initial appeal to the program was denied.

Admission to Candidacy Requirements

Students are recommended for admission to candidacy after successfully completing the DNP Scholarly Project defense. A student may not achieve candidacy and graduate in the same term. Candidacy must be achieved at least one term prior to the term of graduation.

Scholarly Project

Students complete a DNP Scholarly Project in conjunction with their clinical residency courses. The DNP Scholarly Project is a project that brings together the practice and scholarship aspects of the Doctor of Nursing Practice degree. It is designed to address complex practice issues that affect groups of patients, healthcare organizations, or healthcare systems while utilizing informatics, technology, and in-depth knowledge of the clinical and behavioral sciences. The clinical scholarship required in the DNP Scholarly Project reflects mastery and competency in the student's area of expertise. The DNP Scholarly Project begins in the first semester of study and continues throughout the program, culminating in a scholarly public defense. Defense of the Scholarly Project is conducted in a final oral examination that is open to members of the University community. The announcement of the final defense can be uploaded by the advisor to the Graduate School website at least 10 days prior to the date and disseminated through the Academic Affairs listserv. The announcement of the Scholarly Project defense should include identification of the student's full name, the date of the defense, the location of the defense, the time of the defense, the title of the Scholarly Project, the name of the Chair of the Scholarly Project committee, and a brief Abstract of the dissertation. **The defense constitutes the final exam for a doctoral student. The decision of the faculty advisory committee is final. In the rare event of a split decision, typically the faculty come to an agreement as to whether the student defense is acceptable.** No student is permitted to take the final examination more than twice.

The DNP Scholarly Project is guided by the DNP Scholarly Project Committee. The composition of the

DNP Scholarly Project committee includes: 1) a chair who is a doctoral prepared faculty member with regular graduate faculty status at UNC Charlotte; 2) an expert clinical mentor (Ph.D., DNP, M.D. or other doctoral prepared individual; 3) one additional faculty member; and 4) a graduate faculty representative appointed by the Graduate School at UNC Charlotte. It is the responsibility of the DNP Scholarly Project Committee to guide the student through project planning, implementation, and evaluation process. The committee for doctoral students is indicated on the Appointment of Doctoral Dissertation Committee form (available on-line at the Graduate School's website). At the time that the Appointment of Doctoral Dissertation Committee form is approved, the Graduate School appoints the Graduate Faculty Representative to serve on the doctoral committee.

It is generally expected that all Scholarly Project committee members be physically present for the Scholarly Project proposal defense and for the final defense. If there is an exceptional case in which one committee member needs to participate in the proposal or final defense from a remote location, the student and all committee members must assure that all the conditions listed on the Approval of Remote Committee Participation Form are met. (No more than one committee member may participate from a remote location.) This form, which may be obtained from the Graduate School's website, must be completed and returned to the Graduate School at least two weeks prior to the scheduled proposal or final defense.

The Scholarly Project must be submitted for final review by the student's committee at least three weeks before the date of the final examination in which the Scholarly Project is defended. Following the successful completion of this defense, the doctoral candidate must submit one electronic copy of the approved error-free manuscript to the Graduate School (via ProQuest) no later than the filing date indicated in the University calendar. Guidelines for the preparation of the Scholarly Project are available from the Graduate School and online at gradlife.uncc.edu/resources/dissertation-thesis-formatting. Each student must submit the **Defense Report for Doctoral Dissertation and/or Master's thesis form and the original dissertation title page to the Graduate School (with original signatures).**

The Graduate School requires publication of the Scholarly Project through ProQuest, an on-line database of dissertations. The student is responsible for paying the optional copyrighting fees. Any other arrangements for publications of the dissertation must not interfere with publication through ProQuest.

Graduate Faculty Representative

The graduate faculty representative is a member of the doctoral student's advisory committee appointed by the Graduate School. This faculty member's role is primarily but not totally procedural. He/she must 1) assure that the doctoral student is treated fairly and impartially by his or her advisory committee, and 2) assure that University standards and policies are upheld. For these reasons it is helpful for faculty serving in this role to have prior experience serving on a Scholarly Project committee. The faculty member may also participate in the development and evaluation of the student's research to the extent appropriate for the faculty member's background. The Graduate Faculty Representative is a full voting member of the committee. This representative is generally appointed prior to the student's Scholarly Project proposal defense and must participate in the formation of the student's topic and in the final Scholarly Project examination. A student's advisor may consult with the Graduate School regarding selection of this representative.

Application for Degree

Students should submit the Online Graduation Application at the beginning of the term in which they anticipate defending their dissertation. Adherence to Graduate School deadlines is expected. Degree requirements are completed when students successfully defend their Scholarly Project and file the final copy of the Scholarly Project in the Graduate School. Students are encouraged to review their individual DegreeWorks audit to ensure they have met all graduation requirements.

Graduate Certificate Requirements

The graduate certificate is awarded for successful completion of a coherent program of at least 12 credit hours proposed by a unit of the graduate faculty and approved by the Graduate Council. Students are admitted to a particular graduate certificate program and are advised by faculty in the unit offering the graduate certificate. Admission to a graduate certificate program is separate and distinct from admission to a graduate degree program. Admission to a certificate program is not an indication of subsequent admission to a degree program just as admission to a degree program is not an indication of admission to a certificate program.

Since the graduate certificate is not a degree, students may apply the credits earned in the certificate

program toward a single degree that they pursue either in conjunction with the graduate certificate or after the certificate has been awarded. However, students may not apply credits earned in one certificate program toward the satisfaction of requirements in a second certificate program.

Students may enroll in a graduate certificate program only or may complete the certificate in conjunction with a graduate degree program at the University. Hours taken toward a graduate certificate may be counted toward a graduate degree program with the recommendation of the graduate program coordinator and the approval of the Graduate School.

Graduate certificate programs generally require at least 12 credit hours of graduate coursework. Up to six hours taken at post-baccalaureate status at UNC Charlotte may be applied toward a certificate with the recommendation of the program coordinator and the approval of the Graduate School. Students ordinarily may not transfer hours from another institution into a certificate program. The graduate certificate is awarded to a student who has completed the specified program of study with a GPA of 3.0 or above within four years from the time of enrollment in the first certificate course and has applied to graduate.

Time Limit

No courses older than four years may be applied towards a graduate certificate. Courses that exceed this time limit must be retaken.

Application for Certificate

Students should submit the Online Graduation Application at the beginning of the term in which they anticipate completion of the certificate program. Adherence to Graduate School deadlines is expected. Students are encouraged to review their individual DegreeWorks audit to ensure they have met all graduation requirements.

Note: No Graduate Certificates will be awarded retroactively.

Academic Records and Transcripts

The Office of the Registrar is responsible for maintaining the official academic records for all students. Upon written request by the student or an online request through Banner Self-Service, an official transcript of the academic record will be issued to the person or institution designated, provided that all the student's obligations to the University have been settled satisfactorily.

Requests should reach the Office of the Registrar at least one week before the date the transcript is needed. Students may request an official transcript through the secure student access pages of Banner Self Service within My UNC Charlotte online at my.uncc.edu or complete a request form available at registrar.uncc.edu/students/transcript-order. The Office of the Registrar cannot accept requests via email or telephone.

Family Educational Rights and Privacy Act (FERPA) Notification

In establishing [University Policy 402, Student Education Records](#), UNC Charlotte adheres to a policy of compliance with the [Family Educational Rights and Privacy Act of 1974](#), also known as FERPA, a federal law that affords students the following rights with respect to their education records:

1. To inspect and review the student's education records:

Students should submit to the Office of the Registrar, dean of their college, chair of their major academic department, or other appropriate official written requests that identify the record(s) they wish to inspect. University official will make arrangements for access and notify the student of the time and place where the records may be inspected. If the records are not maintained by the University official to whom the request was submitted, that official shall advise the student of the correct official to whom the request should be addressed.

2. To consent to disclosure of the student's education records to third parties, except to the extent that FERPA authorizes disclosure without consent, as follows:

1. Directory Information. Directory information (as defined in [Section I](#) of University Policy 402), including student images and email addresses, may appear in public documents and may otherwise be disclosed without student consent unless a student submits a [request form](#) to the Registrar to withhold such information from disclosure. A request for non-disclosure will be honored by the University indefinitely, unless the student submits to the Registrar a written revocation of such request for non-disclosure.

2. University Officials. University officials with legitimate educational interests in the student's education records are allowed access to student education records. A "legitimate educational interest" is defined as an interest that is essential to the general process of higher education, including teaching, research, public service, academic advising, general counseling, discipline, job placement, financial assistance, medical services, and academic assistance activities. University officials who may have access to only those education records in which they have legitimate educational interests include, but are not limited to, personnel in the following offices:

- Undergraduate Admissions
- Graduate Admissions
- Office of University Registrar
- Academic Services
- Financial Aid
- Financial Services
- Auxiliary Services
- Student Employment Office
- University Center for Academic Excellence
- Career Center
- Counseling Center
- Office of Adult Students and Evening Services
- Disability Services
- Information Technology Services, for technical support associated with maintaining student education records only
- Internal Audit
- Office of Enrollment Management
- Office of Director of Athletics
- Office of Vice Chancellor for Student Affairs
- Office of Vice Chancellor for Business Affairs
- Office of Dean of Students
- Office of Dean of Graduate School

- Office of International Programs
- Offices of Chairpersons of Departments
- Offices of Deans of Colleges
- Offices of Directors of Interdisciplinary Units
- Office of Provost
- Office of Chancellor
- Office of Legal Affairs
- Campus Police, for internal law enforcement or health and safety purposes only
- University Advancement
- Academic counselors and advisors
- Campus Behavioral Intervention Team
- Office of Institutional Research
- Other academic and administrative personnel, as approved by the Chancellor

3. Parents of Dependents. Parents of a student who is a dependent for federal tax purposes, as defined by [Section 152 of the Internal Revenue Code of 1954](#), may have access to that student's education records without prior consent of the student. Parents may demonstrate the tax dependency of a student only by submitting to the University a copy of the first and signature pages of their most recently filed federal income tax return (with personal financial data removed). Alternatively, a student may demonstrate tax dependency, and thus allow parental access to the student's records without prior consent of the student, by submitting to the University a signed statement of his or her tax dependency. If a dependent student's parents are divorced, both parents may have access to the student's records, so long as at least one parent claims the student as a dependent.

4. Other Institutions. The University may release a student's education records to officials of another school, school system, or institution of postsecondary education where the student seeks or intends to enroll, or where the student is already enrolled, so long as the disclosure is for purposes related to the student's enrollment or transfer.

5. Financial Aid. The University may release a student's education records to persons or organizations in connection with that student's application for, or receipt of, financial aid, but only to the extent necessary for such purposes as determining eligibility, amount, conditions, and enforcement of terms or conditions of such financial aid.

6. Accreditation Agencies. The University may release students' education records to accreditation organizations or agencies for purposes necessary to carry out their

accreditation functions.

7. Judicial Orders. Information concerning a student shall be released in response to a judicial order or lawfully issued subpoena, subject to the conditions set forth in 34 CFR § 99.31(a)(9). The University will make reasonable efforts to notify the student of a subpoena before complying with it, except that the University shall not notify a student of a subpoena if it is from a federal grand jury or is for law enforcement purposes, and it provides that the University shall not disclose to any person the existence or contents of the subpoena or any information furnished in response to the subpoena.

8. Litigation. If the University initiates legal action against a parent or student, or if a parent or student initiates legal action against the University, the University may disclose to the court, without a court order or subpoena, the education records of the student that are relevant for the University to proceed with the legal action as plaintiff or to defend itself in such legal action.

9. Health and Safety. The University may, subject to the conditions set forth in 34 CFR § 99.36, disclose student information to appropriate persons, including parents of a student, in connection with an emergency if knowledge of the information is necessary to protect the health or safety of the student or other individuals.

10. Student Conduct Hearing Results.

Disclosure to Victims: The University may disclose to an alleged victim of any crime of violence (as that term is defined in [Chapter 1, Section 16 of Title 18, United States Code](#)), or a non-forcible sex offense, the final results of any student conduct proceeding conducted by the University against the alleged perpetrator of such crime or offense with respect to such crime or offense, regardless of whether the alleged perpetrator was found responsible for violating the University's rules or policies with respect to such crime or offense.

Disclosure to Third Parties: The University may disclose the final results of any student conduct proceeding against a student who is an alleged perpetrator of any crime of violence or non-forcible sex offense (as those terms are defined in 34 C.F.R. 99.39), if the student is found responsible on or after October 7, 1998, for violating the University's rules or policies with respect to such crime or offense. Such disclosure shall

include only the name of the student, the violation committed, and any sanction imposed by the University on that student. Such disclosure may include the name of any other student, such as a victim or witness, only with the written consent of that other student.

11. Alcohol and Drug Violations. The University may disclose to a parent or legal guardian of a student, information regarding any violation of any Federal, State, or local law, or of any rule or policy of the University, governing the use or possession of alcohol or a controlled substance, regardless of whether that information is contained in the student's education records, if the student is under the age of 21 at the time of disclosure to the parent, and the University determines that the student is responsible for a student conduct violation with respect to such use or possession.

12. Federal, State, and Local Officials and Educational Authorities. Subject to the requirements of 34 CFR [§ 99.35](#), the University may disclose education records to authorized representatives of (i) The Comptroller General of the United States; (ii) The Attorney General of the United States; (iii) The Secretary; or (iv) State and local educational authorities.

13. Institutional Studies. The University may disclose education records, but only under the conditions set forth in [34 CFR § 99.31\(a\)\(6\)](#), to organizations conducting studies for, or on behalf of, educational agencies or institutions to (A) Develop, validate, or administer predictive tests; (B) Administer student aid programs; or (C) Improve instruction.

14. Contractors. The University may disclose education records to a contractor, consultant, volunteer, or other party to whom the University has outsourced institutional services or functions, provided that the outside party:

- a. Performs an institutional service or function for which University would otherwise use employees;
- b. Is under the direct control of the University with respect to the use and maintenance of education records; and
- c. Is subject to the requirements of Section 99.33(a) governing the use and redisclosure of Personally Identifiable Information from education records.

15. Registered Sex Offenders. The University may disclose education records concerning sex offenders and other individuals required to

register under Section 170101 of the Violent Crime Control and Law Enforcement Act of 1994, 42 U.S.C. 14071, if the information was provided to the University under 42 U.S.C. 14071 and applicable Federal guidelines.

3. To request amendment of the student's education records to ensure that they are not inaccurate or misleading:

A student who wishes to ask the University to amend a record should write the University Registrar, clearly identify the part of the record the student wants changed, and specify why it should be changed.

If the University decides not to amend the record as requested, the University will notify the student in writing of the decision and the student's right to a hearing regarding the request for amendment. Additional information regarding the hearing procedures will be provided to the student when notified of the right to a hearing.

4. To be notified of the student's privacy rights under FERPA, as indicated by this Notification.

5. To file a complaint with the U.S. Department of Education concerning alleged failures by the University to comply with the requirements of FERPA. The name and address of the Office that administers FERPA is:

Family Policy Compliance Office
U.S. Department of Education
400 Maryland Avenue, SW
Washington, DC 20202-8520

"Directory Information" means information in a student's education record that would not generally be considered harmful or an invasion of privacy if disclosed. At UNC Charlotte, directory information consists of the student's name, major field of study, dates of attendance, enrollment status, and degrees and awards (including scholarships) received. Photographs, videos, or other media containing a student's image or likeness (collectively, "student images") and University-issued student electronic mail addresses ("email addresses") are designated by UNC Charlotte as "limited use directory information." Use and disclosure of limited use directory information will be restricted to: (1) publication in official University publications or on social media sites or websites hosted or maintained by, on behalf of, or for the benefit of the University, including the University's online directory and internal email system; (2) University officials who have access, consistent with FERPA, to such information and only in conjunction with a legitimate educational interest; and (3) external parties contractually affiliated with

the University, provided such affiliation requires the sharing of limited use directory information.

"Education Records" include records directly related to a student that are maintained by UNC Charlotte. Education records **do not** include:

1. Records of instructional, administrative, and educational personnel that are in the sole possession of the maker (i.e. file notes of conversations), are used only as a personal memory aid, and are not accessible or revealed to any individual except a temporary substitute;
2. Records of the UNC Charlotte campus police;
3. Student medical and counseling records created, maintained, and used only in connection with provision of medical treatment or counseling to the student, that are not disclosed to anyone other than the individuals providing the treatment. (While a student may not inspect his or her medical records, these records may be reviewed by a physician of the student's choice);
4. Employment records unrelated to the student's status as a student;
5. Records created or received by an educational agency or institution after an individual is no longer a student in attendance, and that are not directly related to the individual's attendance as a student;
6. Grades on peer-graded papers before they are collected and recorded by a teacher.

"Personally Identifiable Information" includes, but is not limited to:

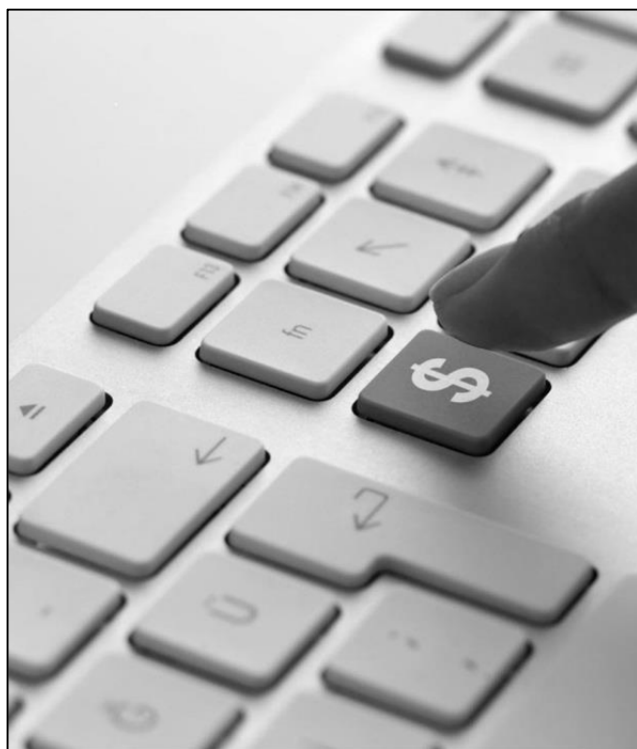
- a. The student's name;
- b. The name of the student's parent or other family members;
- c. The address of the student or student's family;
- d. A personal identifier, such as the student's social security number, student identification number, or biometric record;
- e. Other indirect identifiers, such as the student's date of birth, place of birth, and mother's maiden name;
- f. Other information that, alone or in combination, is linked or linkable to a specific student that would allow a reasonable person in the school community, who does not have personal knowledge of the relevant circumstances, to identify the student with reasonable certainty; or
- g. Information requested by a person who the University reasonably believes knows the identity of the student to whom the education record relates.

"Student" means an individual who is or who has been in attendance at UNC Charlotte. It does not include persons who have been admitted but did not

attend at the University. For the purposes of this policy, "attendance" includes attendance in person or by paper correspondence, videoconference, satellite, Internet, or other electronic information and telecommunications technologies for students who are not physically present in the classroom; and the period during which a person is working under a UNC Charlotte work-study program.

UNC Charlotte intends to comply fully with these requirements. University Policy 402, Student Records, explains the procedures for compliance. Students may obtain copies of the policy in the Office of the Registrar or online at legal.uncc.edu/policies/up-402. That policy includes a list of the locations of all education records maintained by the institution.

All questions concerning this FERPA Annual Notification may be directed to the attention of the Office of the Registrar.



Financial Information

studentaccounts.uncc.edu

Tuition and Fees

Tuition rates are reviewed by the University's Board of Trustees and the Board of Governors of the University of North Carolina System, and set annually by the North Carolina legislature. Fees are reviewed and approved by the University's Board of Trustees with final approval pending the Board of Governors of the University of North Carolina System review.

Tuition and fees are billed by the semester for Fall and Spring terms and by credit hour for Summer terms. Twelve or more credit hours are considered full-time for undergraduates, and nine or more credit hours are considered full-time for graduates.

Students taking fewer than the 12 credit hours for undergraduate study or 9 credit hours for graduate study are charged a prorated portion of tuition and fees.

Charges for tuition and fees vary according to the student's status as a resident or non-resident of North Carolina. A non-resident student pays a higher rate of tuition than a legal resident. For more details, see the heading for *Residence Status for Tuition Purposes* later in this section.

Following are the tuition and required fees for **2016-2017**:

GRADUATE TUITION AND FEES				
	0-2 Credit Hours	3-5 Credit Hours	6-8 Credit Hours	9+ Credit Hours
Tuition (NC Resident)	531.50	1063.00	1594.50	2126.00
Tuition (Non-NC Resident)	2178.00	4355.75	6533.75	8711.50
Ed & Tech Fee	115.00	115.00	184.00	276.00
Food Service Facility Fee	10.00	10.00	10.00	10.00
General Fee	517.25	517.25	831.25	1180.25
ID Fee	7.00	7.00	7.00	7.00
Safety & Security Fee	6.25	6.25	10.00	15.00
Transportation Services Fee	24.00	24.00	24.00	24.00
UNC System Assoc Fee	0.15	0.15	0.25	0.50
Total Cost (NC Resident)	1211.15	1742.65	2661.00	3639.00
Total Cost (Non-NC Resident)	2857.65	5035.40	7600.25	10224.50

GRADUATE TUITION INCREMENT

(This is an additional per term charge that is assessed to all students in these programs)

	0-2 Credit Hours	3-5 Credit Hours	6-8 Credit Hours	9+ Credit Hours
College of Arts + Architecture				
Master's degrees	218.75	437.50	656.25	875.00
College of Business				
M.S. & Grad Certificate in Data Science & Business Analytics	875.00	1750.00	2625.00	3500.00
Master's degrees and Graduate Certificates (excluding Data Science & Business Analytics)	750.00	1500.00	2250.00	3000.00
College of Computing and Informatics				
Master's degrees & Graduate Certificates	337.50	675.00	1012.50	1350.00
College of Engineering				
Doctoral and Master's Programs	225.00	450.00	675.00	900.00
College of Health and Human Services				
Master of Health Administration	337.50	675.00	1012.50	1350.00
M.S. & Grad Certificate in Health Informatics	337.50	675.00	1012.50	1350.00
Doctor of Nursing Practice	600.00	1200.00	1800.00	2400.00
Ph.D. in Public Health Sciences	225.00	450.00	675.00	900.00
College of Liberal Arts & Sciences				
M.A. in I/O Psychology	300.00	600.00	900.00	1200.00

The University reserves the right, with the approval of proper authorities, to make changes in tuition and fees at any time. The University also reserves the right to correct any clerical errors on a student's account. For the most current listing of tuition and fees at The University of North Carolina at Charlotte, see studentaccounts.uncc.edu.

TUITION SURCHARGE

UNC Charlotte follows regulations regarding Tuition Surcharge established by the State of North Carolina. These regulations change frequently. The current state policy can be found at

registrar.uncc.edu/common-requested-information/tuition-surcharge.

REQUIRED FEES

The required fees included in the Tuition and Fees table above are explained below.

Ed and Tech Fee

This fee is directly related to the infrastructure supporting student technology needs across campus including hardware and software applications, supplies for educational materials, web services, laboratory expenses and equipment, public student computing labs, central email and Internet services, training classes and classrooms, and central help desk services.

Food Service Facilities Fee

This fee provides funds to support year round access, maintenance, repairs, and operation of campus dining facilities.

General Fee

This is a consolidated fee that relates to University debt service payments (to construct new facilities and purchase administrative computing systems) and to support other activities/operations including Athletics programs and events, the Student Health Center that serves our student population, Student Activity Center operations, and Cone Center operations. The following fees are consolidated into the General Fees:

- *Athletics* - Funds intercollegiate athletics, including salaries and maintenance and operation of athletic facilities.
- *Health Services* - Funds medical services for students, including the salaries, maintenance and operation of student health centers.
- *Student Activities* - Funds non-academic student services (student unions, intramural facilities, student organizations, newspapers, yearbooks, and entertainment programs).
- *Debt Service* - Funds the principal and interest for capital projects. Examples for UNC Charlotte include the Student Union, Football Stadium, and Student Activity Facility.

ID Fee

This fee supports the University's 49er Card operations and support. The ID card is not only used for identification purposes, but also as a library card and as a campus card for dining and vending purchases. This fee does not cover a replacement card of a lost or stolen card.

Transportation Fee

This fee helps to fund the campus transportation shuttle system which operates during the Fall and Spring semesters. The shuttle serves to provide the UNC Charlotte campus with efficient and safe campus transportation, reduce vehicular congestion, and decrease the demand for proximity parking.

UNC System Student Association Fee

This fee is a University of NC system-wide fee charged to all system students to support the University Of North Carolina Association of Student Governments. This association is a student led advocacy group whose main purpose is to ensure that the benefits of the University of North Carolina are extended to the people of North Carolina, as far as practicable, free of expense.

SPECIAL FEES

The following additional course fees are charged to cover the cost of supplies or special materials:

ADDITIONAL COURSE FEES FOR GRADUATE STUDENTS (PER SEMESTER)

Course	Fee
GRAD 7999 Certificate/Master's Graduate Residency (Resident)	\$209
GRAD 7999 Certificate/Master's Graduate Residency (Non-Resident)	\$855
GRAD 9999 Doctoral Graduate Residency (Resident)	\$209
GRAD 9999 Doctoral Graduate Residency (Non-Resident)	\$855

Application Fee

A \$60 application fee must be submitted with the application for admission. The fee is nondeductible and nonrefundable.

Credit by Examination Fee

A written examination for a course requires a fee of \$15. A laboratory examination requiring the arrangement of such things as laboratory materials will require a fee of \$25. A combination of a laboratory and written examination will require a fee of \$30.

Matriculation Fee

Instead of paying separate fees for such things as new student convocation, commencement, and hardcopy academic transcripts, UNC Charlotte students pay a matriculation fee and receive these and other services at no charge. Students are charged the \$100 matriculation fee upon entry into a baccalaureate,

graduate certificate/master's, and doctoral program at UNC Charlotte.

RESIDENCE STATUS FOR TUITION PURPOSES

Tuition charges are based upon classification of a student as a resident or a non-resident of North Carolina for tuition purposes. UNC Charlotte shall determine whether a student is a resident or a non-resident for tuition purposes in accordance with North Carolina General Statutes that are summarized below. A more complete explanation of the statute and the procedures are contained in *The North Carolina State Residence Classification Manual*. Copies of the *Manual* are available for inspection in the Library, in the Residency Determination Office, and online at NCresidency.uncc.edu.

Residence

Generally, in order to qualify as a resident for tuition purposes, a person must be a legal resident of North Carolina AND must have been domiciled in North Carolina for at least twelve (12) consecutive months immediately prior to the beginning of the term. In order to be eligible for such classification, the person must establish that his or her presence in the state during such twelve-month period was for purposes of maintaining a bona fide domicile rather than for purposes of mere temporary residence incident to enrollment in an institution of higher education.

Initiative and Proof of Status

A student is responsible for seeking reclassification as a resident for tuition purposes. A student must (1) provide all of the information that the residency application requires for consideration of residence classification and (2) establish facts that justify classification as a resident for tuition purposes. (See *Residence Application Procedure below*.)

Parents' Domicile

If a dependent student has living parents or a court-appointed guardian who maintain bona fide domicile in North Carolina, this fact shall be prima facie evidence that the student is also domiciled in North Carolina. ***This primary proof of the student's legal residence may be supported or rebutted by other information relative to the applicant's age and general circumstances.***

If a student's parents or legal guardian are domiciled outside of North Carolina, this fact shall be prima facie evidence that the student is also not domiciled in North Carolina, unless the student has lived in North Carolina for five consecutive years preceding enrollment or re-registration at UNC Charlotte.

Domicile of Non-U.S. Citizens

If a student is not a U.S. citizen, he or she may or may not qualify for resident tuition on the same basis as a U.S. citizen. The type of immigration documentation held by the student will determine if he or she has capacity to (i.e., is legally able to) establish legal residence for tuition purposes. However, that person must still take the actions and have the intent necessary to establish legal residence.

Effect of Marriage

A person does not automatically obtain North Carolina domicile solely by marrying a North Carolina resident. If both student and spouse have established a North Carolina domicile and the spouse has met the 12-month requirement, the student who has not met the requirement may borrow his or her spouse's domicile to meet the 12-month requirement. However, the two durations cannot be added together to meet the 12-month requirement.

Military Personnel

A North Carolinian who serves outside the State in the armed forces does not lose North Carolina domicile and thus North Carolina legal residence simply by reason of such service. Students in the military may prove retention or establishment of legal residence by reference to residentiary acts accompanied by residentiary intent.

An active duty service member stationed in North Carolina, as well as his or her spouse, dependent children, and dependent relatives who are living with the service member shall be charged the in-state tuition rate along with any applicable mandatory fees. Under this provision, the dependent relative must comply with any applicable requirements of the Selective Service System.

Also, members of the North Carolina National Guard may be eligible to pay the in-state rate while attached to a military unit in North Carolina. Only the Guard member is eligible for this benefit.

Tuition benefits based on military service may be enjoyed only if requirements for admission to UNC Charlotte have been met. The military service tuition statute does not qualify a person for or provide the basis for receiving derivative benefits under other tuition statutes.

Employees

Permanent full-time employees of The University of North Carolina who are legal residents of North Carolina qualify for the in-state rate even if they do not meet the 12-month requirement. The employee's spouse and dependent children (using income tax

dependency as the standard) who are legal residents also qualify for this benefit.

Grace Period

If a student (1) is a legal resident of North Carolina, (2) has consequently been classified a resident for tuition purposes, and (3) has subsequently lost North Carolina legal residence while enrolled at UNC Charlotte, the student may continue to enjoy the in-state tuition rate for a grace period of 12 months measured from the date the student lost his or her status as a legal resident. If the 12 month grace period ends during an academic term in which the student is enrolled at UNC Charlotte, the grace period extends to the end of that term. Marriage to one domiciled outside of North Carolina does not, by itself, cause loss of legal residence.

Minors

Minors (persons under 18 years of age) usually have the domicile and thus the legal residence of their parents. This presumption may be rebutted by other information in the case of divorce, legal separation, a deceased parent or a minor living with neither parent. Certain specific cases are recognized in determining residence for tuition purposes.

- a) If a minor's parents live apart, the minor's legal residence is deemed to be North Carolina for the time period(s) that either parent, as a legal resident of North Carolina, may claim and does claim the minor as a tax dependent. Under this provision, a minor deemed to be a legal resident will not, upon turning eighteen before enrolling at an institution of higher education, lose North Carolina legal residence if he or she (1) acts in a manner consistent with bona fide legal residence in North Carolina and (2) begins enrollment at UNC Charlotte no later than the Fall academic term immediately following completion of education prerequisite to admission at UNC Charlotte.
- b) If a minor has lived for five or more consecutive years in the home of adult relatives (other than parents) who are domiciled in North Carolina and if the relatives have functioned during this time as if they were personal guardians, the minor will be deemed a resident for tuition purposes for the enrolled term commencing immediately after the five years in which these circumstances have existed. Under this provision, a minor deemed to be a resident for tuition purposes immediately prior to his or her eighteenth birthday will be deemed a legal resident of North Carolina for the required 12 month period when he or she turns eighteen; provided he or she does not abandon North Carolina legal residence.

Re-Establishment of Domicile within 12 Months

If a student ceases enrollment at or graduates from an institution of higher education in North Carolina while classified a resident for tuition purposes and then abandons and reestablishes North Carolina legal residence within a 12-month period, that student shall be permitted to re-enroll at UNC Charlotte as a resident for tuition purposes without meeting the 12-month durational requirement. Under this provision, the student maintains the reestablished legal residence through the beginning of the academic term for which in-state tuition status is sought. A student may receive the benefit of this provision only once.

Transfer Students

When a student transfers from one institution of higher education to another, he or she is treated as a new student and must be assigned an initial residence classification for tuition purposes.

Admitted and Readmitted Students

A student accepted for initial enrollment at UNC Charlotte or permitted to re-enroll following an absence from the institutional program that involved a formal withdrawal from enrollment will be classified by the admitting institution either as a resident or as a non-resident for tuition purposes prior to actual enrollment.

Residency Application Procedure

A newly admitted student or continuing student who has been classified as a non-resident for tuition purposes may pursue reconsideration of the residency classification by submitting the Residence and Tuition Status Application and supporting documentation to the Residency Determination Office. The due date for submission of the NC Residence and Tuition Status Application in the Residency Determination Office along with all required documentation is by 5 p.m. on the 5th day of classes. Refer to the Residency Determination Office website at NCresidency.uncc.edu for application deadlines for each semester.

Appeal Procedure

A student, who has exhausted the residency application procedure and has been classified as a non-resident for tuition purposes, may request further consideration of that decision to the UNC Charlotte University Residence Status Appeals Board (URSAB) pursuant to the "Policy and Procedures for Determining Residence Status for Students at The University of North Carolina at Charlotte." This request must be in writing to the Chairperson of the URSAB and must be submitted to the Residency Determination Office within twenty (20) business days

from the date of the issuance of the letter of determination. The request may consist simply of the statement, "I wish to appeal the decision of my residence classification for tuition purposes." It must be dated and signed and should indicate the applicant's UNC Charlotte student identification number, academic term, mailing address, e-mail address, and phone number.

Dining, Housing, and Parking

DINING AND MEAL PLANS

Meal Plans, the 49er Account, and the Optional Dining Account all reside on the UNC Charlotte 49er ID Card.

A Meal Plan purchase provides these advantages:

- Convenience: One card for all campus dining purchases
- Variety: many places to eat on campus
- Flexibility and Lifestyle: Meal plans to fit everyone's dining needs; night and weekend dining
- Favorite Flavors: Many popular, national brands
- Dietary Preferences: Vegetarian, vegan, and healthy options available at every meal

For a listing of available dining locations, menus, Meal Plans, and Meal Plans Policies, visit aux.uncc.edu/dining/meal-plans.

HOUSING

The below figures are **2016-2017 rates** per semester and include rent, all utilities, cable TV service, Internet connectivity, Wi-Fi, weekly laundry allowance (where applicable), and membership in the Resident Students Association (RSA). *Prices and plans are subject to change.* Current pricing can be found online at housing.uncc.edu/assignments/housing-rates.

HOUSING PER SEMESTER	
Type	Fee
Apartment	\$4,130 – \$4,830
Greek Village	\$4,100 – \$4,175
Tower/Residence Hall – Double Room	\$2,955 – \$3,350
Tower/Residence Hall – Single Room (<i>if available</i>)	\$3,960 – \$4,105
Suite	\$3,740 – \$4,615

Admission to UNC Charlotte does not guarantee residence hall space. Arrangements for on-campus housing are made, after admission, with the Office of Housing and Residence Life. Shared Residence Hall space is not available to spouses or children of enrolled students.

Housing Deposit

A \$200 deposit must be submitted with all housing contracts. The deposit is not applied toward payment of fees. It is refunded only after the student has left on-campus housing and only if the student has met all financial obligations to the University. In the case of contract cancellation, the date of receipt of the written request for cancellation will determine, in part, the student's financial obligation to the University (please see the Housing Contract for the current academic year for specific terms and cancellation dates).

PARKING

Students attending UNC Charlotte (as well as faculty and staff) are required to register their motor vehicle(s) in order to park on campus. Vehicle registration and permit purchase is available online. Payment must be received before the permit is issued or mailed.

Permits are required at all times when parked on campus, unless parked in a visitor parking area or at a meter. For students, two categories of permits are issued: *Resident* (for students living on-campus) and *Commuter* (for students living off-campus).

For the 2016-2017 academic year, the annual rate for a resident or full-time commuter student is \$450. **Please reference pats.uncc.edu/parking/parking-permit-information for the most current fees listing and complete permit information including where each type of permit allows you to park.** Full-time permits are valid from August 15 of one year through August 14 of the following year. Students who graduate in December may return their parking permit for a pro-rated refund.

Two-day, discount remote lot, and night permits are reduced rate options available to commuters. Night permits and two-day permits are sold by the semester. Night permits are valid only after 3 p.m. Parking before 3 p.m. requires parking and payment at the meters or in visitors' spaces. Two-day permits are valid on specified weekdays; parking on any other day requires payment at meters or in visitors' spaces.

The primary factor that determines permit prices is the cost of new deck construction and replacing flat lots with decks. Neither tuition dollars nor state funds are used toward parking facilities; therefore, parking fees

must pay for construction and maintenance of all decks and lots and associated operations.

Penalties for Parking Violations

Violators of University parking regulations are subject to monetary penalties ranging from \$20 to \$450, depending on the severity of the violation. Copies of parking regulations are distributed with the parking permit. Additionally, citations enforced and penalties assessed can be found online at pats.uncc.edu. If a citation is not paid or appealed within 10 days, the penalty will be applied to the student's account with the University. Subsequent registration may be withheld for non-payment. Parking and Traffic regulations are enforced 24 hours a day, seven days a week. Currently, permits are enforced at all times, and meters are enforced from 5 a.m. on Monday through 10 p.m. on Friday.

The Parking and Transportation Services website, pats.uncc.edu, is where you'll find the UNC Charlotte parking ordinances, all parking policy information, permit and citation FAQs and updates, and changes or disruptions to parking areas. Information about the campus shuttle and SafeRide services may also be found there.

Questions concerning parking on campus should be directed to Parking and Transportation Services Call Center at 704-687-0161, 5 a.m. on Monday through 10 p.m. on Friday, except on University Holidays or when the University is closed. Office hours are 7:30 a.m. to 5:00 p.m., Monday-Friday. Emergency situations and questions at other times should be directed to the Campus Police at 704-687-2200.

Funding a Graduate Education

GRADUATE SCHOOL FUNDING

The Graduate School offers numerous opportunities to financially support exemplary students with tuition, stipends, and various fellowships. Below is a list of some of the funding opportunities managed by the Graduate School. Students are encouraged to talk with their Graduate Program Director and/or Advisor about them.

Graduate Assistant Support Plan (GASP)

The Graduate Assistant Support Plan (GASP) is a highly competitive multi-year support package used to attract and retain top quality doctoral students to UNC Charlotte. Students enrolled in this plan are eligible

to receive full payment of in-state tuition, non-resident tuition (if required), and health insurance. To be eligible, a student must be a doctoral student who holds a graduate assistantship or appropriate fellowship of at least \$7,000 for the academic year (\$777.77 per month for the calendar year) and must be enrolled full-time (at least 9 credit hours) for each term of support. Students must be nominated by their Graduate Program Director.

Merit Awards

These awards are used to recruit exceptional students to master's programs and are renewable for the second year of study. RESIDENT (in-state) students approved for merit awards are eligible to receive payment of regular tuition charges up to 8 credit hours (\$3,096/per year based on 2015-16 rates). Awards for approved domestic and international NON-RESIDENTS will consist of non-resident tuition differential (NRTD) charges up to 8 credit hours (\$9,504/per year based on 2015-16 rates). To be eligible a student must be enrolled in a master's program, have a 3.0 GPA or higher, and hold a graduate assistantship of at least \$7,000 for the academic year (\$777 per month for the calendar year) and must enroll in at least 6 graduate credit hours each fall and spring semester. Merit Awards for new students are limited, and students must be nominated by their Graduate Program Director.

Graduate School Tuition Scholarships

These need-based scholarships are used to support the recruitment and retention of exemplary doctoral, master's and certificate students to programs at UNC Charlotte, particularly part-time students. Awards are available to new and continuing graduate students, including North Carolina residents and non-residents, with the award maximum being the cost of regular, full time, in-state tuition. Students must be nominated by their Graduate Program Director.

Veteran's Graduate Assistantships

The Graduate School supports efforts to recruit exceptionally talented military veterans to graduate programs at UNC Charlotte. Veteran's Graduate Assistantships provide a graduate assistantship (teaching or research) for two academic years, resident tuition support and health insurance, to three newly admitted graduate students (doctoral or master's). Students must be nominated by their Graduate Program Director.

ASSISTANTSHIPS AND EMPLOYMENT

The majority of graduate assistantships at UNC Charlotte are awarded by academic departments. Many graduate students seek teaching, research, or administrative assistantships as a way of both gaining

valuable experience and securing financial support. Students may also choose from a variety of on- or off-campus employment opportunities in the Charlotte region.

Graduate Assistantships

With graduate assistantships, students can gain valuable knowledge and experience related to their degree program by fulfilling teaching, research, or administrative roles within the University. Stipends, responsibilities, selection criteria, and application and notification procedures vary from department to department, so students should contact their Graduate Program Director for additional information on available assistantships.

Some available Graduate Assistantships are listed on graduateschool.uncc.edu/funding/assistantships-and-employment/available-assistantships (positions listed on this site are typically administrative in nature).

Graduate Students may be assigned as Teaching Assistants (TAs), however, only graduate students with at least 18 credit hours may serve as primary instructors (IORs).

On-Campus Employment

The Office of Student Employment assists students in obtaining Federal Work Study and temporary student worker positions within the University. Visit the Human Resources website at hr.uncc.edu/students for more information.

Off-Campus Employment

The University Career Center (UCC) operates a database called NinerJobNet, which offers part-time and full-time employment opportunities. Detailed information about the services offered within the UCC can be found on their website at career.uncc.edu.

FINANCIAL AID PROGRAMS

The Office of Student Financial Aid administers several federal, state, and institutional financial aid programs available to graduate students at UNC Charlotte who complete a Free Application for Federal Student Aid (FAFSA). The FAFSA helps U.S. citizens and eligible non-citizens gain access to gift aid (repayment not required) such as grants or self-help aid (direct repayment or service required), like loans and Federal Work Study awards.

Applying for Federal and State Aid

The FAFSA can be completed from the Office of Student Financial Aid website, or directly at www.fafsa.ed.gov. The federal school code for UNC Charlotte is 002975.

Deadlines

The Office of Student Financial Aid must receive completed FAFSA forms by March 1 for grant assistance consideration for the following academic year. For loan assistance, there is no deadline, provided that the FAFSA is received by the Financial Aid Office to allow sufficient processing time prior to the end of the academic year (usually three to four weeks).

Grant Assistance

The Tuition Assistance Grant administered by the Financial Aid Office is available to graduate students. It provides up to \$1,250 in grant assistance to students demonstrating financial need regardless of state residency. Eligible students are awarded these grants until funds are exhausted. For more information, visit the Office of Student Financial Aid.

Forgivable Education Loans for Service (FELS)

The Forgivable Education Loans for Service Program was established by the North Carolina Assembly to provide assistance to qualified students who are committed to working in North Carolina in designated critical employment shortage professions. For information on deadlines, eligibility, value, and application procedure, visit www.cfnc.org/FELS.

Loan Assistance

Graduate students may borrow up to \$20,500 annually from the Federal Direct Stafford Loan Program. Beginning with the 2012-13 academic year, only Unsubsidized Stafford loans are available to graduate students. "Unsubsidized" means that interest will begin to accrue on the loan once it is disbursed to the student's account. Students have the option of either paying the interest while enrolled in school at least half-time (3+ hours for graduate students) or having the interest added to the loan principal. Loan repayment begins nine months after the student graduates or ceases to be enrolled at least half-time.

In addition to Stafford Loans, graduate students may borrow funds through the federal Graduate PLUS loan program. Each student's maximum loan amount (combining all loan sources) is limited to the student's total Cost of Attendance minus any other aid received. More detailed information on the Cost of Attendance can be found on the Office of Student Financial Aid website at finaid.uncc.edu.

Private Loans

Loans are also available for domestic and international students through private lenders. Please visit the Financial Aid website at finaid.uncc.edu to view UNC Charlotte's Preferred Lender List selection.

SCHOLARSHIPS

UNC Charlotte provides graduate students the opportunity to apply for scholarships. Scholarships can be merit-based or need-based, and may also focus on other criteria defined by the individual donor or donors who fund the award. Scholarships can be used to offset tuition, room and board, books, or study abroad experiences, and do not have to be repaid.

UNC Charlotte committed to offering students an elite scholarship resource on campus by establishing the University Scholarship Office in 2015. This designated student resource office exists to make it easier for students to find and apply for scholarship opportunities, while serving as the single point of contact to student, parents, faculty, and staff with scholarship-related questions.

NinerScholars Portal

The NinerScholars Portal serves as the common application system for all scholarships offered by a college, department, office, or program at UNC Charlotte. NinerScholars uses the University's student information system to build a scholarship profile specific to each student's academic history and current status. The Portal then compares a student's profile to the criteria for each UNC Charlotte scholarship, matches them with those scholarships they are eligible for, and provides the student with the ability to apply in real-time.

The NinerScholars Portal gives students direct access to apply to more than 1,000 scholarship opportunities with one application, through one online system. To access the NinerScholars Portal, learn more about specific scholarship opportunities, or take advantage of additional scholarship resources, visit the University Scholarship Office website at scholarships.uncc.edu.

EXTERNAL FUNDING

Many organizations outside of the Graduate School and the University offer fellowship and other award opportunities to students at all levels of graduate education as part of local, national, and international competitions. For more information, visit graduateschool.uncc.edu/funding/external-funding.

Payment

The Office of Student Accounts bills students for tuition, room and board, and various other University

charges. Each student receives an email around the 15th of each month at their UNC Charlotte email address informing them that their bill is available on My UNC Charlotte, online at my.uncc.edu. It is the student's responsibility to regularly check their UNC Charlotte email account. Failure to receive a billing statement or view their account online will not exempt students from having their registration cancelled for non-payment or from having a hold placed on their account blocking them from receiving their transcript and diploma.

Payment can be made by cash, check, online from a checking or savings account (eCheck), or by credit card (Visa, MasterCard, American Express, or Discover). All payments must be in U.S. currency. Remittance should be made payable to "UNC Charlotte" and identified with the student name and ID number.

UNC Charlotte offers a payment plan which allows students to spread out their tuition and fees, on-campus housing and dining, and other charges billed to the student's account into three installment payments.

Returned Check Policy

If a check is returned by the bank, a letter is sent to the maker indicating that a penalty of \$25 has been assessed and the account must be settled within 10 working days or the check will be considered to be a bad check and be processed accordingly. A hold will be placed on the student's record until the bad check is covered and the penalty is paid.

A student who pays a previous balance with a check in order to have a registration hold flag lifted will have their registration cancelled if the check is returned by the bank for any reason.

Parent Information/Authorized Users

Authorized users are family and friends that have been given the ability to access the student's account information. In compliance with the Family Educational Rights and Privacy Act of 1974 (FERPA), student financial records may not be shared with a third party without the student's written consent. Adding an authorized user is the student's written consent that an individual may view their account information and make payments on their behalf. Please note that authorized users DO NOT have access to a student's stored payment methods, academic records, or other personal information.

Students can add Authorized Users by logging in to My UNC Charlotte at my.uncc.edu. Students will then need to access their Student Account Information, select Authorized User under the "My

Account" tab, and proceed with "Add Authorized User."

Authorized Users will receive an email informing them that they have been granted access to the student's account information. The email notification will include access information that will be used when accessing the information from the UNC Charlotte Student Account Suite at https://ecom.uncc.edu/C21561_tsa/web/login.jsp.

Refunds

A student who officially withdraws (drops all courses) from the University in the Fall or Spring semester will receive a refund as follows:

TUITION AND FEES REFUNDS	
Period of Withdrawal	Percent of Tuition and Fees Refunded
Before 1st Class Day	100%
Period 1*	90%
Period 2*	50%
Period 3*	25%
Period 4*	0%

**Generally, each period is two weeks in length; however, for specific dates of each period, please visit the Refunds Schedule located online under finance.uncc.edu/student-accounts/refunds.*

Summer School Refunds

A student who officially withdraws (drops all courses) from the University prior to the fifth class day of the Summer session will receive a 100% refund. Students who officially withdraw (drops all courses) from the University on the fifth class day of the Summer session or later will receive no refund. Please review the Refunds Schedule available online on the Student Accounts website above.

Exceptions

Charges are refundable by administrative action on a prorated basis for the unexpired portion of the term for the following reasons: death of the student, withdrawal for adequate medical reason as certified by the University's Student Health Center or family doctor, death in the immediate family that necessitates student withdrawal, and dismissal or suspension from school. Immediate family is defined as wife, husband, parent, child, brother, sister, grandparent, and grandchildren, and includes step-, half- and in-law relationships. Appropriate documentation must be submitted to the Dean of Students.

Appeal Procedure

Sometimes a student experiences extenuating circumstances that warrants consideration of a refund. In such situations, the student can submit an appeal for refund consideration. The *Appeal for Tuition, Housing, and Dining Refund Form* can be found online at finance.uncc.edu/resources/forms. The Offices of the Registrar, Student Accounts, Housing and Residence Life, and other offices must then research the request thoroughly. In some cases, the appeal for a refund must be forwarded to the Tuition, Housing, and Dining Appeals Committee. If the request must be forwarded to the Committee, the student will be notified of the date and time of the meeting and offered the option to present the request in person. Once a decision has been made regarding the appeal, the student will be notified by mail.

The contract period for academic-year housing contracts is the entire academic year (Fall and Spring semesters). The student and/or guarantor agree to pay the full amount of charges for residential services. To cancel residential services, the student and/or guarantor must send a signed written request for cancellation of the contract to the Housing and Residence Life Office. The date of receipt of the written request for cancellation will determine, in part, the student's financial obligation to the University (please see the Housing Contract for the current academic year for specific cancellation dates). If, during the time of the Contract, the student loses the right to live in University housing by reason of disciplinary action, or breach of the Contract, no refund of housing charges for the term will be made.

The contract period for Summer School coincides with each term of the Summer School calendar; housing charges are refundable based upon the number of weeks of occupancy.



College of Arts + Architecture

coaa.uncc.edu

Dean: Mr. Kenneth Lambla

Senior Associate Dean: Dr. Lee Gray

Associate Dean for Performing Arts Services:
Mr. Dean Adams

The College of Arts + Architecture consists of one school and four departments (the School of Architecture and the Departments of Art and Art History, Dance, Music, and Theatre), which share basic educational values and academic aspirations. At the graduate level, the College offers master's programs in architecture and urban design, a graduate certificate in music, and a North Carolina K-12 teacher licensure graduate certificate program in Art Education (see the *College of Education* section in this Catalog for details).

The primary mission of the College is to provide programs that prepare graduates for careers as architects, urban designers, artists, musicians, leaders, cultural administrators, and innovators in our emerging creative economy. The College draws together in a single academic unit disciplines with common histories, methods of inquiry, and potential for contributions to the community. It serves to enhance creative, professional, and cultural production within UNC Charlotte and to help lead the creative economy in the region and state. The College is responsive to both cross-cultural exchange and "crossover" research and programming and seeks to provide new connections to the public realm and new opportunities for community leadership.

Architecture

- **Master of Architecture**
- **Master of Urban Design**
- **Master of Architecture and Urban Design Dual Degree**
- **Master of Architecture and Master of Science in Computer Science or Information Technology Dual Degree**

School of Architecture

Storrs Architecture Building
coaa.uncc.edu/academics/school-of-architecture

School of Architecture Directors

Christopher Jarrett, Director
Kelly Carlson-Reddig, Associate Director

Master of Architecture Program Coordinator

Dr. Emily Makas

Master of Urban Design Program Director

Dr. Zhongjie Lin

Master of Architecture and Master of Science in Computer Science or Information Technology Dual Degree Program Coordinator

Chris Beorkrem

Graduate Faculty

Dr. Mona Azarbayjani, Associate Professor

Jeff Balmer, Associate Professor

Chris Beorkrem, Associate Professor

Dale Brentrup, Professor

Kelly Carlson-Reddig, Associate Professor

Dr. Charles Davis II, Assistant Professor

Jefferson Ellinger, Associate Professor

Thomas Forget, Associate Professor

Dr. José L.S. Gámez, Associate Professor

Thomas Gentry, Associate Professor

Lee Gray, Professor, Senior Associate Dean

Christopher Jarrett, Professor, Director

Dr. Kyoung-hee Kim, Assistant Professor

Ken Lambla, Professor and College Dean

Dr. Ming-Chun Lee, Assistant Professor

Dr. Zhongjie Lin, Associate Professor

Dr. Emily Makas, Associate Professor

John Nelson, Associate Professor

Deborah Ryan, Associate Professor

Eric Sauda, Professor

Nicholas Senske, Assistant Professor

Greg Snyder, Associate Professor

Michael Swisher, Associate Professor

David Thaddeus, Professor

Betsy West, Associate Professor

Peter Wong, Associate Professor

The School of Architecture at UNC Charlotte offers a fully accredited program recognized for the outstanding quality of its faculty and students, its commitment to outreach and community involvement, and the quality and extent of resources offered through its labs, classrooms, and studios. Students organize their study around concentrations in Urbanism, Technology, or Design, Theory & Practice. Each area of study is well supported not only by coursework but also by travel and research opportunities. The College participates in several international exchange programs and offers summer travel and study programs in Spain, Italy, Canada, Australia, Great Britain, and China to broaden students' global understanding and further inform their work. The specialized study of urban design is also focused under the auspices of either a separate but interrelated graduate program in that discipline or a dual degree program that combines the two-year Master of Architecture program with graduate study in Urban Design. The Urban Design Program is based in UNC Charlotte's Center City Building in the heart of Uptown Charlotte.

Each curricular program offers each student significant individual time and attention, an engaged and accessible faculty, and a wealth of diversity through both the interests of the faculty and the varied background of the graduate students themselves. Because the School stresses the importance of 'making' in addition to thinking, the wood, metal, computer, and digital fabrication workshops are all equipped with the latest high performance equipment to enable students to both explore and embody their design ideas. Contact with the profession is also emphasized and the School is frequently enriched by the expertise of local practitioners. An extensive lecture series involving nationally and internationally recognized designers and theorists further enhances the educational environment and exposure to contemporary schools of thought.

Program Accreditation

The School of Architecture maintains accredited status through the National Architectural Accrediting Board, which reviews the curriculum, facility, faculty, and program resources annually. In addition, the NAAB conducts an intensive site visit every six years. The School has maintained full accreditation standards as prescribed by this board and includes the following required statement:

"In the United States, most registration boards require a degree from an accredited professional degree program as a prerequisite for licensure. The National Architectural Accrediting Board (NAAB), which is the sole agency authorized to accredit professional degree programs in architecture offered by institutions with U.S. regional accreditation, recognizes three types of degrees: the Bachelor of Architecture, the Master of Architecture, and the Doctor of Architecture. A program may be granted an eight-year, three-year, or two-year term of accreditation, depending on the extent of its conformance with established educational standards."

Doctor of Architecture and Master of Architecture degree programs may require a preprofessional undergraduate degree in architecture for admission. However, the preprofessional degree is not, by itself, recognized as an accredited degree."

University of North Carolina at Charlotte, School of Architecture, offers the following NAAB-accredited degree programs:

- B. Arch. (158 undergraduate credit hours)
- M. Arch. (preprofessional degree + 60 graduate credit hours)

- M. Arch. (non-preprofessional degree + 96 credit hours)

Next accreditation visit for all programs: 2016.

MASTER OF ARCHITECTURE

The professional Master of Architecture degree (MArch) is comprised of M.Arch I and M.Arch II tracks listed below. The post-professional dual degree with Computer Science or Information Technology is described under the March III heading. Full-time academic status is expected in all programs.

MArch I

The three-year-plus MArch I curriculum, which begins with one summer session, accommodates students whose previous degree is outside the field of architecture.

The MArch I Curriculum involves three primary components: 1) the first year (including the summer session prior to the first fall of enrollment) focuses on establishing a strong foundation in fundamental design skills, architectural history and theory, building-to-site relationships, and introductory building technologies; 2) the second year focuses on comprehensive architectural design and its relationship to building systems as well as advanced studies in history, theory, and building technology; and 3) the third year is focused on specialization through electives and topical studios, as well as on the student's individual final project/research thesis.

MArch II

The two-year MArch II curriculum serves students who have already completed a four-year degree program in architecture at a National Architectural Accrediting Board (NAAB) accredited institution. The courses and options within MArch I and MArch II are similar, but the advanced standing of MArch II students allows them to complete the degree requirements in two years.

The MArch II curriculum is tailored through the advising process to the previous educational background of the students and to their individual professional and research goals. The program involves two primary components: 1) the first year focuses on comprehensive architectural building design and its relationship to building systems, as well as advanced studies in history, theory, and building technology; and 2) the second year is focused on specialization through electives and topical studios, as well as the student's individual final project/research thesis.

MArch II students may wish to combine their professional architecture studies with graduate work in Urban Design for a **MArch/M.U.D Dual Degree** completed in three calendar years, including one summer involving a required study abroad experience. The M.U.D program is housed off-campus in the University's Center City Building. Most of the urban coursework is taught in this Uptown location, utilizing the City of Charlotte itself as a laboratory for urban design exploration and research.

MArch III

The MArch III curriculum serves research-focused students who wish to collaborate with the research centers of the School of Architecture (SoA).

Students are admitted to a specific concentration within the MArch III, and are required to meet all academic standards and curriculum requirements of that concentration. Currently, the only concentration offered is Design Computation.

The goal of the MArch III curriculum is to involve each student in on-going collaborative research with faculty. The program involves three primary phases: 1) a two semester methods sequence which introduces students to a common set of procedures; 2) a six course sequence of specialized courses in the research area; and 3) a thesis sequence focused on developing original research.

Note: the MArch III track is not accredited by NAAB; it is primarily intended for students who already possess accredited degrees.

Admission Requirements

The following requirements are expected of applicants to the MArch I and MArch II curricula:

- 1) A minimum undergraduate GPA of 3.0. Students who do not meet this average may still submit an application, and may be considered in exceptional cases.
- 2) A minimum composite GRE score above the 30th percentile. Students whose scores do not exceed this average percentile may still submit an application, and may be considered in exceptional cases.
 - a) The GRE may be waived for applicants to the MArch I program with undergraduate degrees from colleges or universities in the United States in art, art history, interior architecture, interior design, landscape architecture, planning, building science, architectural technology, or architectural studies who have a cumulative undergraduate GPA of 3.0 or above and a in major GPA of 3.25 or above. The Graduate Program Director will identify

students from programs for whom the GRE can be waived and request the waiver from the Graduate School.

- b) The GRE is waived for applicants to the MArch II program with an undergraduate B.A. in Architecture from UNC Charlotte who have a cumulative undergraduate GPA of 3.0 or above and an in major GPA of 3.25 or above.
- 3) All University's Graduate School application requirements, including a statement of purpose, a current curriculum vitae (CV), transcripts from all other colleges and universities attended, GRE scores, and three letters of recommendation.
- 4) A portfolio of creative work. Applicants to the MArch I curriculum should submit examples of work that offer evidence of creativity, self-motivation, analysis, and critical thinking. Such examples are not expected to be architectural in nature. Visual work such as painting, sculpture, furniture making, photography, etc. are acceptable, as are fiction writing, poetry, and any other reasonable evidence of sustained creative endeavor. Applicants to the MArch II curriculum may offer similar evidence of any kind of creative endeavor but must also offer significant evidence of a mastery of architectural skill and knowledge. Applicants for the dual MArch/M.U.D degree must meet the requirement for MArch II curriculum plus clear evidence of an interest in urban studies.
- 5) Applicants to the MArch I curriculum are expected to complete introductory, college-level physics and pre-calculus courses.
- 6) Applicants to the MArch II curriculum are expected to have a minimum of 6 architectural design studios at the undergraduate level.

Students who do not meet the grade point average requirements noted above may still submit an application for admission to both programs but admission will be weighed against those meeting these requirements.

Master of Architecture I Curriculum

The MArch I curriculum requires a minimum of 96 hours to be completed during three academic years and one summer session.

Year One

Summer (6 credit hours)

- ARCH 6100 Design Studio: Basics (3)
ARCH 6601 Ideas in Architecture (3)

Fall (15 credit hours)

- ARCH 6101 Design Studio: Fundamentals (6)
ARCH 5201 Architectural History I: Prehistory-1750 (3)
ARCH 5302 Environmental Systems Principles (3)

ARCH 6602 Representation I: Fundamentals (3)

Spring (15 credit hours)

- ARCH 6102 Design Studio: Fundamentals (6)
ARCH 5202 Architectural History II: 1750-Present (3)
ARCH 5301 Material and Assembly Principles (3)
ARCH 6603 Representation II: Digital Fundamentals (3)

Year Two

Fall (15 credit hours)

- ARCH 7101 Design Studio: Topical (6)
ARCH 5203 Architectural History III: Survey of Contemporary Theory (1950-Present) (3)
ARCH 5303 Structural Principles (3)
ARCH 5604 Computational Methods (3)

Spring (15 credit hours)

- ARCH 7102 Design Studio: Integrated Project Design (6)
ARCH 5304 Structural Systems (3)
ARCH 5605 Computational Practice (3)
ARCH 7201 Design Methodologies (3)

Year Three

Fall (15 credit hours)

- ARCH 7103 Design Studio: Topical (6)
ARCH 7202 Final Project/Thesis Document (3)
ARCH 5305 Building Systems Integration (3)
ARCH 6050 Architectural Elective (3)*

Spring (15 credit hours)

- ARCH 7104 Final Project/Thesis Studio (6)
ARCH 5206 Professional Practice (3)
ARCH 6050 Architectural Elective (3)*
ARCH 6050 Architectural Elective (3)*

**ARCH 5204/5205 or ARCH 6306/6307 can be substituted for ARCH 6050.*

Optional Summer Session Courses

- ARCH 6050 Architectural Elective (3)
ARCH 5204 Architectural History Topics (3) (*Study Abroad*)
ARCH 6890 Directed Independent Study (1-3)

Master of Architecture II Curriculum

The MArch II curriculum requires a minimum of 60 credit hours to be completed during two academic years. If applicants accepted to the MArch II curriculum are evaluated and found deficient in entry-level competencies, curriculum substitutions and/or additional courses will be required. Below is a list of expected entry-level competencies for MArch II Candidates:

- 1) A minimum of six semesters of architectural design studios;

- 2) A minimum of three semesters of architectural history and/or theory courses;
- 3) A minimum of four semesters of building technology courses equivalent to the following UNC Charlotte's School of Architecture courses:

ARCH 5301 Material and Assembly Principles (3)
 ARCH 5302 Environmental Systems Principles (3)
 ARCH 5303 Structural Principles (3)
 ARCH 5304 Structural Systems (3)

To ensure that incoming students are evaluated appropriately, the School of Architecture may require candidates for the MArch II curriculum to furnish the Architecture Graduate Admissions Committee and Graduate Program Coordinator relevant course descriptions and syllabi of all architecture courses passed and completed which may satisfy entry-level competencies. The following curriculum is modeled for students accepted to the program who have satisfied all entry-level competencies.

Year One

Fall (15 credit hours)

ARCH 7101 Design Studio: Topical (6)
 ARCH 5203 Architectural History III: Survey of Contemporary Theory (1950-Present) (3)*
 ARCH 6307 Technology Topic (3)
 ARCH 5604 Computational Methods (3)**

**UNC Charlotte undergraduates who have previously taken ARCH 4203 should substitute ARCH 4205 for ARCH 5203.*

*** UNC Charlotte undergraduates who have previously taken ARCH 4604 should substitute ARCH 6050 for ARCH 5604.*

Spring (15 credit hours)

ARCH 7102 Design Studio: Integrated Project Design (6)
 ARCH 7201 Design Methodologies (3)
 ARCH 5605 Computational Practice (3)
 ARCH 6306 Technology Topic (3)

Year Two

Fall (15 credit hours)

ARCH 7103 Design Studio: Topical (6)
 ARCH 7202 Final Project/Thesis Document (3)
 ARCH 5305 Building Systems Integration (3)
 ARCH 6050 Architectural Elective (3)***

Spring (15 credit hours)

ARCH 7104 Final Project/Thesis Studio (6)
 ARCH 5206 Professional Practice (3)
 ARCH 6050 Architectural Elective (3)***
 ARCH 6050 Architectural Elective (3)***

****ARCH 5204/5205 or ARCH 6306/6307 can be substituted for ARCH 6050.*

Optional Summer Session Courses

ARCH 5204 Architecture History Topics (3) (*Study Abroad*)
 ARCH 6050 Architectural Elective (3)
 ARCH 6890 Directed Independent Study (1-3)

The combined dual degree of Master of Architecture and Master of Urban Design (MArch/M.U.D) requires a minimum of 74 credit hours to be completed in three calendar years of full-time study, including a summer studio in a foreign country. Details of this dual degree are listed under the dual Master of Architecture and Master of Urban Design section. This three-year dual degree is only available to students in the Master of Architecture II curriculum. Applicants for this dual degree must meet all the admission requirements and entry-level competencies for the MArch II curriculum.

Master of Architecture III Curriculum

The Master of Architecture III track is currently offered only as a dual degree with a Master of Science in Computer Science or Information Technology. The combined dual degree requires a minimum of 47 credit hours to be completed in two calendar years of full-time study. Details of this dual degree are listed under the section for the Master of Architecture and M.S. in Computer Science or Master of Architecture and M.S. in Information Technology dual degree.

Architectural Elective Courses

Architectural Elective Courses are available in a wide variety of topical subjects, and are listed under the general course number ARCH 6050. These courses complement the core courses and studios and allow students to pursue their specific interests. Some subjects include: Computation, Theory, Representation, Making, Urbanism, and Technology. Current elective offerings can be viewed in Banner Self Service or the School of Architecture website. Recent offerings have included:

Computation and Theory

- Building Information Modeling
- Digital Fabrication I & II
- Digital Methods I & II
- Digital Theory

Urbanism

- Introduction to Urban Design
- Community Planning Workshop
- Dilemmas of Modern City Planning
- Planning, Law, and Urban Design
- Post-CIAM Discourse on Urbanism
- Public Space in Cities
- Real Estate Development Students: Introduction to Real Estate Development

- Shaping the American City
- Strategies for the Public Realm
- The Changing Urban Landscape: The Development of Uptown Charlotte, 1875-Present
- Urban Form, Context and Economics

Architectural Technology

- Architectural Luminous Environment
- Bio-Climatology and Cross Cultural Assessments of Traditional Built Form
- Building Shapes and Skins for Daylighting
- Parametric Methods: Notes on Sustainable Design Decision Making
- Site Sustainability and Planning
- Sustainability and Climate Responsive Architecture
- Sustainable Design: Ecology, Technology, and Building
- Trend or Truth: Sustainability in Architecture

General Architecture Electives

- Architecture/Culture/Discourse
- Furniture Making
- Methods and Meaning
- Objects and Analysis
- Watercolor and Representation

Architectural History Topics Courses

Architectural History Topics Courses offer a focused study of issues in specific areas of history. These courses complement the architectural history survey courses (ARCH 5201, ARCH 5202, ARCH 5303), and serve to inform and develop in-depth research, writing, and presentation skills. Entering MArch II students who have previously satisfied ARCH 5303 will be required to take an Architectural History Topic to satisfy their degree requirement. Recent offerings have included:

- An Architecture of Questionable Effects
- Architecture and National Identity
- From Auschwitz to Zapruder: Mapping the Mid-Century
- Histories of Latin American Architecture
- History of the 19th and 20th Century City
- Layered Berlin
- Modern Perception: Linear Perspective and Motional Pictures
- Offices in the Sky: The History of the Skyscraper from 1870 to the Present
- Popular Modernism: Charlotte Architecture in the '50s and '60s
- Post-CIAM Discourse on Urbanism
- Renewing the Modernist Debate: The Theory and Works of Adolf Loos

- Representation: Exploits of the Architectural Image
- The Changing Urban Landscape: The Development of Uptown Charlotte, 1875-Present
- The Public Space of Cinema: Transformation of the City 1850-1940
- Urban Design in Global Perspective
- Urban Design of Capital Cities

Requisite and Capstone Experiences

Integrated Project Design

The Design Studio: Integrated Project Design (ARCH 7102) serves as the requisite studio experience that bridges between foundational studios and advanced studios for all MArch students. Taken in the fifth semester of enrollment for MArch I students and in the second semester of enrollment for MArch II students, the Design Studio: Integrated Project Design is defined as an architectural building design project that comprehensively demonstrates the student's ability to conceptualize, prepare, organize, and design a building having a specific programmatic type. All students must demonstrate competency before they engage in the final year of study.

Thesis

The capstone for both MArch I and MArch II students occurs in their final year in ARCH 7104 and ARCH 7202. This is typically defined as an architectural design thesis that demonstrates the students' ability to independently identify and engage a specific set of issues, a building type, and a site.

A research thesis is defined as an architectural research project that engages and explicates primary source material leading to project work possessing an original argument. A research thesis may include design-related materials as part of the final submission. Primary source material from data and information gathered from original texts and documents, interviews, raw data resulting from experiments, demographic data, etc. shall be a part of the project. Research thesis students must identify the issue(s) to be engaged and the research and/or design methods through which this engagement will take place.

For students in the MArch/M.U.D dual degree program, the thesis and preceding Thesis Document course (ARCH 7202) must have a clear focus on the integration of architectural and urban design issues.

Students declare whether they intend to pursue a Final Project or a Research Thesis at the beginning of a student's final year in the Thesis Document course (ARCH 7202).

Graduate Advising

A critical component of any successful graduate program is academic advising and guidance during the course of a student's program of study. The primary advisor for all graduate students in the School of Architecture is the Associate Director, in consultation with the appropriate Graduate Program Director.

Transfer Credit

Transfer credit is normally limited to a maximum of six (6) hours of graduate credit. Under special circumstances, a greater number of hours may be transferred if a student can demonstrate that the courses to be transferred meet or exceed the content and rigor of graduate curricula offered by the School of Architecture.

Waiver Credit

Waiver credit may be allowed if a student can demonstrate that a course or courses taken at the post-undergraduate level that equals or exceeds in both content and rigor of a course or courses required in the graduate curriculum. Grades received for such courses must be B or above. In such cases, credit will be permitted by examination. If a required course in the curriculum is waived, the student will be allowed to fill those credit hours with another course as advised by the Associate Director, in consultation with the Graduate Program Director.

Application for Degree

In order to meet UNC Charlotte's Graduate School requirements for degree candidacy, all graduate students must receive a written certification from their department confirming successful project completion. This report requires approvals from members of each student's committee as well as an endorsement from the Chair of Instruction. The completion of this report results in the granting of the degree. In addition, each student should make application for his/her degree by completing the online Application for Degree through Banner Self Service no later than the filing date specified in the University Academic Calendar.

Assistantships, Tuition Differentials, and Scholarships

A number of teaching and research assistantships, scholarships, in-state and non-resident new master's student tuition awards, and graduate tuition assistantship program support (GASP), are available to both high performing MArch I and MArch II candidates. No separate assistantship application is required; awards are based on application materials to the program, and award decisions are made based on the applicant's academic merit or promise of academic merit, and/or on demonstration of need. Tuition awards are typically paired with teaching

and/or research assistantship stipends. School of Architecture scholarships are also awarded pending a review of student applications to various private endowments. In addition, other awards are available under independent faculty or research center grants.

MASTER OF URBAN DESIGN

The Master of Urban Design (M.U.D) degree can be taken as a stand-alone qualification, or may be combined with a Master of Architecture two-year degree for a dual M.Arch/M.U.D degree. Opportunities also exist for students to craft individually approved curricula combining the M.U.D degree with the M.A. in Geography/Community Planning for a dual urban design and planning graduate degree, or with the Master of Science in Real Estate (M.S.R.E.) for a dual degree in urban design and real estate development.

The stand-alone Master of Urban Design degree (M.U.D) serves two groups of students: (1) Students with an architecture or landscape architecture undergraduate or graduate degree (including a B.Arch five-year degree) and (2) those holding a B.A. or B.S. undergraduate degree or a master's degree from disciplines other than architecture or landscape architecture. For those students with an architectural or landscape undergraduate or graduate qualifications, the courses within the program can be completed in one calendar year/three consecutive semesters of full-time enrollment from late August one year to early August the following year (Fall-Spring-Summer).

For students with undergraduate or graduate degrees in planning or other non-design disciplines, the program begins with an intensive second Summer semester experience in the July preceding enrollment in the Fall semester. Students with an interior design background will be evaluated on an individual basis regarding enrollment in this preparatory summer class.

The M.U.D Program prepares students and professionals to engage complex issues faced by towns and cities across America. The program uses the fast changing Charlotte metropolitan region as its laboratory to provide students with relevant design skills to influence urban life under the pressures of globalization, environmental change, and cultural diversification. To emphasize this global perspective, part of the final Summer semester will be based outside the USA, primarily in China, South America, or Europe, involving design problems in an international context and with input from faculty in those countries.

The first semester in the Fall focuses on the fundamental skills and techniques of urban design; the second Spring semester foregrounds issues of urban sustainability, infrastructure, and urban open space, and the third semester during the summer months examines advanced topics of vertical urbanism through complex urban design problems in locations outside the USA. Each semester also includes two seminar courses, some of which comprise individual elective choices from a menu of topics in urban design and urban history and theory.

Students with an undergraduate degree from an accredited architectural program may also apply for a 3-year M.Arch/M.U.D dual degree, combining the two-year Master of Architecture program with the 12-month M.U.D program. Details of this dual degree program are noted below and also in the preceding *Catalog* section regarding the Master of Architecture program.

Admission Requirements

Online applications must be made to the UNC Charlotte Graduate School, either for the stand-alone M.U.D degree or the dual M.Arch/M.U.D degree. This dual degree has its own application option within the online system. Students seeking other dual degree opportunities with programs in other colleges (M.U.D/M.S.R.E. and M.U.D/M.A. in Geography [Community Planning]) should initiate individual counseling with the appropriate Program Directors prior to application and complete separate applications for each degree program. Applicants should study all the varying requirements carefully and should comply with all the application mandates of the other programs.

In addition to the admissions materials required by the Graduate School, the School of Architecture requires the submission of a portfolio of creative work. Applicants to the M.U.D program should submit examples of work that offer evidence of creativity, self-motivation and critical appraisal. Such examples do not have to be solely urban design-related, but may also include visual work such as painting, sculpture, furniture making, photography, writing, and other reasonable evidence of their creative abilities. However, the portfolio must include some clear visual and/or written evidence of an interest in urban settings and conditions. Specific admission requirements by the School include:

- 1) An undergraduate degree with a 2.75 grade point average (GPA) overall, and a junior/senior grade point average of 3.0 overall
- 2) A Statement of Purpose describing the objectives relative to graduate study

- 3) Fulfillment of the University's Graduate School application requirements in effect at the time of application

Students who do not meet the GPA requirements noted above may still submit an application for admission; however, this will be weighed against those meeting these requirements.

Students enrolled in the fifth year of the Bachelor of Architecture program at the UNC Charlotte School of Architecture may apply for admission into the M.U.D program for entry after completion of their fifth year. They will need to fulfill all normal application requirements during either the Fall or Spring semesters of their fifth year program and, if admitted to the M.U.D program, can complete a sequence of the B.Arch professional degree plus the M.U.D post-professional qualification in two calendar years.

Recommendation for Automatic Admission

Students applying to the M.U.D program who have completed either the four-year Bachelor of Arts in Architecture or the five-year Bachelor of Architecture from UNC Charlotte must have an undergraduate degree GPA of 3.25 or above to receive a recommendation to the Graduate School for automatic admission.

Master of Urban Design Curriculum

The M.U.D program requires a minimum of 36 hours to be completed (39 hours for non-design based applicants). There are two study options: (1) a full-time program that can be completed in three consecutive semesters (Fall-Spring-Summer), or (2) a part-time option for working professionals that may be completed generally within two years. However, part-time students should note that the foreign-based Summer studio has to be taken as a full-time commitment.

Students enrolled in the dual degree MArch II/M.U.D program complete their extended program in three calendar years of full-time study, including the Summer semester spent abroad in either China, Europe, or South America, according to program rotation. The dual degree option is only available to full-time students.

A) Full-Time M.U.D Option

Year One

Second Summer Session (3 credit hours)

MUDD 5101 Design Studio: Basics (3) *(For non-design based applicants only. May be waived if determined in the admissions process.)*

Fall (12 credit hours)

MUDD 6101 Fundamentals of Urban Design Studio (6)
 MUDD 5601 Community Planning Workshop (3)
 MUDD 6205 Modern City: Theories and Forms (3)

Spring (12 credit hours)

MUDD 6102 Urban Open Space and Infrastructure Design Studio (6)
 MUDD 6050 Urban Design Elective (3)
 MUDD 6204 Geographic Information System (3)

Foreign-Based First Summer Session (6 credit hours)

MUDD 7102 Vertical Urbanism / Global Urban Design Studio, Part I (3)
 MUDD 6050 Urban Design Elective (3)

Charlotte-Based Second Summer Session (6 credit hours)

MUDD 7103 Vertical Urbanism / Global Urban Design Studio, Part II (3)
 MUDD 5602 Planning, Law, and Urban Design (3)

B) Part-Time M.U.D Option

Year One

Summer (3 credit hours)

MUDD 5101 Design Studio: Basics (3) *(For non-design based applicants only. May be waived if determined in the admissions process.)*

Fall (6 credit hours)

MUDD 5601 Community Planning Workshop (3)
 MUDD 6205 Modern City: Theories and Forms (3)

Spring (6 credit hours)

MUDD 6050 Urban Design Elective (3)
 MUDD 6204 Geographic Information System (3)

Year Two

Fall (6 credit hours)

MUDD 6101 Fundamentals of Urban Design Studio (6)

Spring (6 credit hours)

MUDD 6102 Urban Open Space and Infrastructure Design Studio (6)

Foreign-Based First Summer Session (6 credit hours)

MUDD 6050 Urban Design Elective (integrated with foreign studio) (3)
 MUDD 7102 Vertical Urbanism / Global Urban Design Studio, Part I (foreign-based first Summer session) (3)

Charlotte-Based Second Summer Session (6 credit hours)

MUDD 5602 Planning, Law, and Urban Design (3)

MUDD 7103 Vertical Urbanism / Global Urban Design Studio, Part II (Charlotte-based second Summer session) (3)

Notes: First Summer session studio must be taken as a full-time course load abroad. Second Summer session may be deferred until the following Fall semester and taken as an independent study. MUDD 5602 must be taken in the Second Summer Session.

Year Three (if applicable)

Fall (3 credit hours)

MUDD 7103 Vertical Urbanism (3)**

***Studio course to be taken as Independent Study in Fall if MUDD 7103 was not taken in Summer.*

Urban Design Elective Courses

Urban Design Elective Courses are available in a wide variety of topical subjects, and are listed under the general course number MUDD 6050. These courses complement the core courses and studios and allow students to pursue their specific interests. Topics include: Computation, Theory, Representation, Making, Urbanism, and Technology. Current elective offerings can be viewed in the Schedule of Classes or the School of Architecture website. *May be repeated for credit with change of topic.*

MASTER OF ARCHITECTURE AND URBAN DESIGN DUAL DEGREE

The curriculum for the dual M.Arch/M.U.D degree is noted below. Customized curricula for the dual degree opportunities of M.U.D/M.A. Geography (Community Planning) and M.U.D/M.S.R.E. (Real Estate) are developed to suit the individual student interested in these options once the student is accepted onto both programs.

Master of Architecture/Master of Urban Design Curriculum

The dual M.ARCH/M.U.D degree requires a minimum of 84 credit hours to be completed. Typically, the 12-month M.U.D portion of the dual degree is taken in the second year of the three-year sequence (as shown below). However, by special agreement of the student and the MArch and M.U.D Program Directors, the 12-month M.U.D portion may be completed in the first or final year of the three-year sequence.

Year One

Fall (15 credit hours)

ARCH 7101 Design Studio: Topical (6)
 ARCH 5203 Architectural History III: Survey of Contemporary Theory (1950-Present) (3)*

ARCH 5604 Computational Methods (3)**
 ARCH 6307 Technology Topic (3)

**UNC Charlotte undergraduates who have previously taken ARCH 4203 should substitute ARCH 5205 (Architectural History Elective) for ARCH 5203.*

*** UNC Charlotte undergraduates who have previously taken ARCH 4604 should substitute ARCH 6050 (Architectural Elective) for ARCH 5604.*

Spring (12 credit hours)

ARCH 7102 Design Studio: Integrated Project Design (6)
 ARCH 5605 Computational Practice (3)
 ARCH 6306 Technology Topic (3)

Year Two

Fall (12 credit hours)

MUDD 5601 Community Planning Workshop (3)
 MUDD 6101 Fundamentals of Urban Design Studio (6)
 MUDD 6205 Modern City: Theories and Forms (3)

Spring (12 credit hours)

ARCH 7201 Design Methods (3)
 MUDD 6102 Urban Open Space and Infrastructure Design Studio (6)
 MUDD 6204 Geographic Information System (3)

Foreign-Based First Summer Session (6 credit hours)

MUDD 6050 Urban Design Elective
 MUDD 7102 Vertical Urbanism / Global Urban Design Studio, Part I (3)

Charlotte-Based Second Summer Session (6 credit hours)

MUDD 5602 Planning, Law, and Urban Design (3)
 MUDD 7103 Vertical Urbanism / Global Urban Design Studio, Part II (3)

Year Three

Fall (9 credit hours)

ARCH 7202 Final Project/Thesis Document (3) (approved urban focus required)
 ARCH 5305 Building Systems Integration (3)
 ARCH 6050 Architecture Elective (3)***

Spring (12 credit hours)

ARCH 7104 Final Project/Thesis Studio (6)
 ARCH 5206 Professional Practice (3)
 ARCH 6050 Architecture Elective (3)***

****ARCH 5204/ARCH 5205 (Architecture History Elective) or ARCH 6306/ARCH 6307 (Technology Topic) may be substituted for ARCH 6050.*

Optional Summer Session Courses

ARCH 5204 Architectural History Topics (3) (*Study Abroad*)

ARCH 6050 Architectural Elective (3)
 ARCH 6890 Directed Independent Study (1-3)

Capstone Studios and Final Project/Thesis

Students enrolled in the Dual Degree M.Arch/M.U.D program are required to complete two M.U.D Capstone Studios: (MUDD 7102 and MUDD 7103), as well as the Thesis Document (ARCH 7202) and Thesis Studio (ARCH 7104). Their final project/research thesis must have a clear focus on the integration of architectural and urban design issues.

Graduate Advising

A critical component of any successful graduate program is academic advising and guidance during the course of a student's program of study. The primary advisors for all urban design graduate students in the School of Architecture will be the Associate Director of the School of Architecture, in consultation with the Director of the Urban Design Program.

Transfer Credit

Transfer credit may be granted under special circumstances (e.g., approved post-baccalaureate status prior to entry into the program) and is limited to a maximum of six hours of graduate credit.

Waiver Credit

Waiver credit may be allowed if a student can demonstrate that a course or courses taken in his or her prior undergraduate or graduate curriculum equals or exceeds in both content and rigor of a course or courses required in the graduate curriculum. If a required course in the curriculum is waived, the student will be allowed to fill those credit hours with another course as advised by the Associate Director of the School of Architecture, in consultation with the Director of the Urban Design Program.

Application for Degree

In order to meet UNC Charlotte's Graduate School requirements for degree candidacy, all graduate students must receive a written certification from their department confirming a successful capstone project. For urban design students, this comprises completion of the two summer design studios. For dual degree students, this comprises the thesis project taken in the final year. This report requires approval from the Director of the Urban Design Program, as well as the signatures from the graduate faculty members involved in the project. The completion of this report results in the granting of the degree. In addition, and prior to this completion, each student should make application for his/her degree by completing the online Application for Degree through Banner Self Service no later than the filing date specified in the University Academic Calendar.

Research and Study Abroad Opportunities

M.U.D and Dual Degree students may engage in research activities via the School of Architecture's City Building Lab (CBL). All students automatically obtain international study experience through the required global Summer studio.

Assistantships, Tuition Differentials, and Scholarships

A number of research assistantships, scholarships, and tuition waivers are available to M.U.D candidates. No separate assistantship application is necessary; awards are based on application materials to the program, and award decisions are based on the applicant's academic merit or promise of academic merit, and/or on demonstration of need.

MASTER OF ARCHITECTURE AND MASTER OF SCIENCE IN COMPUTER SCIENCE OR INFORMATION TECHNOLOGY DUAL DEGREE

Design has become increasingly important to computer scientists and at the same time computation has become important to designers. The dual degree program in Architecture and Computer Science/Information Technology program is a unique curriculum that systematically combines the strength and insights of these disciplines.

As computing has matured as a discipline, it has expanded its focus to include the physical and virtual settings in which users interact with the machine. Specialties like human computer interaction, ubiquitous computing, gaming, and visualization require an understanding not only of the logic of the machine, but also the logic of the user. Based on these concerns, the design thinking ability that is an integral part of design training is of interest as an alternative paradigm that may change the way that students think and operate.

Within architecture, there is a unique opportunity to develop students who will have the knowledge to lead the integration of the computer into architectural practice and research. As firms rely more and more on computation, those who know how to think, program, and script will be able to change the way architects design and practice. We see the day fast approaching when the IT department at firms is not separate but rather is at the core of what architects do. Already, in advanced practices across the world, computing and design are intermingling.

The curriculum integrates architecture students with computer science/information technology students, working collaboratively on tasks that challenge both fields. Early in the curriculum, the cohorts with architecture background and those with computing background take courses to provide basic competency in a new discipline.

Students in this dual degree program enroll simultaneously in the Master of Architecture program and either the M.S. in Computer Science degree (courses labeled ITCS) or the M.S. in Information Technology degree (courses labeled ITIS).

Admission

Students are admitted to this program upon recommendation of a joint admissions committee of faculty from the School of Architecture and the Departments of Computer Science and Software and Information Systems. Admitted students are expected to complete all coursework outlined above to receive both degrees. Upon successful completion of all requirements, students receive the Master of Architecture III degree and the M.S. in Computer Science or M.S. in Information Technology degree.

All students admitted to the Master of Architecture III program must be enrolled in the Dual Masters program.

Note: Other programs within the School of Architecture are accredited through the National Architectural Accrediting Board, but the Master of Architecture III degree program, because of its research focus, is not an accredited program that can lead to licensure as a registered architect.

Admission to the dual degree program requires either:

- A degree in architecture or a related design discipline or
- An undergraduate degree in computer science, information technology, or a related discipline

Students without an undergraduate degree in a computing-related discipline must meet the following additional admission requirements:

1) Architecture and Computer Science option

Students are expected to have knowledge of two higher programming languages, data structures, operating systems or computer architecture, and an additional upper-level computing course. Also, knowledge of calculus, discrete mathematics, and linear algebra is strongly recommended. Work experience at a professional level in the computer industry or satisfactory completion the Advanced GRE in Computer Science may be substituted for some or

all of the subject area admission requirements, subject to review by the joint admissions committee.

2) *Architecture and Information Technology option*
Students admitted to the It option must have one of the following:

- A summer programming course (boot camp) offered by the College of Computing and Informatics
- An introductory programming course as part of a bachelor's degree
- A certificate in a programming course offered online that is approved by the admission committee for the dual degree program

Master of Architecture / M.S. in Computer Science or Information Technology Curriculum

Year One

Second Summer Session (3 hours)

ARCH 7210 Idea Seminar (3)

Fall (12 hours)

ARCH 5607 Digital Fabrication (3)

ARCH 5611 Research Methods I: Computational (3)

ITCS 6112 Software System Design and

Implementation (3) or ITIS Core (3)

ITCS Design*, ITIS Design*, or ARCH 6110** (3)

**Course required for entering students with undergraduate architecture degrees*

***Course required for entering students with undergraduate computing degrees*

Spring (13 hours)

ARCH 5606 Scripting (3)

ARCH 7211/ITCS 6211/ITIS 6211 Studio Lab One

(4)*

ITCS 6114 or ITIS Core (3)

ITCS Breadth or ITIS Core (3)

Year Two

Fall (10 hours)

ARCH 5612 Research Methods II (3)

ARCH 7212/ITCS 6212/ITIS 6212 Studio Lab Two

(4)*

ITCS Breadth or ITIS Core (3)

Spring (9 hours)

ARCH 7213/ITCS 6991/ITIS 6991 Thesis (6)

ITCS Elective or ITIS Elective (3)

Total Dual Degree Credit Hours = 47

**Another 4-credit Design + Computation Studio Course may be substituted for this course.*

The centerpiece of the curriculum is a three-semester sequence of studio/lab courses taught jointly by the College of Computing and Informatics and School of Architecture faculty that are focused on issues and problems that are researched by design teams.

Courses in Architecture (ARCH) follow. For courses in Computer Science (ITCS) and Information Technology/Software and Information Systems (ITIS), please see the course listings in the "College of Computing and Informatics" section.

COURSES IN ARCHITECTURE (ARCH)

ARCH 5201. Architectural History I: Prehistory-1750. (3) Global survey of architecture and urbanism from prehistory to 1750. Explores key examples of buildings and cities as well as the theoretical, environmental, political, economic, technological, and cultural context in which they were built. Provides a general knowledge of the formal, spatial and ornamental characteristics that distinguish the built environment of distinct historic and traditional building cultures.

ARCH 5202. Architectural History II: 1750-Present. (3) Prerequisite: ARCH 5201 or permission of instructor. Global survey of architecture and urbanism from 1750 to the present. Explores key architectural and urban ideas, designers, buildings, and urban projects as well as how they were shaped by their environmental, political, economic, technological, and cultural context.

ARCH 5203. Architectural History III: Survey of Contemporary Theory (1950-Present). (3) Prerequisite: ARCH 5202 or MII Standing. Survey of architecture theory from 1950 to the present. Focuses on the key ideas, texts, debates, and discourse that have informed architectural practice in the late twentieth and early twenty-first century. (Fall)

ARCH 5204. Architectural History Topics. (3) Architectural History Topics are available in a wide variety of subjects; develop in-depth research, writing, and presentation skills; and are listed under the general course numbers ARCH 5204 and ARCH 5205. *May be repeated for credit with change of topic.*

ARCH 5205. Architectural History Topics. (3) Architectural History Topics are available in a wide variety of subjects; develop in-depth research, writing, and presentation skills; and are listed under the

general course numbers ARCH 5204 and ARCH 5205. *May be repeated for credit with change of topic.*

ARCH 5206. Professional Practice. (3) An introduction to the objectives of the practice of architecture, its responsibilities and procedures, and emerging alternative forms of practice and as they pertain to the role of the architect.

ARCH 5301. Materials and Assembly Principles. (3)
Prerequisite: ARCH 5302 or permission of instructor. Introduces the quantitative and qualitative characteristics of architectural materials, systems, and processes. Students are introduced to the physical properties of materials relevant to their application in construction, assembly, and detail systems. Topics include: masonry, concrete, wood, steel, glass, cladding, and roofing and flooring materials and their assemblies.

ARCH 5302. Environmental Systems Principles. (3)
Introduces qualitative and quantitative analytical methods commonly used to assess the impact of environmental forces on occupant thermal and luminous comfort, energy performance, and regional sustainability. Students are introduced to the interplay between climatic events, patterns of building use, and the architectural variables that inform the appropriate application of building systems technology. Topics include: building envelope performance, and the introduction of passive and mechanical systems for heating, cooling, illuminating, and ventilating buildings.

ARCH 5303. Structural Principles. (3) Prerequisite: ARCH 5301 or permission of instructor. Introduces issues relevant to the fundamentals of structures including statics, strength, and stability of materials. Students will be introduced to structural concepts, systems, and the tracing of structural loads through basic principles, physical modeling, and theoretical and analytical methods. Topics include: interrelationship between strain, stress, and stability, as well as the implications of tension, compression, shear, torsion, and bending.

ARCH 5304. Structural Systems. (3) Prerequisite: ARCH 5303. Introduces specific structural applications of wood, steel, concrete, and masonry systems commonly used in small-scale commercial/institutional buildings. Students are introduced to the design of beams, columns, walls, joinery, and connections appropriate to each material type through theoretical, analytical, and computer simulation methods.

ARCH 5305. Building Systems Integration. (3)
Prerequisite: ARCH 5304 or MII Standing. Introduces

a set of advanced issues related to the comprehensive, systemic integration of building technology systems commonly used in large-scale buildings through case study, analytical, and simulation methods. Topics address the resolution of building structure, materials, environmental systems, mechanical systems, electrical systems, life safety, building water supply and waste, and conveying systems in building design.

ARCH 5601. Ideas in Architecture. (3) The fundamental concepts, issues, and working knowledge specific to design in architecture. Topics include: order, form and space, site, type, and architectural meaning.

ARCH 5604. Computational Methods. (3)
Prerequisite: ARCH 6603 or MII Standing.
Corequisite: ARCH 7101 or permission of instructor. Introduces students to the fundamental concepts of computation through explorations with basic scripting and parametric tools. The goal is to understand the potential of computation and the role it can play as part of one's design process, not as a collection of specific tools, but as a way of thinking about design.

ARCH 5605. Computational Practice. (3)
Prerequisite: ARCH 5604 or permission of instructor. Capstone course for digital media and computational studies in the School of Architecture. The goal of this seminar course is to provide students with experience using advanced digital tools and methods, including digital fabrication, parametrics, Building Information Modeling/Management (BIM), scripting, and performance analysis in preparation for professional practice and/or advanced graduate research.

ARCH 5606. Scripting. (3) Teaches students how to apply scripting as one might within a professional setting: understanding discipline-specific procedures and problems, planning and developing scripts, testing, debugging, and supporting scripts within a production environment. Students gain an understanding of how scripting can support professionals in their daily work by improving productivity and enabling innovation.

ARCH 5607. Digital Fabrication. (3) An introduction to the use of parametric software and the use of digitally controlled fabrication. Emphasizes both the development of complex building components in modeling software and the construction of those components using laser cutter, CNC routers and plasma cutters, 3D printers, and other equipment.

ARCH 5611. Research Methods I: Computational. (3)
An overview of the fundamental concepts of design computation through explorations with methods such as parametric software and scripting. Students study these methods in the context of emerging areas of

architectural technology research such as Building Information Modeling (BIM), digital fabrication, building performance optimization, and generative design, among others.

ARCH 5612. Research Methods II. (3) Undertakes a historical survey of the dominant theoretical rubrics designers have used to integrate scientific concepts into architectural research since the Enlightenment. The course is divided into two parts. The first half exposes students to the range of conceptual strategies and techniques architects have used to translate scientific concepts into architectural form, from direct experimentation of structural principles to analogical and metaphorical models of procedural design strategies. The second half requires students to develop a working thesis statement of their independent research that places their work within one of the historical traditions reviewed in class.

ARCH 6050. Architectural Elective. (3) Architectural Electives are available in a wide variety of subjects, and are listed under the general course number ARCH 6050. Topics include: Computation, Theory, Representation, Making, Urbanism, and Technology. Current elective offerings can be viewed in the Schedule of Classes or the School of Architecture website. *May be repeated for credit with change of topic.*

ARCH 6100. Design Studio: Basics. (3) Cross-listed as MUDD 5101. Prerequisite: B.A., B.S., or equivalent college degree. This introductory graduate course in architecture is intended for students newly admitted to the School of Architecture's 3+ year professional program. This five-week, intensive studio-based course includes an introduction to freehand drawing, 2-D composition, 3-D modeling, and visual theory. In addition, the course offers an introduction to a variety of related topics (history, urbanism, structure, lighting, materials, etc.) that serve as critical departure points for understanding and making architectural and urban projects.

ARCH 6101. Design Studio: Fundamentals. (6) Corequisite: ARCH 6602. An introductory architectural design studio that focuses on fundamental concepts of architecture, as well as the acquisition and practice of a wide range of technical and graphic skills and media. It is intended to complement the reading and writing engaged in ARCH 5601 and to serve as an arena to explore and test the issues encountered in that course through the act of making.

ARCH 6102. Design Studio: Fundamentals. (6) Prerequisite: ARCH 6101. Corequisite: ARCH 6603. An introductory architectural design studio that focuses on the development of site, space, and design

process issues, as well as the continued acquisition and practice of a variety of technical and graphic skills. Exploration into the creative and appropriate use of a variety of media is addressed.

ARCH 6306. Technology Topic. (3) Focuses on the study of topical areas of technology in architecture. Provide an in-depth extension of the five required technology courses. The course may be selected from a number of designated technology courses that examine specific issues contributing to architecture as a process of investigation, innovation, analysis and/or research. *May be repeated for credit with change of topic.*

ARCH 6307. Technology Topic. (3) Focuses on the study of topical areas of technology in architecture. Provide an in-depth extension of the five required technology courses. The course may be selected from a number of designated technology courses that examine specific issues contributing to architecture as a process of investigation, innovation, analysis and/or research. *May be repeated for credit with change of topic.*

ARCH 6601. Ideas in Architecture. (3) Corequisite: ARCH 6100. This seminar class concentrates on fundamental concepts, issues, and working knowledge specific to design in architecture. It is intended to complement the design problems encountered in ARCH 6100 (studio) and to serve as a critical platform to raise issues that are not always evident in studio making alone. Primary topics addressed include order, form and space, site, type, and architectural meaning.

ARCH 6602. Representation I: Fundamentals. (3) Prerequisite: ARCH 6100. Corequisite: ARCH 6101 or permission of instructor. A fundamental visual and architectural skills course that includes lessons in: visual composition, 2D design and communication, 3D physical models, graphic and photographic image manipulation, and craft in design. Also includes readings and criticism, which address the artistic and architectural correlation of these skills.

ARCH 6603. Representation II: Digital Fundamentals. (3) Prerequisite: ARCH 6602. Corequisite: ARCH 6102. Introduces students to architectural drafting (2D) and modeling (3D) using digital tools and processes. The expected outcome of this course is a student who is skillful, adaptable, and critical in the use of digital media.

ARCH 6890. Directed Independent Study. (1-3) Prerequisite: Permission of the Graduate Program Director and the graduate faculty member advising the study. Enables directed individual study and in-depth analysis of a special area related to the interests

of the student and the expertise of the advising faculty member. May count towards completion of Concentration requirements if appropriate. *May be repeated for credit with change of topic.*

ARCH 7101. Design Studio: Topical. (6) Prerequisite: ARCH 6102 or MII Standing. Focuses on issues relevant to current architectural practice and/or exploration of architectural theory. Students choose from among several sections of this studio, each of which addresses a different set of issues. The issues addressed as well as the pedagogical approach of these studios are defined by the faculty teaching them. All students must take a minimum of one Topical Design Studio within their area of Concentration.

ARCH 7102. Design Studio: Integrated Project Design. (6) Prerequisite: ARCH 7101. Focuses on a site-specific project emphasizing technological and systemic issues that lead toward a comprehensive building design.

ARCH 7103. Design Studio: Topical. (6) Prerequisite: ARCH 7102. Focuses on issues relevant to current architectural practice and/or exploration of architectural theory. Students choose from among several sections of this studio, each of which addresses a different set of issues. The issues addressed as well as the pedagogical approach of these studios are defined by the faculty teaching them. All students must take a minimum of one Topical Design Studio within their area of Concentration. *May be repeated for credit with department permission.*

ARCH 7104. Final Project/Thesis Studio. (6) Prerequisite: ARCH 7103. Offers support and structure for students undertaking their individualized project in the MArch program. Focuses upon an individually defined architectural design project, or upon an individually defined research project (see Requisite and Capstone Experiences for more details). The faculty member teaching the course coordinates the activities of the students and their advisory committees.

ARCH 7201. Design Methodologies. (3) Focuses on examination of analytic and synthetic models including information processing, programming, and implementation activities used to structure the architect's design process, conjectural models, and methods specific to the architect's creative skills.

ARCH 7202. Final Project/Thesis Document. (3) Prerequisite: ARCH 7201. Provides structure for the formation and exploration of the ideas and issues relevant to the project in the MArch program. This project is to be undertaken individually by students in their final year of study. This course results in the documentation of relevant research in preparation for

the execution of the project, which is carried out in ARCH 7104.

ARCH 7210. Idea Seminar. (3) An introduction to the important issues that involve design within the fields of computing and architecture. Design has become increasingly important to computer scientists and at the same time computation has become important to designers. This course serves as a survey of these overlapping interests.

ARCH 7211. Studio Lab I. (4) Cross-listed as ITCS 6211 and ITIS 6211. The Studio/Lab sequence situates students with varying backgrounds in an educational environment that allows them to develop and test innovative computational design tools, applications and settings. Each semester is jointly taught by faculty from the School of Architecture and the College of Computing and Informatics, and is organized around a topic chosen by the participating faculty. Each focused topic requires expertise both in spatial design and computational design, and results in prototypes and evaluation.

ARCH 7212. Studio Lab II. (4) Cross-listed as ITCS 6212 and ITIS 6212. The Studio/Lab sequence situates students with varying backgrounds in an educational environment that allows them to develop and test innovative computational design tools, applications and settings. Each semester is jointly taught by faculty from the School of Architecture and the College of Computing and Informatics, and is organized around a topic chosen by the participating faculty. Each focused topic requires expertise both in spatial design and computational design, and results in prototypes and evaluation.

ARCH 7213. Thesis. (6) Cross-listed as ITCS 6991 and ITIS 6991. The Thesis is the culmination of the student's work in the Dual Degree Program. It allows students to pursue focused research based upon their previous experiences and coursework. The intent is to demonstrate an understanding of an ongoing discourse, to form a clear hypothesis and to develop research methods suitable to implement and test the hypothesis.

ARCH 7950. Directed Research Study. (3) Prerequisite: completion of first year of the MArch II Program (or equal). An optional opportunity for research in which MArch II students may engage. Allows graduate students to engage research activities to support their growing knowledge of architecture and architectural discourse. Informs and motivates possible interests that the students might pursue in their final year of study.

Computer Science Courses (ITCS)

See descriptions of ITCS courses under "Computer

Science" in the College of Computing and Informatics section of this *Catalog*.

Information Technology Courses (ITIS)

See descriptions of ITIS courses under "Information Technology" in the College of Computing and Informatics section of this *Catalog*.

COURSES IN URBAN DESIGN (MUDD)

MUDD 5101. Design Studio: Basics. (3) Cross-listed as ARCH 6100. Prerequisite: B.A., B.S. or equivalent college degree. This introductory graduate course in architecture is intended for students newly admitted to the School of Architecture's 3+ year professional program. This five-week, intensive studio-based course includes an introduction to freehand drawing, 2-D composition, 3-D modeling, and visual theory. In addition, the course offers an introduction to a variety of related topics (history, urbanism, structure, lighting, materials, etc.) that serve as critical departure points for understanding and making architectural and urban projects.

MUDD 5601. Community Planning Workshop. (3) Cross-listed as ARCH 6050. Serves to acquaint students with contemporary theory and practice in planning and urban design; to give students experience in applying planning and urban design theory and methods to actual problems; to provide students with experience in compiling and analyzing community scale data, working with citizens, professional planners and designers, and elected officials, to provide students with experience in the preparation of oral reports and technical documents; and to examine what it means for the planner and urban designer to demonstrate ethical responsibility to the public interest, to clients and employers, and to colleagues and oneself.

MUDD 5602. Planning, Law, and Urban Design. (3) Examines the impact of planning law on the urban form of cities, both historically and in terms of contemporary professional practice. It surveys the impacts of planning regulations from Philip of Spain's "Laws of the Indies" at the beginning of American colonization through the development of English common law property rights, their extension to America and the development of zoning and planning legislation during the 20th century. Special attention is paid to current applications of form-based zoning codes in Britain and America and their implications for urban design and the patterns of settlement.

MUDD 6050. Urban Design Elective. (3) Study of topical areas of urbanism and urban design. May

include courses from the M.A. in Geography (Community Planning Track) program and/or Master of Science in Real Estate (MSRE) program by permission of the Director of the M.U.D Program. *May be repeated for credit with change of topic.*

MUDD 6100. Directed Independent Study. (1-3)

Prerequisites: Permission of the M.U.D Program Director and the graduate faculty member advising the study. Directed individual study and in-depth analysis of a special area related to the interests of the student and the expertise of the advising faculty member. May generally be taken once for credit towards degree.

MUDD 6101. Fundamentals of Urban Design Studio. (6)

This introductory urban design studio focuses on fundamental concepts as well as the acquisition and practice of a wide range of technical and graphic skills and media. It is intended to serve as an arena to explore and test issues focused around the making of sustainable public infrastructure, spatial definition by buildings, and the particular dynamics of civic and social spaces.

MUDD 6102. Urban Open Space and Infrastructure Design Studio. (6)

Prerequisite: MUDD 6101. This intermediate design studio focuses on the sustainable development of neighborhoods, districts, sites and urban open spaces, exploring design process issues as well as the continued acquisition and practice of a variety of technical and graphic skills. (*Spring*)

MUDD 6204. Geographic Information System. (3)

An applied research course focused on the broader technical issues of what a contemporary geographic information system (GIS) is and how the system can help us model and better understand the dynamic complexities of a city. Students are introduced to a mix of geographic information system theory and applications to urban design and planning problems. Topics include: geographic projection and coordinate systems, data management, models of spatial data, spatial analysis techniques, and GIS implementation issues.

MUDD 6205. Modern City: Theories and Forms. (3)

An historical survey of urban design from the mid-19th century to the end of the 20th century, focusing on various ideas of urbanism and their impact on the contemporary practice of urban design and development. It investigates the cities and large-scale urban projects resulting from revolutionary ideas of urban design and important theories of urbanism. The course is organized with topical discussions on the emergence of modern city planning, monumental city, garden city, suburbanization, new urbanism, ecological urbanism, and global city among other paradigms of modern city.

MUDD 7102. Vertical Urbanism / Global Urban Design Studio, Part I. (3) Prerequisite: MUDD 6102. Part one of an advanced, two-part design studio which focuses on site-specific projects in countries outside the USA and emphasizes methods of research and design as well as technological and systemic issues of sustainability in dense and vertical urban environments. Part I takes place outside the USA and initiates work on design projects. Pursues a directed research and design agenda that varies according to faculty interest, expertise and/or project requirements. May build upon the resources of the City.Building.Lab (CBL) at the School of Architecture.

MUDD 7103. Vertical Urbanism / Global Urban Design Studio, Part II. (3) Prerequisites: MUDD 6102 and MUDD 7102. Part two of an advanced, two-part design studio focuses on site-specific projects in countries outside the USA and emphasizes methods of research and design as well as technological and systemic issues of sustainability in dense and vertical urban environments. Part II is held in Charlotte and completes the design projects commenced abroad. Pursues a directed research and design agenda that varies according to faculty interest, expertise and/or project requirements. May build upon the resources of the City.Building.Lab (CBL) at the School of Architecture.

MUDD 7120. Graduate Summer International Study. (3-6) Prerequisite: Approval of the M.U.D Program Director. The premise of this course is to allow graduate students to engage a summer experience abroad to support their growing knowledge of architecture and architectural discourse. This experience is intended to inform and motivate possible interests that the students might pursue in further study.

MUDD 7134. Independent Capstone Research Project (6) Prerequisite: MUDD 6102. This is an alternative capstone course to MUDD 7102/7103 for students in exceptional circumstances only. This advanced project offers support and structure for students undertaking their capstone experience as individualized research and/or design work within the parameters of the M.U.D program but outside the normative full-time sequence of studios or as part of a dual degree option with an individually tailored course plan. An individually defined urban research and/or design project will be taken under the direction of a M.U.D faculty member and other advisors as appropriate.

Music

• Graduate Certificate in Vocal Pedagogy

Department of Music

music.uncc.edu

Graduate Certificate Program Coordinator

Dr. James A. Grymes

Graduate Faculty

Dr. John Allemeier, Associate Professor

Dr. Brian Arreola, Associate Professor

Dr. Alissa Deeter, Associate Professor

Dr. James A. Grymes, Professor

Dr. Randal Haldeman, Associate Professor

David Russell, Professor

Dr. Fred Spano, Associate Professor

Dr. Jennifer Whitaker, Associate Professor

Jacqueline Yost, Lecturer

GRADUATE CERTIFICATE IN VOCAL PEDAGOGY

The Graduate Certificate in Vocal Pedagogy is designed to provide the advanced student with a concentrated program focusing on the methodology and practice of teaching voice. The curriculum consists of 17 hours of graduate level work that can be completed in two semesters over one academic year. The course of study includes private lessons, masterclasses, internships teaching in one-on-one and/or group situations, and a graduate pedagogy sequence culminating in a directed project.

Admission Requirements

- 1) A bachelor's degree in music from an accredited university or conservatory
- 2) Online application to Graduate Admissions, accompanied by the application fee in effect
- 3) GPA required for entry into a master's degree program
- 4) Official transcripts
- 5) Formal audition for acceptance as a post-baccalaureate student
- 6) Placement tests in music theory, ear training, and piano. Any deficiencies revealed in the placement tests may be remedied through coursework at UNC Charlotte or any other accredited institution.
- 7) A diagnostic vocal pedagogy exam will be administered prior to placement into the program.

Program Requirements

Students must take all of the courses below to complete the Graduate Certificate in Vocal Pedagogy. All courses must be taken at UNC Charlotte and must be completed within four years.

MUSC 5137 Graduate Vocal Pedagogy I (3)
 MUSC 5153 Graduate Vocal Pedagogy II (3)
 MUSC 6453 Voice Teaching Internship (2) (*two semesters*)
 MUPF 6253 Applied Music Voice (2) (*two semesters*)
 MUPF 6253L Voice Masterclass (0) (*two semesters*)
 MUSC 6600 Concluding Seminar (3)

COURSES IN MUSIC, MUSIC EDUCATION, AND MUSIC PERFORMANCE

Music Education (MUED)

MUED 5140. Choral Methods. (2) Prerequisite: Admission to the MAT or Graduate Certificate in Teaching Program. Corequisite: MUED 5140L. Rehearsal techniques, repertoire, and administration of school choral programs. A minimum of ten hours of field work required. Three contact hours.

MUED 5140L. Choral Methods Lab. (1) Corequisite: MUED 5140. Clinical application of rehearsal methods with various choral ensembles. A minimum of 10 hours in the field are required.

MUED 5151. Computer Skills for the Music Educator. (3) Prerequisites: Admission to MAT or Graduate Certificate in Teaching Program, and permission of the instructor. The study of contemporary MIDI and computer related technologies available to the music educator. Two contact hours.

MUED 5194. Instrumental Methods. (2) Prerequisites: Admission to MAT or Graduate Certificate in Teaching Program, and permission of the instructor. Corequisite: MUED 5194L. Rehearsal techniques, repertoire, teaching strategies, methods, and materials of teaching and administering an instrumental music program in the public school. Two contact hours.

MUED 5194L. Instrumental Methods Lab. (1) Prerequisites: Admission to MAT or Graduate Certificate in Teaching Program, and permission of the instructor. Corequisite: MUED 5194. Clinical application of rehearsal methods with collegiate and public school instrumental ensembles. A minimum of 10 hours in the field are required.

Music Performance (MUPF)

MUPF 6120. Graduate Choral Ensemble. (1) Prerequisite: Audition. Corequisite: MUPF 6120L. A mixed chorus that performs music of many styles from the Baroque period to the present. 3 contact hours. *May be repeated for credit.*

MUPF 6120L. Graduate Choral Ensemble Sectional Rehearsals. (0) Corequisite: MUPF 6120. Sectional rehearsals for MUPF 6120. *May be repeated.*

MUPF 6160. Chamber Orchestra. (1) Prerequisite: audition. Corequisite: MUPF 6160L. An elite ensemble that plays advanced string orchestra works and collaborates with the choral and opera programs. *May be repeated for credit.*

MUPF 6160L. Chamber Orchestra Sectional Rehearsals. (0) Corequisite: MUPF 6160. Sectional rehearsals for MUPF 6160. *Graded on a Pass/Unsatisfactory basis. May be repeated for credit.*

MUPF 6249. Applied Music: Violin. (2) Prerequisite: Admission to the Graduate Certificate in Violin program. Corequisites: MUPF 6160 and MUPF 6249L. Private instruction; one hour lesson per week. Minimum of four hours of practice per day. *May be repeated for credit.*

MUPF 6249L. Violin Masterclass. (0) Weekly masterclasses for MUPF 6249. *Graded on a Pass/Unsatisfactory basis.*

MUPF 6253. Applied Music: Voice. (2) Prerequisite: Admission to the Graduate Certificate in Vocal Pedagogy program. Corequisites: MUPF 6253L and approved principle ensemble. Consists of private instruction, a one-hour lesson per week leading to a formal jury at the end of the semester. *May be repeated for credit.*

MUPF 6253L. Voice Masterclass. (0) Corequisite: MUPF 6253. Weekly masterclasses for MUPF 6253. *May be repeated.*

MUPF 6400. Graduate Recital. (0) A graduate-level recital of solo and ensemble repertoire performed before a jury of faculty members and the general public. See the Department of Music *Student Handbook* for details.

Music (MUSC)

MUSC 5001. Topics in Music. (1-6) Prerequisites: Admission to MAT or MME and permission of the instructor. Special topics in music; *May be repeated*

for credit. Specific topics courses will be field-tested and modified to become permanent courses.

MUSC 5049. Violin Literature. (3) Prerequisites: Admission to the Graduate Certificate in Violin program and MUSC 5230. An analysis course focusing on the major repertoire for the violin. Methodologies will include both historical and structural analysis of violin compositions from the 17th century through the present.

MUSC 5137. Graduate Vocal Pedagogy I. (3) Prerequisite: Admission to the Graduate Certificate in Vocal Pedagogy program. Surveys the history of vocal pedagogy from Manuel García to present-day pedagogues, as well as investigates areas of interest such as singing psychology, repertoire selection, methodology development, and complementary training.

MUSC 5149. Violin Pedagogy. (3) Prerequisite: Admission to the Graduate Certificate in Violin program. Corequisites: MUPF 6249 and MUPF 6249L. A methodology course outlining the teaching techniques, materials, and related literature necessary for offering private instruction on the violin.

MUSC 5153. Graduate Vocal Pedagogy II. (3) Prerequisite: MUSC 5137. Researches vocal mediation and remediation by examining pathologies, predisposing conditions, age-specific needs, health and care protocols, and ethics.

MUSC 5170. Graduate Survey of Music History. (3) A survey of the materials of Western music and an overview of the historical development and relationships of musical styles.

MUSC 5230. Form and Analysis. (3) Prerequisite: admission to the Graduate Certificate in Violin program. The impact of form and process on the analysis and interpretation of music. A detailed examination of common practice forms such as Binary, Ternary, Rondo, Theme and Variation, and Sonata form.

MUSC 6453. Voice Teaching Internship. (2) Prerequisite: Admission to the Graduate Certificate in Vocal Pedagogy program. Applied teaching with a select number of students, both male and female, and a weekly seminar to review and discuss issues and solutions in the studio and in another vocal-teaching contexts (e.g., choral, opera, ensemble, etc.), as appropriate. Students develop and document a systematic teaching methodology, learn how to select appropriate repertoire based on singer ability, and apply appropriate protocols for technical issues. *May be repeated for credit.*

MUSC 6600. Concluding Seminar. (3) Prerequisite: Admission to the Graduate Certificate in Vocal Pedagogy program. Concluding Seminar consists of a Directed Learning Project, enabling the student to focus on his or her area of pedagogical interest. Students are mentored through the project by a supervising instructor. Concluding Seminar is intended to provide a learning experience for students to gain additional knowledge that reinforce their Vocal Pedagogy program and support student career goals.

MUSC 6601. Graduate Seminar in Music History. (3) Prerequisite: MUSC 5170 or permission of the department. Individual or group investigation of a selected style period, composer, genre, or topic of current interest in music history. Provides an introduction to research methods, documentary sources, and critical analysis that culminates in a formal research paper worthy of scholarly presentation and/or publication.



Belk College of Business

belkcollege.uncc.edu

Dean: Dr. Steven Ott

Senior Associate Dean: Dr. Richard Buttner

Associate Dean for Research & Graduate Programs: Dr. Jennifer Troyer

Associate Dean for Undergraduate Programs: Dr. Patricia Mynatt

The Belk College of Business is accredited by AACSB International, the premier accrediting agency for academic programs in business administration and accounting. Our challenging master's programs in Accountancy, Business Administration, Economics, and Mathematical Finance provide graduates with the tools they need to succeed in business. Courses are taught by full-time faculty with Ph.D.s from top schools whose research is published in top-level journals and whose expertise is highly sought after by industry executives. Students have the opportunity to network with professionals from a variety of fields, and interact with alumni and leaders from Charlotte's dynamic business community. These programs provide flexible schedules with courses offered both at UNC Charlotte's main campus and at our Uptown campus in the heart of Charlotte's Center City, so that working professionals may earn their graduate degree without interrupting their careers.

College of Business Graduate Degree Programs

- Doctor of Business Administration
- Ph.D. in Business Administration
- Master of Accountancy
- Master of Business Administration
- Master of Science in Economics
- Master of Science in Real Estate

Interdisciplinary Degree Programs

- Master of Science in Data Science and Business Analytics (in collaboration with the College of Computing & Informatics)

- MACC/JD Dual Degree (in conjunction with the Charlotte School of Law)
- MBA/JD Dual Degree (in conjunction with the Charlotte School of Law)
- MBA in Global Business and Strategy Dual Degree (in conjunction with the Graduate School of Business and Leadership (EGADE))
- MBA/MHA Dual Degree (in collaboration with the College of Health and Human Services)
- M.S./M.Sc. in Economics (in conjunction with Copenhagen Business School)
- Master of Science in Mathematical Finance (The Departments of Finance and Economics in the Belk College of Business collaborate with the Department of Mathematics and Statistics in the College of Liberal Arts & Studies in this interdisciplinary program)
- MSRE/JD Dual Degree (in conjunction with the Charlotte School of Law)
- Ph.D. in Computing and Information Systems - Business Track (The Belk College collaborates with the College of Computing & Informatics on the Business Track in this multidisciplinary program, located in the "College of Computing and Informatics" section of this Catalog)
- Ph.D. in Organizational Science (Faculty from the Belk College's Department of Management teach in this multidisciplinary program, located in the "College of Liberal Arts & Sciences" section of this Catalog)
- Ph.D. in Public Policy (Faculty from the Belk College's Department of Economics teach in this multidisciplinary

program, located in the "College of Liberal Arts & Sciences" section of this Catalog)

Graduate Non-Degree Programs

- MBA PLUS Post-Master's Certificate
- Graduate Certificate in Business Foundations
- Graduate Certificate in Data Science and Business Analytics (*In collaboration with the College of Computing & Informatics*)
- Graduate Certificate in Applied Econometrics
- Graduate Certificate in Real Estate and Development

Accountancy

- **Master of Accountancy (MACC)**
- **MACC/JD Dual Degree** (*in conjunction with the Charlotte School of Law*)

Turner School of Accountancy

macc.uncc.edu

Graduate Program Director

Dr. Jack Cathey

Graduate Faculty

Dr. Hughlene Burton, Associate Professor and School Director

Dr. Jack Cathey, Associate Professor

Dr. Howard Godfrey, Professor

Dr. Keejae Hong, Assistant Professor

Dr. David Kerr, Associate Professor

Dr. Greg Martin, Assistant Professor

Dr. Kristin Roland, Assistant Professor

Dr. Suzanne Sevin, Clinical Professor

Dr. Paul Tanyi, Assistant Professor

Dr. Marcia Watson, Associate Professor

Dr. Casper Wiggins, Big Five Distinguished Professor

MASTER OF ACCOUNTANCY

The Master of Accountancy program is a multiple concentration program designed to prepare accountants for the rapidly changing expectations of the accounting profession. The program has three concentrations: (1) Professional Accounting, (2) Financial Accounting/Auditing, and (3) Tax. The program also includes the option for development of an individualized program of study. Completion of the Professional Accounting concentration or the Financial Accounting/Auditing concentration enables students to pursue licensure in states requiring 150 credit hours.

Additional Admission Requirements

In addition to the general requirements for admission to the Graduate School, an acceptable score on the verbal and quantitative portions of the Graduate Management Admission Test (GMAT) is required for graduate study in Accounting. A Graduate Record Exam (GRE) score may be submitted in lieu of a GMAT score. Students with outstanding undergraduate performance may be able to waive this requirement. Contact the Program Director for additional information.

Degree Requirements

The program leading to the Master of Accountancy degree consists of 30 credit hours (10 graduate courses) of coursework for students with an accounting undergraduate degree and 36 hours for students who do not have an accounting undergraduate degree. The coursework is divided into two components: accounting classes and elective classes. See the concentration descriptions below for more information on required and elective courses.

Due to the importance of having a strong foundation in financial reporting, all MACC students are required to have earned a grade of B or above in Intermediate Accounting I and II. Neither a comprehensive examination nor a thesis is required; however, each concentration has a designated capstone course.

Concentrations

Professional Accounting Concentration

The Concentration in Professional Accounting is designed for students who have an interest in preparing for careers in public accounting, consulting, and corporate accounting. The concentration is designed for students who do not have an undergraduate degree in accounting. It is also designed for students who have an undergraduate degree in accounting from outside of the United States. The program is offered in both full-time and part-time formats, with classes offered both during the daytime and in the evenings. Students planning to pursue full-time study should plan to begin the program during the summer.

Required Courses (21 credit hours)

ACCT 5220 Income Tax (3)
 ACCT 5311 Intermediate Financial Reporting I (3)*
 ACCT 5312 Intermediate Financial Reporting II (3)*
 ACCT 6120 Taxation of Corporations and Shareholders (3)
 ACCT 6220 Financial Statement Auditing (3)
 ACCT 6260 Advanced Financial Reporting (3)
 ACCT 6270 Accounting for Business Combinations, Governmental, and Not-for-Profit Entities (3)

**ACCT 5311 and ACCT 5312 or equivalent must be completed with a grade of B or above or permission of the MACC program director before taking the other courses in the program.*

Capstone Course (3 credit hours)

ACCT 6280 International Financial Reporting (3)

Elective Courses (12 credit hours)

In addition to the required and capstone courses, students are expected to complete four elective courses. Elective courses may be chosen from other courses offered by the MACC program, courses from

other master's programs offered by the Belk College of Business, and courses from other master's programs offered by the University. Courses chosen from other College of Business master's programs must be approved by the Program Director of that program. Courses chosen outside of the College of Business can be taken only with permission of both the MACC Program Director and the Program Director for the specific program offering the course.

Financial Accounting/Auditing Concentration

The Concentration in Financial Accounting/Auditing is designed for students wishing to pursue careers in public accounting, consulting, and corporate accounting. The concentration is designed for students who have an undergraduate degree or equivalent in accounting from a U.S. university. The program is offered in both full-time and part-time formats with classes offered both during the daytime and in the evenings.

Required Courses (12 credit hours)

ACCT 6120 Taxation of Corporations and Shareholders (3)
 ACCT 6220 Financial Statement Auditing (3)
 ACCT 6260 Advanced Financial Reporting (3)
 ACCT 6270 Accounting for Business Combinations, Governmental, and Not-for-Profit Entities (3)

Capstone Course (3 credit hours)

ACCT 6280 International Financial Reporting (3)

Elective Courses (15 credit hours)

In addition to the required and capstone courses, students are expected to complete five elective courses. Elective courses may be chosen from other courses offered by the MACC program, courses from other master's programs offered by the Belk College of Business, and courses from other master's programs offered by the University. Courses chosen from other College of Business master's programs must be approved by the Program Director of that program. Courses chosen outside of the College of Business can be taken only with permission of both the MACC Program Director and the Program Director for the specific program offering the course.

Tax Concentration

The Concentration in Tax is designed for students who wish to specialize in taxation. Students can enroll in the Tax concentration with or without an undergraduate degree in Accounting. The program is offered in both full-time and part-time formats with tax classes offered in only the evenings.

Prerequisite Courses (6 credit hours)

ACCT 2121 Introduction to Financial Accounting (3)
 ACCT 4220 Income Tax (3)
 or ACCT 5220 Income Tax (3)

(or equivalents)

Required Courses (12 credit hours)

ACCT 6110 Tax Research and Planning (3)
 ACCT 6120 Taxation of Corporations and Shareholders (3)
 ACCT 6130 Taxation of Pass-Through Entities (3)
 ACCT 6160 Advanced Individual Taxation (3)

Capstone Course (3 credit hours)

ACCT 6150 Tax Strategy and Policy (3)

Elective Courses (15 credit hours)

In addition to the required and capstone courses, students are expected to complete five elective courses, with at least two in taxation or accounting. Elective courses are available for students who wish to specialize in tax and also prepare for the CPA exam.

Individualized Concentration

The Individualized concentration is designed for students with unique career and professional goals that are not met by any of the other concentrations. The Individualized concentration consists of 10 courses, at least five of which must be from the MACC curricula, with the remaining five courses chosen as elective courses. Consultation with the Program Director is required for this concentration.

Elective courses may be chosen from other courses offered by the MACC program, courses from other master's programs offered by the Belk College of Business, and courses from other master's programs offered by the University. Courses chosen from other College of Business master's programs must be approved by the Program Director of that program. Courses chosen outside of the College of Business can be taken only with permission of both the MACC Program Director and the Program Director for the specific program offering the course.

Advising

Prior to, or concurrent with, the start of the first semester of study, students are expected to complete a program of study listing each course they expect to take as a part of the program.

Application for Degree

Students should make application for their degree by completing the online Application for Degree through Banner Self Service no later than the filing date specified in the University Academic Calendar.

Assistantships

Assistantships are available on a competitive basis.

Program Certifications/Accreditation

The Belk College of Business and the Turner School of Accountancy are accredited by The Association to Advance Collegiate Schools of Business (AACSB International).

MACC/JD DUAL DEGREE

This dual degree program allows students to earn a Master of Accountancy (MACC) degree from the Belk College of Business at UNC Charlotte and a Juris Doctor (JD) degree from the Charlotte School of Law in eight semesters of study.

Prospective dual-degree program students must apply separately to both UNC Charlotte and the Charlotte School of Law. Full-time students spend the first full year of study at either UNC Charlotte or the Charlotte School of Law. They then spend their entire second or third year at the other institution. For the remainder of the program, students take classes at both UNC Charlotte and the Charlotte School of Law. Each school grants nine (9) units of credit for courses taken at the other school.

Visit macc.uncc.edu and charlottelaw.edu for additional information.

COURSES IN ACCOUNTING (ACCT)

ACCT 5220. Income Tax. (3) An introduction to the Federal income tax system with emphasis on concepts and procedures applicable to all types of entities.

ACCT 5311. Intermediate Financial Reporting I. (3)
 Prerequisites: ACCT 2121 or equivalent, and enrollment in the MACC program. Analysis of the financial reporting requirements of corporations with emphasis on the conceptual framework and accounting for assets.

ACCT 5312. Intermediate Financial Reporting II. (3)
 Prerequisite: ACCT 3311 or ACCT 5311 with grade of B or above; and enrollment in the MACC program. A continuation of ACCT 5311 with emphasis on financial reporting for liabilities and stockholder's equity. Also, a number of special topics, including the accounting for investments and the statement of cash flows.

ACCT 6110. Tax Research and Planning. (3) Tax research techniques applicable to federal tax law affecting individuals, corporations and partnerships, including use of traditional and computerized tax services to solve tax problems. Emphasis on tax planning principles and related tax practice matters,

including handling tax compliance issues and dealing with the Internal Revenue Service.

ACCT 6120. Taxation of Corporations and Shareholders. (3) Examines the federal and state tax law applicable to corporations and their shareholders. The course covers tax compliance matters, strategies for minimizing tax liabilities and strategies for handling tax controversies.

ACCT 6130. Taxation of Pass-Through Entities. (3) Tax law applicable to partnerships, Limited Liability Companies and S corporations, including tax compliance matters strategies for minimizing tax liabilities and strategies for handling tax controversies.

ACCT 6140. Taxation of Estates, Gifts, and Trusts. (3) Wealth transfer taxes and taxation of estates and trusts, including integration of these taxes and tax planning opportunities for minimizing tax liabilities. (*Summer*)

ACCT 6150. Tax Strategy and Policy. (3) Tax strategies in all phases of business operations, including creation of the business, choice of the type of business entity, financing, operations, distributions to owners, expansion, reorganization and liquidation with emphasis on minimizing taxes and avoiding tax traps. Analysis of business planning cases and completion of a comprehensive project with the results presented in both an oral and written report.

ACCT 6160. Advanced Individual Taxation. (3) Focuses on topics related to the taxation of individuals to enable the student to better advise taxpayers on these matters, identify problem areas and assist in tax planning matters to minimize the amount of tax due. Topics include: passive loss limitation rules, interest categorization and limitations, individual alternative minimum tax, individual net operating loss rules and rules concerning divorced taxpayers.

ACCT 6199. Topics in Taxation. (1-4) Topics in the area of taxation that go beyond the coverage in other existing courses by either addressing new tax issues or by delving more deeply into a tax topic. *May be repeated for credit with change in topic.*

ACCT 6220. Financial Statement Auditing. (3) Analysis of the accounting control systems and the independent auditor's examination of the system and other evidence as a basis for expressing an opinion on financial statements.

ACCT 6240. Business Environment, Governance, and Accountability. (3) Examines a wide variety of topics related to the general business environment and business concepts. Topics include: corporate

governance and control, information technology, managerial and cost accounting, economic concepts and analysis, strategic planning, financial management, and operations management.

ACCT 6260. Advanced Financial Accounting I. (3) Advanced concepts and practices in financial reporting with special emphasis on the use of accounting information in capital markets and accounting theory and research. In addition, the course will examine current topics and emerging issues in financial reporting.

ACCT 6270. Accounting for Business Combinations, Governmental, and Not-for-Profit Entities. (3) Advanced concepts and practices in financial reporting with special emphasis on business combinations, consolidated financial statements and financial reporting issues and practices for governmental and other not-for-profit entities. In addition, the course examines current topics and emerging issues in financial reporting.

ACCT 6280. International Financial Reporting. (3) Examination of accounting standards under International Financial Reporting Standards (IFRS).

ACCT 6291. Financial Statement Analysis. (3) The analysis and interpretation of financial statements. This includes profitability and returns analysis, operating versus non-operating performance evaluation, credit analysis (liquidity and solvency), reformulation of financial statements, forecasting of financial statements, analysis of off-balance-sheet financing, analysis of intercorporate investments, cash flow analysis, accounting-based equity valuation, cash-based equity valuation, market-based valuation, assessing earnings quality and earnings management, mergers and acquisitions, assessment of intangible assets, and credit ratings of debt securities.

ACCT 6299. Topics in Financial Accounting and Auditing. (1-4) Topics in the area of financial accounting and auditing that go beyond the coverage in other existing courses by either addressing new issues or by delving more deeply into a topic. *May be repeated for credit with change in topic.*

Business Administration

- **Doctor of Business Administration (DBA)**
- **Ph.D. in Business Administration**
- **Master of Business Administration (MBA)**
- **MBA/MA in Latin American Studies Dual Degree** (*in collaboration with the College of Liberal Arts & Sciences*)
- **MBA/MHA Dual Degree** (*in collaboration with the College of Health and Human Services*)
- **MBA/JD Dual Degree** (*in conjunction with the Charlotte School of Law*)
- **MBA Dual Degree** (*in conjunction with the Graduate School of Business and Leadership (EGADE)*)
- **MBA PLUS Post-Master's Certificate**
- **Graduate Certificate in Business Foundations**

DOCTOR OF BUSINESS ADMINISTRATION (DBA)

****ENROLLMENT FOR THIS PROGRAM
BEGINS IN FALL 2017****

Website

dba.uncc.edu

Graduate Program Director

Dr. Franz Kellermanns

The Doctor of Business Administration (DBA) is a professional degree taught in an executive format designed to prepare graduates for leadership positions in organizations and teaching careers in academia. The program focuses on research methodology with practice-focus content and projects that address issues confronting contemporary business leaders. Students gain an advanced level of knowledge in the following major fields: management, marketing, operations management and information systems. In addition, students are expected to demonstrate mastery of the existing body of knowledge in their major field and to

develop new knowledge through original independent research. With the educational background provided by the program, graduates are qualified to lead organizations as senior executives and change agents, acquire faculty positions in academic institutions, and launch successful careers in management consulting.

Additional Admission Requirements

All applicants seeking admission to the DBA program must fulfill the University's general requirements for graduate admission at the Ph.D. level. Additional requirements for admission into the program include:

- An earned MBA or master's degree in a related field from a regionally accredited college or university with a minimum GPA of at least 3.0 on a 4.0 scale
- Five or more years of professional working experience
- For non-native speakers of English, a minimum score of 220 on the computer-based TOEFL, a score of 557 on the paper-based TOEFL, a score of 83 on the internet-based TOEFL, or a band score of 6.5 on the IELTS
- Three positive letters of recommendation
- Two essays: one addressing the candidate's goals and motivations for pursuing the DBA and the second outlining the candidate's general areas of research interest
- Other credentials as required by the Graduate school or the executive DBA program committee

Students are admitted to the program by the Dean of the Graduate School based on the recommendation of the Belk College of Business DBA Program Director, in consultation with the Belk College of Business DBA Program Committee. Recommendations are based on the assessments of the Program Director and Program Committee of the candidate's ability to complete the program, as supported by the application materials. If there are more candidates than can be accommodated, candidates are recommended in order of their perceived ability, promise of success, and suitability to the program.

Degree Requirements

The degree of Doctor of Business Administration is awarded for completion of scholarly research that advances knowledge in the fields of business theory or practice. Evidence of this is demonstrated by a successful dissertation defense. Additionally, recipients of this degree must demonstrate mastery of the body of knowledge within the field and potential for success in future leadership positions and academia.

The DBA is a three-year (six-semester), lockstep program consisting of 18 three credit hour courses. The program requires 54 post-master's credit hours. The curriculum has three major components:

Research Methodology Courses (21 credit hours)

- BDBA 8100 Introduction to Experimental Design and Measurement (3)
- BDBA 8130 Introduction to Business Theory (3)
- BDBA 8140 Advanced Business Theory (3)
- BDBA 8150 Business Statistics and Data Analysis (3)
- BDBA 8200 Research Methods I (3)
- BDBA 8230 Research Methods II (3)
- BDBA 8350 Dissertation Proposal Development (3)

Seminars in Applied Research (15 credit hours)

- BDBA 8110 Organizational Theory and Systems (3)
- BDBA 8120 Professional Issues I (3)
- BDBA 8210 Current Topics Research Seminar (3)
- BDBA 8220 Professional Issues II (3)
- BDBA 8240 Focused Research Seminar (3)

Dissertation (18 credit hours)

- BDBA 8999 Doctoral Dissertation Research (18)

Grade Requirements

Students are expected to earn an A or B in all courses included in the program and must maintain a minimum cumulative 3.0 GPA (on a 4.0 scale) to graduate. The dissertation is graded on a Pass/Unsatisfactory basis and, therefore, will not be included in the cumulative average. An accumulation of three marginal C grades in any graduate coursework will result in suspension of enrollment. If students earn a grade of U in any course, their enrollment will be suspended and they cannot take further coursework without being readmitted to the program. Readmission to the program requires approval of the Dean of the Graduate School upon the recommendation of the Program Director.

Dissertation Advisor and Advisory Committee

Every student in the program must have a Dissertation Advisor and an Advisory Committee prior to being admitted to Candidacy. Students should select a dissertation advisor before the end of the second year of the program. Students and their dissertation advisor jointly determine the advisory committee. The Dissertation Advisor serves as Chair of the Advisory Committee and must be a member of the Graduate Faculty of Belk College of Business UNC Charlotte. The Advisory Committee must have at least four members, three of which are chosen by the student. Normally, the Dissertation Chair will be graduate faculty of the Belk College from the Departments of Business Information Systems and Operations Management, Management, or Marketing.

Advisory Committee members must be members of the graduate faculty at UNC Charlotte or from other institutions or industry provided they have relevant expertise and background. Committee members should reflect both content and methods expertise needed for the student to complete the research.

Admission to Candidacy

The dissertation topic may be proposed after students have completed the required coursework. The proposal defense serves as the qualifying exam. Pursuant to Graduate School rules, doctoral students advance to candidacy after their Advisory Committee and the Dean of the Graduate School approve the dissertation topic. Further pursuant to Graduate School rules, candidacy must be achieved at least six months before the degree is conferred.

Dissertation

Students must complete and defend a dissertation based on a research program approved by their Dissertation Advisor and Advisory Committee which results in a high-quality, original, and substantial piece of research. Students must orally present and defend the dissertation before the Advisory Committee in a defense that is open to the University community. A copy of the dissertation must be made available to the Graduate Faculty of the Belk College of Business at least three weeks prior to the public defense. While the defense is open to the University community, the deliberations of the Advisory Committee are held in Executive Session. The dissertation is graded on a Pass/Unsatisfactory basis by the Advisory Committee and the Dean of the Graduate School.

The dissertation defense is the final examination. It is a Graduate School requirement that students who fail the final examination twice are terminated from the program.

Residency Requirement

The DBA is a cohort-based program offered in an executive format. Normally students must enroll for nine credit hours during each semester of the regular academic year (i.e., fall and spring). Students may petition the Program Director for permission to enroll in less than nine semester hours in cases of hardship or other emergencies. It is a Graduate School requirement that a student must enroll in at least 18 total credit hours of Dissertation Research in order to graduate from the program.

Students that have completed all degree requirements, including the Dissertation Defense, may enroll once in GRAD 9999 (Doctoral Graduate Residency Credit) in order to meet Graduate School Residency requirements.

Time Limit for Degree Completion

Students are allowed a maximum of eight calendar years from formal admission to the DBA program to complete the program successfully.

Application for Degree

Students should make application for their degree by completing the online Application for Degree through Banner Self Service no later than the filing date specified in the University Academic Calendar.

COURSES IN DBA BUSINESS ADMINISTRATION (BDBA)

BDBA 8100. Introduction to Experimental Design and Measurement. (3) Overview of quasi-experimental design, qualitative techniques, basic statistics, and methodological skills necessary to carry out applied research in the fields of management, marketing, operations management and information systems.

BDBA 8110. Organizational Theories and Systems. (3) Review of a broad range of organizational theory and topics in the fields of management, marketing, operations management and information systems.

BDBA 8120. Professional Issues I. (3) Introduction to the principles of scholarly research for both academic and industry settings, including ethics and research integrity, navigating scholarly literature, focusing on research and teaching excellence.

BDBA 8130. Introduction to Business Theory. (3) Review of fundamental theories and research in the fields of strategic management, marketing, operations management, and information systems.

BDBA 8140. Advanced Business Theory. (3) Review of micro- and meso-theories and research developed in the fields of management, marketing, operations management and information systems.

BDBA 8150. Business Statistics and Data Analysis. (3) Development of basic skills to conduct quantitative and qualitative research in the chosen area of study within the fields of management, marketing, operations management and information systems.

BDBA 8200. Research Methods I. (3) Development and application of advanced research skills. Both advanced quantitative and qualitative research methods are discussed.

BDBA 8210. Current Topics Research Seminar. (3) Review of current topics in the fields of management,

marketing, operations management and information systems and development of research skills in the respective focus areas.

BDBA 8220. Professional Issues II. (3) Consideration of advanced topics in the conduct and application of scholarly research within both academic and industry settings.

BDBA 8230. Research Methods II. (3) Development and application of advanced research skills necessary for successfully defending a dissertation proposal, building on Research Methods I. Both advanced quantitative and qualitative research methods are discussed.

BDBA 8240. Focused Research Seminar. (3) Review of current topics identified by the students in the program to support the development of dissertation idea. Topics include: the fields of management, marketing, operations management, and information systems.

BDBA 8350. Dissertation Proposal Development. (3) In-depth discussion of papers and development of research models and approaches in preparation of dissertation work. Collaboration with the intended dissertation chair is desired.

BDBA 8999. Doctoral Dissertation Research. (3) Each student initiates and conducts an individual investigation culminating in the preparation and presentation of a doctoral dissertation.

PH.D. IN BUSINESS ADMINISTRATION

Website

phd-business.uncc.edu

Graduate Program Director

Dr. David Mauer

Graduate Faculty

Economics

Dr. Hwan Lin, Associate Professor

Dr. Rob Roy McGregor, Professor

Dr. Dmitry Shapiro, Associate Professor

Dr. Jennifer Troyer, Associate Dean for Research and Graduate Programs and Professor

Dr. Artie Zillante, Department Chair and Associate Professor

Finance

Dr. Lloyd Blenman, Professor

Dr. Richard Buttimer, Senior Associate Dean and Professor

Dr. I-Hsuan Ethan Chiang, Assistant Professor

Dr. Steven Clark, Associate Professor

Dr. Tao-Hsien Dolly King, Department Chair and Rush S. Dickson Professor

Dr. Christopher M. Kirby, Professor

Dr. David Mauer, Terrence E. Hemby, Sr. Distinguished Professor in Financial Services

Dr. Faith Neale, Associate Professor

Dr. Steven Ott, Dean of the Belk College of Business and John Crosland Sr. Distinguished Professor of Real Estate

Dr. Weidong Tian, Distinguished Scholar in Risk Management and Insurance and Professor

Dr. Kiplan Womack, Assistant Professor

Dr. Yilei Zhang, Assistant Professor

Mathematics and Statistics

Dr. Jaya Bishwal, Associate Professor

Dr. Adriana Ocejo Monge, Assistant Professor

Dr. Mingxin Xu, Associate Professor

The Ph.D. in Business Administration is a research-oriented program designed to prepare graduates for teaching and research careers in academia. The program includes core courses covering all business specialties combined with an in-depth study in both theoretical and empirical aspects of the major and minor field. Students also receive training in pedagogy. Students are expected to demonstrate mastery of the existing body of knowledge in their major field and to develop new knowledge through original independent research. With the educational background provided by the program, graduates are qualified for tenure-track professor positions at both national and international research and teaching universities and other educational institutions.

Additional Admission Requirements

All applicants seeking admission into the Ph.D. in Business Administration must fulfill the University's general requirements for graduate admission at the Ph.D. level. Additional requirements for admission into the program are listed below.

- 1) A baccalaureate or master's degree in Business, Economics, or a related field with a minimum undergraduate GPA of 3.5 (A=4.0) overall. In the case a candidate presents a master's degree at application, a minimum graduate GPA of 3.25 (A=4.0) on all graduate coursework is required.
- 2) A GMAT score of at least 650 or GRE scores with scores on the quantitative section of at least 700 and on the verbal section of at least 500.
- 3) For non-native speakers of English that do not hold degrees from a US university, a score of 220 on the computer-based TOEFL, a score of 557 on the paper-based TOEFL, or 85% on the MELAB.

- 4) Non-native speakers of English may be required, at the discretion of the Graduate School or the Program Director for the Ph.D. in Business Administration, to enroll in English as a Second Language (ESL) courses at the English Language Training Institute.
- 5) Three positive letters of recommendation, one of which must be from a former professor.
- 6) A Statement of Purpose from the applicant explaining why they wish to pursue a Ph.D. in Business Administration and why they wish to study the specific area to which they are applying.
- 7) To ensure their preparation for doctoral coursework, students may be required to take additional undergraduate or graduate courses, as determined by the Ph.D. in Business Administration Program Committee and the Program Director. Such courses will be specified at the time of admission into the program and may include courses in finance, economics, accounting, marketing, management, operations management, management information systems, mathematics, or statistics.

Students are admitted to the program by the Dean of the Graduate School based on the recommendation of the Belk College of Business Doctoral Program Director, in consultation with the Belk College of Business Doctoral Program Committee. Recommendations are based on the assessments of the Program Director and the Program Committee of the candidate's ability to complete the program, as supported by the application materials. The Program Director, in consultation with the Program Committee, may waive certain requirements if they judge the candidate to be capable of completing the program. If there are more candidates than can be accommodated, candidates are recommended in order of their perceived ability, promise of success, and suitability to the program.

Degree Requirements

The degree of Doctor of Philosophy in Business Administration is awarded for completion of scholarly research that advances knowledge in the field of research. Evidence of this is demonstrated by a successful dissertation defense. Additionally, recipients of this degree must demonstrate mastery of the body of knowledge within their major field and potential for success in future teaching and research.

Students that enter the program must work with the Program Director to develop a Plan of Study during their first two semesters in the program. This Plan of Study determines the exact coursework that the student must meet in order to be eligible to take the Qualifying Examination. The Plan of Study must meet all Graduate School and Belk College of Business

requirements. The Graduate School requires that any student earning a Ph.D. must complete at least 72 post-baccalaureate credit hours, including at least 18 hours of dissertation credit. Some of these graduate credit hours may include courses taken while enrolled in other graduate programs. It is a Belk College of Business requirement that any program of study within the Ph.D. in Business Administration must contain at least 42 credit hours of doctoral coursework, regardless of other graduate hours that the student may have previously earned. These 42 credit hours are in addition to the minimum 18 hours of dissertation credit that the Graduate School requires. The Plan of Study must contain a minimum of 18 credit hours in the major field, a minimum of 15 credit hours in the minor field, and a minimum of 9 credit hours in research support courses.

In addition to the general requirements above, if a student enters the program with only a Bachelor's degree, the Plan of Study must include an additional 30 credit hours of coursework. This coursework must be taken at the graduate level and will generally include courses that are part of the Master of Accountancy, Master of Business Administration, Master of Science in Economics, or Master of Science in Mathematical Finance programs. These 30 credit hours of additional coursework are subject to the approval of the Program Director.

To ensure that all students are ready for doctoral courses in Business Administration, the program has two distinct sets of prerequisites. First, students entering the program must either demonstrate or attain proficiency in each of the business specialties. Second, students must also demonstrate or attain mathematical proficiency. Students entering the program will be evaluated for these proficiencies by the Program Director. If a student is found to be deficient, then the Plan of Study must include appropriate courses, as determined by the Program Director, from the Business Core and Mathematical prerequisites listed below. These courses are in addition to the major, minor, and research support courses.

Business Core Courses

To ensure their preparation for doctoral level coursework in all business specialties, students must demonstrate proficiency in the Business Core. Students may satisfy this requirement either by taking the following courses or by having previously taken equivalent courses:

MBAD 6152 Financial Management (3)
 MBAD 6194 Global Strategic Management (3)
 MBAD 6270 Marketing Management (3)

Students who lack sufficient preparation in accounting, economics, or information systems may, at the discretion of the Program Director, be required to complete one or more 5000-level business courses in these disciplines. For the 6000-level courses listed above, only graduate courses may count as equivalent courses. However, students may, at the discretion of the Program Director, be permitted to take other 6000-level or higher-level courses in place of those listed above if the student's background indicates that this would benefit the student.

Prerequisite Mathematics Courses

The only major available to students enrolled in the Ph.D. in Business Administration program is finance, and all finance students must minor in economics. Finance and economics are mathematically intensive fields. To ensure that students are prepared for doctoral level coursework, they are required to have had, at the graduate or undergraduate level, the equivalent of the following courses:

MATH 1241 Calculus I (3)
 MATH 1242 Calculus II (3)
 MATH 2164 Linear Algebra (3)
 MATH 2241 Calculus III (3)
 MATH 3122 Probability and Statistics I (3)
 MATH 3123 Probability and Statistics II (3)

Students lacking these mathematics courses will generally be allowed to take those courses at either the graduate or undergraduate level. At the Program Director's discretion, a student may be permitted to take combined courses to meet multiple prerequisites.

Although unlikely, it is possible that a student may enter the program without having taken a specific prerequisite or business core course but has, nevertheless, acquired the same skill and technical abilities that the course would convey. In such cases, the Program Director may waive the course.

Students who lack strong computer programming skills may be advised to take programming courses offered by the College of Computing and Informatics. Specifically, the Program Director may advise a student to take ITCS 1212 (Introduction to Computer Science) or other similar courses after reviewing the student's background and prior programming experience.

Finance Major Courses (18 credit hours)

The Plan of Study for the finance major must consist of a minimum of six courses in finance. Typically, these courses are:

BPHD 8200 Financial Economic Theory I (3)
 BPHD 8210 Investments and Portfolio Theory (3)
 BPHD 8220 Financial Economic Theory II (3)

BPHD 8230 Theory of Corporate Finance (3)
 BPHD 8240 Derivatives (3)
 BPHD 8650 Advanced Seminar in Finance (3)

Two of these courses, BPHD 8200 and BPHD 8240, are cross-listed with courses that are part of the Master of Science in Economics and the Master of Science in Mathematical Finance programs. Ph.D. students in these cross-listed courses will be required to complete the master's level requirements of the course and in addition, will be required to take separate exams, prepare a research paper, and complete additional readings. Students that have taken those equivalent courses may, at the discretion of the Program Director, substitute additional sections of BPHD 8650 on their Plan of Study for those courses. In addition, the Program Director may require a student to list BPHD 8650 more than once in their Plan of Study as topics change.

Economics Minor Courses (15 credit hours)

The Plan of Study for an economics minor must consist of five courses in economics as follows:

BPHD 8100 Microeconomic Theory I (3)
 BPHD 8110 Microeconomic Theory II (3)
 BPHD 8120 Econometrics I (3)
 BPHD 8130 Econometrics II (3)
 BPHD 8140 Econometrics III (3)

Exceptions to the economics minor courses may only be made with the permission of the Ph.D. Program Director.

Research Support Courses (9 credit hours)

The Ph.D. in Business Administration requires that students have at least nine hours of research support courses in their Plan of Study. For the finance major, these research support courses must come from the Department of Mathematics and Statistics or Department of Economics. Students are required to choose three courses from the following:

ECON 6257 Applied Computational Economics (3)
 MATH 6205 Financial Computing (3)
 MATH 6206 Stochastic Calculus for Finance II (3)
 MATH 8203 Stochastic Calculus for Finance (3)
 MATH 8204 Numerical Methods for Financial Derivatives (3)

Some of the research support courses are cross-listed with courses used in the M.S. in Mathematical Finance program. Students that have taken those equivalent courses may, at the discretion of the Graduate Program Director, take other mathematics, statistics, economics, finance or related courses in place of the courses specified above.

Elective Courses (12 credit hours)

In addition to the 60 credit hours of required coursework indicated above, students are required to complete 12 elective credit hours from the following:

- Additional course offering(s) with different topics of BPHD 8650 Advanced Seminar in Finance (3)
- Additional Research Support Courses
- Additional Dissertation Credits

As an exception, students may, at the discretion of their Program Director, be permitted to use a course taken while enrolled in another graduate program to count toward the elective credit hours.

Dissertation Credits (18 credit hours)

Students are required to complete at least 18 hours of dissertation credits.

BPHD 8999 Doctoral Dissertation Research

Grade Requirements

Students are expected to earn an A or B in all courses included in the program of study and must have at least a 3.0 GPA to graduate. The dissertation is graded on a Pass/Unsatisfactory basis and, therefore, is not be included in the cumulative average. An accumulation of more than two marginal (C) grades will result in suspension of the student's enrollment in the program. If students earn a grade of U in any course, their enrollment in the program is suspended, and the student cannot take further coursework without being readmitted to the program. Readmission to the program requires approval of the Dean of the Graduate School upon the recommendation of the Program Director.

Teaching Mentor and Pedagogy Training

To ensure that graduates of the program are prepared for a career in both teaching as well as in research, a formal system of pedagogical training is required. Students that enter the program without prior teaching experience will be assigned a faculty Teaching Mentor and will be required to attend a teaching workshop. Most students entering the program will also initially be employed as teaching assistants. Normally after one year in the program students will begin to teach their own sections of undergraduate courses. The combination of mentoring, apprenticeship training through the teaching assistantships, formal pedagogy, and actual instructor experience will allow students in the program to develop their teaching skills along with their research skills.

Diagnostic Evaluation

Students entering the program will take a diagnostic evaluation at the end of their first full year in the

program. The diagnostic examination will be administered by the Program Director, in consultation with the Program Committee. The format of the diagnostic examination will be determined by the Committee, but might consist of a review of the student's work in classes, a written exam, or an oral exam. The purpose of the diagnostic evaluation will be to determine whether the student is making sufficient progress toward the degree. Students that are determined not to be making satisfactory progress toward the degree will be suspended from the program.

Dissertation Advisor and Advisory Committee

Every student in the program must have a Dissertation Advisor and an Advisory Committee prior to being admitted to Candidacy. The student should select a dissertation advisor before the end of the second year of residency. The student and the dissertation advisor jointly determine the advisory committee. The Dissertation Advisor serves as Chair of the Advisory Committee and must be a member of the Graduate Faculty of UNC Charlotte. Normally the Dissertation Advisor for a student majoring in finance will be a member of the Department of Finance. A student may petition the Program Director to allow a member of another department within the Belk College, or a member of the Department of Mathematics and Statistics, to serve as their Dissertation Advisor. The advisory committee must have at least four members, three of which are chosen by the student. Normally two members will be from the student's major field, and one from the student's minor field. A student may petition the Program Director to allow a member of another department within the Belk College, or a member of the Department of Mathematics and Statistics to serve on the Committee. The fourth member of the committee will be the Graduate Faculty representative to the Committee. That member will be appointed by the Dean of the Graduate School. All members of the Committee must be members of the UNC Charlotte Graduate Faculty.

Qualifying Examination

Upon completion of all required coursework on their Plan of Study, a student must take the Qualifying Examination. The Qualifying Examination is held twice per year. Students that have completed their Program of Study must take the qualifying examination the first time that it is offered. The Comprehensive Exam will be a written exam consisting of two four-hour sessions, administered on consecutive days. The intent of the Qualifying Examination is to test the student's mastery of the body of knowledge in their major, and to demonstrate their familiarity with current research in the field. The qualifying exam will, therefore, cover topics

addressed during doctoral coursework, seminars, and in the recent scholarly literature. The Qualifying Examination will be written and graded by an Examination Committee appointed by the Program Director. This committee will normally consist of faculty from the student's major, minor, and research support fields.

If a student fails the Qualifying Examination at the first attempt, they must retake the exam the next time it is offered. During the interim period, the student may be required to retake courses in which, in the eyes of the Examination Committee, they have a deficiency. It is Graduate School policy that a student who fails the Qualifying Examination twice will be terminated from the program.

Admission to Candidacy

The dissertation topic may be proposed after the student has passed the Qualifying Examination. Pursuant to Graduate School rules, a doctoral student advances to candidacy after the student's Advisory Committee and the Dean of the Graduate School approve the dissertation topic. Further pursuant to Graduate School rules, candidacy must be achieved at least six months before the degree is conferred.

Dissertation

The student must complete and defend a dissertation based on a research program approved by the student's Dissertation Advisor and Advisory Committee which results in a high-quality, original and substantial piece of research. The student must orally present and defend the dissertation before the Advisory Committee in a defense that is open to the University Community. A copy of the dissertation must be made available to the Graduate Faculty of the Belk College at least three weeks prior to the public defense. While the defense is open to the University Community, the deliberations of the Advisory Committee are held in Executive Session. The dissertation will be graded on a pass/unsatisfactory basis by the Advisory Committee and the Dean of the Graduate School.

The dissertation defense is the final examination. It is a Graduate School requirement that a student that fails the final examination twice will be terminated from the program.

Residency Requirement

The Ph.D. in Business Administration is a full-time program. Normally students must enroll for at least nine credit hours during each semester of the regular academic year (i.e., fall and spring) and at least six hours in the summer semester. Students may petition the Program Director for permission to enroll in less than nine credit hours (six credit hours in summer) in

cases of hardship or other emergencies. Students that have passed their Qualifying Examinations must enroll in BPHD 8999 – Doctoral Dissertation Research for at least 9 hours during the fall and spring semester and 6 hours during the summer semester. It is a Graduate School requirement that a student must enroll in at least 18 total hours of Dissertation Research in order to graduate from the program.

Students that have completed all degree requirements, including the Dissertation Defense, may enroll once in GRAD 9999 – Doctoral Degree Graduate Residency Credit in order to meet Graduate School Residency requirements.

Assistantships

A number of graduate assistantships are available each year for qualified applicants. The Graduate School also has a limited number of fellowships available for highly qualified applicants.

Transfer Credit

Only courses with grades of A or B from an appropriate doctoral program at an AACSB accredited school may be accepted for transfer credit. Transfer credit must be approved by the Program Director, and cannot exceed the limit set by the Graduate School.

Time Limit for Degree Completion

The student must achieve candidacy for the Ph.D. degree within six years of enrolling in the program, and the student must complete all degree all requirements within eight years of enrolling in the program. All courses listed on the Plan of Study must also meet Graduate School time requirements.

Application for Degree

Each student should make application for his/her degree by completing the online Application for Degree through Banner Self Service no later than the filing date specified in the University Academic Calendar.

COURSES IN PH.D. BUSINESS ADMINISTRATION (BPHD)

BPHD 8100. Microeconomic Theory I. (3)

Prerequisite: Admission to Ph.D. in Business Administration or Permission of Instructor. Theories of the firm, of the consumer, and of resource owners; determination of prices under different market structures; general equilibrium analysis and welfare economics.

BPHD 8110. Microeconomic Theory II. (3)

Prerequisite: BPHD 8100. Study of game theory, its applications in microeconomic theory and finance,

and topics on market equilibrium and market failure. The topics cover simultaneous-move games, dynamic games, analysis of competitive markets, market power, adverse selection and the principal-agent problem.

BPHD 8120. Econometrics I. (3) Prerequisites:

Admission to the Ph.D. in Business Administration or Permission of Instructor. Advanced study of the theory and application of statistics to economic problems. Topics include: the derivation of least squares estimators, maximum likelihood estimation, and problems of multicollinearity, heteroskedasticity, and autocorrelation.

BPHD 8130. Econometrics II. (3) Prerequisite: BPHD

8120. Advanced course in cross-section and panel data methods. Focus on underlying assumptions regarding the population, specification, estimation, and testing of microeconomic models. Students become acquainted with a variety of extensions of conventional linear models for cross-sectional and panel data, including panel data models, instrumental variables models, simultaneous equations models, and qualitative response models.

BPHD 8140. Econometrics III. (3) Prerequisite: BPHD

8130. Advanced study of the econometric methods applicable to financial economic modeling. Examines the predictability of stock market returns, the event study methodology, single factor and multifactor models, basic principles of portfolio theory and portfolio evaluation. The course also covers topics on volatility modeling and fixed-income securities.

BPHD 8200. Financial Economic Theory I. (3)

Prerequisite: Admission to Ph.D. in Business Administration program or permission of instructor. Examines the main themes of financial economics using discrete-time models. Topics include: mean-variance analysis, risk management principle, capital asset pricing model (CAPM), linear factor model, the arbitrage pricing theory, market completes, consumption-based CAPM, multi-period consumption and portfolio choice, market equilibrium, and contingent claim pricing.

BPHD 8210. Investments and Portfolio Theory. (3)

Prerequisite: BPHD 8200. Detailed introduction to modern investment and portfolio theory, including asset pricing. Covers standard and non-standard CAPM analysis, APT, stochastic dominance, efficient frontier analysis, optimal portfolio selection, fixed income and bond portfolios, options, futures pricing and evaluation of portfolio performance. The goal of the course is to provide a solid foundation in investments for students who will take further advanced courses in asset pricing.

BPHD 8220. Financial Economic Theory II. (3)

Prerequisite: BPHD 8210. Introduction to asset pricing and portfolio choice theory. The course begins with discrete-time models, and then moves to a continuous-time setting. Topics include: arbitrage, stochastic discount factors, beta pricing models, factor models, dynamic programming, derivative securities and models of the term structure of interest rates.

BPHD 8230. Theory of Corporate Finance. (3)

Prerequisite: BPHD 8200. Examines the theory and evidence concerning major corporate financial policy issues including capital structure, payout policy, security design and issuance, capital budgeting, mergers and acquisitions, agency theory and financial contracting, and the market for corporate control.

BPHD 8240. Derivatives. (3) Prerequisites: BPHD 8200. Theory and practice of financial derivatives markets including forwards, futures, options and interest rate markets. Topics include: the economics of derivatives markets, pricing models for instruments in these markets, strategies for hedging and speculation, as well as regulatory and governance issues. Special attention is placed on the development of pricing models and advanced analytic techniques.

BPHD 8650. Advanced Seminar in Finance. (3)

Prerequisites: Permission of Instructor. Advanced topics in Finance. Topics will vary. *May be repeated for credit with change in topic.*

BPHD 8999. Doctoral Dissertation Research. (1-9)

Prerequisite: Admission to Candidacy for the Ph.D. in Business Administration. Each student initiates and conducts an individual investigation culminating in the preparation and presentation of a doctoral dissertation.

RESEARCH SUPPORT COURSES

Economics Courses (ECON)

See descriptions of ECON courses under "Economics" in this section of this *Catalog*.

Mathematics Courses (MATH)

See descriptions of MATH courses under "Mathematics and Statistics" in the College of Liberal Arts & Sciences section of this *Catalog*.

MASTER OF BUSINESS ADMINISTRATION (MBA)

MBA Program

mba.uncc.edu

Graduate Program Directors

Dr. Gary Kohut, Director of the MBA

Robin Boswell, Director of Graduate Student Career Development

John Butt, Associate Director of Graduate Student Services

Leslye Gervasi, Associate Director of Graduate Student Services

Corey Henderson, Associate Director of Graduate Student Services

The primary objective of graduate study in business is to develop candidates for leadership positions in complex organizations. The MBA program focuses on developing the expertise to lead, influence, and persuade others through effective written and spoken communications; the ability to approach complex problems both systematically and imaginatively; the confidence to make decisions in the face of imperfect information, competing objectives, and technological change; the insight to recognize the ethical dimensions of organizational and individual decisions; the sensitivity to recognize that organizational decisions involve teamwork and consensus-building across diverse groups of individuals; and the awareness that business represents an inherently multinational enterprise that exists without geographical or cultural boundaries.

Additional Admission Requirements

In addition to the general requirements for admission to the Graduate School, the following are required for graduate study in Business Administration.

- 1) A generally satisfactory undergraduate record from an accredited college or university
- 2) A satisfactory score on the Graduate Management Admission Test (GMAT) or Graduate Record Exam (GRE)
- 3) A full resume or a description of significant work experience
- 4) A satisfactory score on the TOEFL or IELTS examination for students whose native language is not English or that have not received a degree from a U.S. institution

Degree Requirements

The MBA degree program comprises 37 graduate credit hours, including a Core component and a Concentration/Elective component. Up to 6 credit hours of coursework may be transferred from an

AACSB-accredited institution or equivalent, based on a recommendation of the relevant academic department, approval of the Director of the MBA program, and approval of the Graduate School. Necessary preparatory work is determined during the admissions process, and prerequisite courses to meet the specific need are available. All students in the program must meet the Graduate School's requirements for a Master's Degree.

Prerequisite Courses (0-12 credit hours)

The prerequisite courses may be taken after admission to the MBA in a face-to-face or online, self-study format. They are not required prior to admission to the MBA program. Prerequisite courses must be completed before enrolling in 6000-level courses except by permission of the Director of the MBA program.

MBAD 5110 Foundations of Economics (3)
 MBAD 5121 Business Information Systems (3)
 MBAD 5131 Fundamentals of Financial Accounting and Financial Management (3)
 MBAD 5141 Business Statistics and Quantitative Analysis (3)

Required Core Courses (22 credit hours)

MBAD 6100 Leadership, Ethics, and the Business Environment Seminar (1)
 MBAD 6112 Economics of Business Decisions (3)
 MBAD 6131 Management Accounting (3)
 MBAD 6141 Operations Management (3)
 MBAD 6152 Financial Management (3)
 MBAD 6161 Human Behavior in Organizations (3)
 MBAD 6194 Global Strategic Management (3)*
 MBAD 6270 Marketing Management (3)

**MBAD 6194 serves as the required capstone course for the MBA program. Thus, all core courses should be completed prior to taking MBAD 6194.*

Concentration Courses (12 credit hours)

Complete 12 credit hours of courses specified for a concentration. Students may enroll in these courses as soon as they complete the prerequisites for each course. MBAD 6890 and MBAD 7090 may be included in a concentration with permission of the MBA Program Director and the related department.

Applied Investment Management Concentration

MBAD 5158 Student Managed Investment Fund I (3)
 MBAD 5159 Student Managed Investment Fund II (3)
 MBAD 6153 Investment Management (3)

Plus one of the following:

MBAD 6155 Multinational Finance (3)
 MBAD 6156 Commercial Bank Management (3)
 MBAD 6157 Advanced Corporate Finance (3)
 FINN 6210 Financial Elements of Derivatives (3)

Business Analytics Concentration

MBAD 6201 Business Intelligence and Analytics (3)
 MBAD 6122 Decision Modeling and Analysis via Spreadsheets (3)
 MBAD 6211 Advanced Business Analytics (3)

Plus one of the following:

MBAD 6202 Managing IT-Enabled Business Processes and Systems (3)
 MBAD 6203 Information Systems Economics, Strategy, and Policy (3)
 MBAD 6204 Management of Information Security and Privacy (3)
 MBAD 6207 Business Project Management (3)
 MBAD 6208 Supply Chain Management (3)
 MBAD 6272 Marketing Analysis and Decision Making (3)
 MBAD 6281 Pricing and Positioning Strategy (3)
 ECON 6112 Graduate Econometrics (3)
 ECON 6218 Advanced Business and Economic Forecasting (3)

Business Finance Concentration

MBAD 6153 Investment Management (3)
 MBAD 6157 Advanced Corporate Finance (3)

Plus two of the following:

MBAD 6151 Financial Institutions and Markets (3)
 MBAD 6154 Applied Business Finance (3)
 MBAD 6155 Multinational Finance (3)
 MBAD 6156 Commercial Bank Management (3)

Energy Concentration

EMGT 5961 Introduction to Energy Systems (3)
 MBAD 6962 Energy Markets (3)

Plus two of the following with at least one of the courses selected from: ECON 5181, EMGT 5963, or EMGT 5964.

ECON 5181 Energy and Environmental Economics (3)
 EMGT 5963 Energy Systems Planning (3)
 EMGT 5964 Case Studies in Energy Systems (3)
 EMGT 6901 Advanced Project Management (3)
 EMGT 6930 Capital Cost Estimating (3)
 FINN 6210 Derivatives 1: Financial Elements of Derivatives (3)
 MBAD 6157 Advanced Corporate Finance (3)

Financial Institutions/Commercial Banking Concentration

MBAD 6153 Investment Management (3)
 MBAD 6156 Commercial Bank Management (3)
 MBAD 6157 Advanced Corporate Finance (3)

Plus one of the following:

MBAD 6151 Financial Institutions and Markets (3)

MBAD 6155 Multinational Finance (3)
FINN 6210 Financial Elements of Derivatives (3)

Global Business Concentration

MBAD 6193 Global Business Environment (3)
MBAD 6197 Managing the Multinational Enterprise (3)

Plus one of the following:

MBAD 6155 Multinational Finance (3)
MBAD 6275 Global Marketing Strategy (3)

Plus one course involving MBA-approved international study or travel (3)

Information and Technology Management Concentration

MBAD 6202 Managing IT-Enabled Business Processes and Systems (3)
MBAD 6207 Business Project Management (3)

Plus two of the following:

MBAD 6122 Decision Modeling and Analysis via Spreadsheets (3)
MBAD 6201 Business Intelligence and Analytics (3)
MBAD 6204 Management of Information Security and Privacy (3)

Management Concentration

Select four of the following:

MBAD 6162 Leadership in Organizations (3)
MBAD 6163 Managing People for Competitive Advantage (3)
MBAD 6164 Executive Communication (3)
MBAD 6165 Negotiation and Conflict Management (3)
MBAD 6191 Entrepreneurship (3)
MBAD 6192 Business Ethics and Corporate Responsibility (3)
MBAD 6193 Global Business Environment (3)
MBAD 6197 Managing the Multinational Enterprise (3)
MBAD 6207 Business Project Management (3)

Marketing Concentration

Select four of the following:

MBAD 6271 Consumer Behavior and Strategy (3)
MBAD 6272 Marketing Analysis and Decision Making (3)
MBAD 6273 Brand Building and New Product Strategy (3)
MBAD 6274 Advertising and Promotion Strategy (3)
MBAD 6275 Global Marketing Strategy (3)
MBAD 6276 Consumer Analytics (3)
MBAD 6277 Social Media Marketing and Analytics (3)
MBAD 6278 Innovation Analytics (3)
MBAD 6279 Design Thinking and Innovation (3)

MBAD 6280 Market Change and Innovating the Future (3)

MBAD 6281 Pricing and Positioning Strategy (3)
MBAD 6282 Marketing of Sports (3)

Marketing Analytics Concentration

Select four of the following:

MBAD 6272 Marketing Analysis and Decision Making (3)
MBAD 6276 Consumer Analytics (3)
MBAD 6277 Social Media Marketing and Analytics (3)
MBAD 6278 Innovation Analytics (3)
MBAD 6283 Mobile Marketing and Analytics (3)

Quantitative Methods for Business Concentration

ECON 6112 Graduate Econometrics (3)
MBAD 6122 Decision Modeling and Analysis via Spreadsheets (3)

Plus two of the following courses:

ECON 6217 Advanced Microeconometrics (3)
ECON 6218 Advanced Business and Economic Forecasting (3)
ITCS 6500 Complex Adaptive Systems (3)
MBAD 6211 Advanced Business Analytics (3)
MBAD 6272 Marketing Analysis and Decision Making (3)

Real Estate Finance and Development Concentration

MBAD 6158 Real Estate Finance and Investment (3)
MBAD 6159 Real Estate Development (3)

Plus two of the following courses:

MBAD 6160 Real Estate Capital Markets (3)
MBAD 6258 Site Feasibility Analysis (3)
MBAD 6259 Applied Real Estate Development (3)
ECON 6250 Advanced Urban and Regional Economics (3)
MSRE 6102 International Real Estate Study Tour (3)
MSRE 6120 Real Estate Law and Land Use Policy (3)
MSRE 6130 Site Planning, Building Design and Construction Fundamentals (3)
MSRE 6220 Financial Analysis of Development (3)
MSRE 6230 Construction Management (3)

Supply Chain Management Concentration

MBAD 6122 Decision Modeling and Analysis via Spreadsheets (3)
MBAD 6208 Supply Chain Management (3)

Plus two of the following courses:

MBAD 6201 Business Intelligence and Analytics (3)
MBAD 6207 Business Project Management (3)
ECON 6112 Graduate Econometrics (3)

Student Structured Concentration

Students may propose a 12 credit hour concentration in a significant area of interest for approval by the

Director of the MBA program. This concentration may include graduate courses from other programs within the University with approval of the MBA Program Director and the related department.

Unrestricted Elective Course (3 credit hours)

Students may select their unrestricted elective course from existing MBA courses or graduate courses from other programs within the University that are approved by the MBA Director. Students may enroll in elective courses as soon as they complete the prerequisites for each course.

Dual Master's Degree Program

MBA candidates interested in combining their business degree with another graduate degree may pursue this option by applying to and being accepted by each program separately. Students must formally propose their dual degree intentions with the Graduate School. A significant time savings may be yielded as a result of the synergy between combined programs. Popular dual degree options for MBA candidates include the Master of Health Administration, Master of Public Administration, Master of Accountancy, Master of Urban Design, and Master of Architecture. The MBA/JD is offered in cooperation with the Charlotte School of Law.

Application for Degree

Each student should make application for his/her degree by completing the online Application for Degree through Banner Self Service no later than the filing date specified in the University Academic Calendar.

Assistantships

A limited number of assistantships are available each year. In order to be competitive, applications should be submitted by March 15. Additional information is available in the MBA office and the Graduate School website.

Advising

Academic Advising is provided by Associate Director of Graduate Student Services and the Director of the MBA Program.

Transfer Credit

Up to six hours of appropriate graduate credit may be accepted for transfer from another AACSB-accredited (or equivalent) MBA program. Only courses where grades of B or above have been earned will be considered. Approval of the Director of the MBA Program and the Graduate School is also required. All other Graduate School policies regarding transfer credit apply.

Program Certifications/Accreditation

The MBA Program and all degree and certificate programs offered by the Belk College of Business are accredited by the Association to Advance Collegiate Schools of Business (AACSB-International).

MBA/MASTER OF ARTS IN LATIN AMERICAN STUDIES DUAL DEGREE

This dual degree program allows students to earn a Master of Business Administration (MBA) degree from the Belk College of Business and a Master of Arts in Latin American Studies degree from the College of Liberal Arts & Sciences. Students are expected to meet the admission requirements of both programs to participate in the MBA/MA in Latin American Studies Dual Degree program. This includes a reading knowledge of Spanish. Students from Latin American Studies who desire to pursue the dual degree are only permitted to select the comprehensive exam option, so no thesis would be required.

Degree Requirements

The combined program requires 52 credit hours of coursework.

- LTAM 5600 Seminar in Latin American Studies (3)
- LTAM 6300 Seminar in Latin American Thought (3)
- LTAM 6950 Comprehensive Examination (3)
- LTAM 5/61xx Elective in Social Science (3)
- LTAM 5/62xx Elective in Latin American History (3)
- LTAM 5/6xxx General Electives in Latin American Studies (9) *(may include up to 3 credits of LATM 6400 Internship)*
- MBAD 6100 Leadership, Ethics, and Business Environment (1)
- MBAD 6112 The Economics of Business Decisions (3)
- MBAD 6131 Management Accounting (3)
- MBAD 6141 Operations Management (3)
- MBAD 6152 Financial Management (3)
- MBAD 6161 Human Behavior in Organizations (3)
- MBAD 6194 Global Strategic Management (3)
- MBAD 6270 Marketing Management (3)
- MBAD/LATM XXXX Approved Elective (3)
- MBAD/LATM XXXX Approved Elective (3)

MBA/MASTER OF HEALTH ADMINISTRATION DUAL DEGREE

This dual degree program allows students to earn both a Master of Business Administration (MBA) degree from the Belk College of Business and a Master of Health Administration (MHA) degree from the College of Health and Human Services.

Applicants might be offered admission into only the MHA or MBA instead of the dual program. Similarly, students admitted into the dual program may opt to matriculate into only the MHA or MBA program. Students who have matriculated into either the MHA or MBA program who desire to add the dual degree must apply and gain admission to the dual degree no later than the end of their first semester of matriculation into either program.

Degree Requirements

The combined program requires 67 credit hours of coursework.

HADM 6100 Introduction to the U.S. Healthcare System (3)
HADM 6104 Health and Disease (3)
HADM 6108 Decision Analysis in Healthcare (3)
HADM 6120 Health Economics (3)
HADM 6128 Human Resources Management (3)
HADM 6134 Quality and Outcomes Management in Healthcare (3)
HADM 6138 Healthcare Finance (3)
HADM 6142 Health Policy Development (3)
HADM 6145 Organizational Behavior in Healthcare (3)
HADM 6146 Information Resources Management (3)
HADM 6150 Health Law and Ethics (3)
HADM 6154 Strategic Management of Health Services Organizations (3)
HADM 6400 Health Internship Project (3)
MBAD 6100 Leadership, Ethics, and the Business Environment Seminar (1)
MBAD 6112 The Economics of Business Decisions (3)
MBAD 6131 Management Accounting (3)
MBAD 6141 Operations Management (3)
MBAD 6152 Financial Management (3)
MBAD 6194 Global Strategic Management (3)
MBAD 6270 Marketing Management (3)
MBAD/HADM Elective (3)
MBAD/HADM Elective (3)
MBAD/HADM Elective (3)

MBA/JD DUAL DEGREE

This dual degree program allows students to earn a Master of Business Administration (MBA) degree from the Belk College of Business at UNC Charlotte and a Juris Doctor (JD) degree from the Charlotte School of Law in eight semesters of study.

Prospective dual-degree program students must apply separately to both UNC Charlotte and the Charlotte School of Law. Full-time students spend the first full year of study at either UNC Charlotte or the Charlotte School of Law. They then spend their entire second

or third year at the other institution. For the remainder of the program, students take classes at both UNC Charlotte and the Charlotte School of Law. Each school grants nine (9) units of credit for courses taken at the other school.

Visit mba.uncc.edu and charlottelaw.edu for additional information.

MBA IN GLOBAL BUSINESS AND STRATEGY DUAL DEGREE

The Belk College of Business at UNC Charlotte, in partnership with the Graduate School of Business and Leadership (EGADE) at Tec de Monterrey, Mexico, offers a dual degree Master's program. Students earn the UNC Charlotte MBA and the EGADE Master of Business Administration. Students also receive a certificate in Global Business and Strategy jointly issued from EGADE and the Belk College of Business. The program is taught in English in Monterrey, Mexico.

Concentration Requirements

EGADE students pursuing the dual degree have a concentration in Global Business Strategy. This concentration is comprised of four courses from the following list:

Required Courses

MBAD 6155 Multinational Finance (3)
MBAD 6275 Global Marketing Strategy (3)

Elective Courses

Select two MBA Director-approved electives tailored for students in the program.

Visit globalbusiness.uncc.edu for additional information.

MBA PLUS POST-MASTER'S CERTIFICATE

The MBA PLUS Post-Master's Certificate program provides an opportunity for graduates of AACSB-accredited MBA programs to broaden and update their business education. As business conditions, tools, and techniques change rapidly, a major way of staying at the forefront of knowledge is through additional university education. The MBA PLUS Certificate makes courses in the Belk College's MBA Concentrations available to persons who already have MBA degrees.

Admission Requirements

Applicants must satisfy the general requirements established by the Graduate School for admission to a graduate certificate program. Applicants must provide one official transcript indicating the awarding of an MBA degree from an AACSB-accredited institution or equivalent, one official transcript indicating the awarding of an accredited bachelor's degree, along with the Graduate application and application fee. (Graduates from the MBA program at UNC Charlotte are not required to send an official transcript.) Applicants will not be required to retake the GMAT.

Completion Requirements

The MBA PLUS Certificate requires completion of twelve or more credit hours of 6000-level courses. At least nine hours must be electives. One 3-hour course may be a repeat of a course previously taken. A student may repeat more courses, but only one such repeated course will be counted toward the certificate. The twelve-hour elective requirement of the MBA PLUS corresponds to the twelve-hour concentrations in the MBA program.

It is expected that most students will use their twelve hours or more to gain a concentration in a particular functional area of interest. However, a broader program that draws from a number of areas may be pursued.

Transfer credits are not accepted in the MBA PLUS Certificate program. To receive the certificate, students must complete all courses with a grade of B or above within four years from the time of enrollment in the first certificate course.

An Application for Candidacy for a Graduate Certificate (candidacy form) and an Application for Certificate should be completed prior to the last semester of MBA PLUS coursework. Consult Graduate School published deadlines.

GRADUATE CERTIFICATE IN BUSINESS FOUNDATIONS

The Graduate Certificate in Business Foundations is a four-course graduate certificate which prepares students without a business undergraduate degree for the MBA program at UNC Charlotte. Successful completion of this certificate does not guarantee admission to the MBA program, but successful performance can help demonstrate academic readiness for graduate study if one's undergraduate performance does not indicate this. All courses taken in fulfillment of this certificate must be taken from UNC Charlotte; no transfer courses are accepted for credit leading to the certificate. To be considered for

admission to the MBA, candidates must still apply separately to be considered based on the overall competitiveness of their application credentials.

The Graduate Certificate in Business Foundations may also prove beneficial for those considering graduate study in business in general, those without undergraduate business coursework seeking to improve their competitiveness for entry-level careers in business, and those with a general interest in developing an introductory level of business acumen.

Certificate Requirements

The graduate certificate program requires 12 credit hours of coursework.

MBAD 5110 Foundations of Economics (3)
 MBAD 5121 Business Information Systems (3)
 MBAD 5131 Principles of Financial Accounting and Financial Management (3)
 MBAD 5141 Business Statistics and Quantitative Analysis (3)

COURSES IN BUSINESS ADMINISTRATION (MBAD)

MBAD 5110. Foundation of Economics. (3)

Prerequisite: Enrollment in MBA or Graduate Certificate program. Focuses on topics related to the scope and methodology of economics as a social science, the analysis of markets, the development of market structure, the characteristics of market failure, problems of economic concentration, the measurement of national income, the theory of national income determination, money and banking, monetary and fiscal policy, international economics and the theory of income distribution.

MBAD 5121. Business Information Systems. (3)

Prerequisites: Enrollment in MBA or Graduate Certificate program, and basic computer knowledge and skills. Examination of how information systems are developed and used in organizations, how information resources are managed, and the potential strategic and competitive impact information systems have in domestic and global business environments.

MBAD 5131. Fundamentals of Financial Accounting and Financial Management. (3)

Prerequisite: Enrollment in MBA or Graduate Certificate program. Accelerated and in-depth study of conceptual foundations and applications of financial accounting and financial management with emphasis on building accounting and finance information bases for external decision making. (Accounting and finance preparation to enter the MBA. May not be taken for credit toward any undergraduate degree within the Belk College of

Business or used as equivalent credit for ACCT 2121-2122).

MBAD 5141. Business Statistics and Quantitative Analysis. (3) Prerequisite: Enrollment in MBA or Graduate Certificate program. Designed to bring MBA students up to an acceptable level of analytical capability in the areas of probability theory, business statistics, basic linear mathematics (algebra and matrix algebra) and basic differential and integral calculus.

MBAD 5158. Student Managed Investment Fund I. (3) Cross-listed as FINN 5158. Prerequisites: MBAD 5159, FINN 3120 or MBAD 6152, FINN 3222 or FINN/MBAD 6153, and permission of instructor. Management of an actual portfolio consisting of a portion of the University's Endowment Fund.

MBAD 5159. Student Managed Investment Fund II. (3) Cross-listed as FINN 5159. Prerequisites: MBAD 5158, FINN 3120 or MBAD 6152, FINN 3222 or FINN/MBAD 6153, and permission of instructor. Management of an actual portfolio consisting of a portion of the University's Endowment Fund.

MBAD 5191. Legal Environment in Business. (1) Prerequisite: enrollment in MBA program. Legal environment in which business operates today; Legal, social, and ethical considerations of managers within the framework of federal and state regulatory laws; role and function of federal regulatory agencies and their impact on business activities.

MBAD 6028. Topics in Business Information Systems. (3) Prerequisite: MBAD 5121 or equivalent. Selected topics in information systems. Topics include: information resource management, database management systems, management support systems, information systems in the financial and banking industry, information systems in manufacturing, information systems in health care, and EDP auditing. *May be repeated for credit with change of topic and permission of MBA Program Director.*

MBAD 6058. Special Topics in Financial Services. (3) Prerequisite: MBAD 6152. Each year, the subject matter of this course deals with a different specialized and contemporary topic of interest to students who are preparing for management careers in the financial services industry. Topics are chosen and covered in a way that builds on and supplements the topics covered in other courses in the Financial Institutions/Commercial Banking concentration. Emphasis is placed on the managerial implications of the subject matter as well as the impact on the financial system. *May be repeated for credit with change of topic one time.*

MBAD 6100. Leadership, Ethics, and the Business Environment Seminar. (1) An introduction to leadership, ethics, and other essential skills and concepts for success in the current business environment. The particular topics and activities included vary each semester as the business environment changes. This course is to be taken by MBA students in their first semester.

MBAD 6111. Macroeconomics and Business Forecasting. (3) Prerequisite: MBAD 5110 and MBAD 5141. Advanced studies of the interrelations of markets in national and international economies; mechanisms of monetary policy and interest rate effects, foreign exchange rates and inflation; relations between national saving, fiscal policy, foreign debt and investment; short-run and long-run effects of economic policy; tax policy, government spending and economic growth; types of economic forecasts; value and limits of forecasts.

MBAD 6112. The Economics of Business Decisions. (3) Prerequisites: MBAD 5110 and MBAD 5141, or equivalents. Economic concepts in the decision-making process. Topics include: scarcity; marginal analysis and tools of optimization; demand and supply analysis and market structure; economic efficiency; regression analysis; risk analysis and game theory; and international issues.

MBAD 6122. Decision Modeling and Analysis via Spreadsheets. (3) Cross-listed as DSBA 6122. Prerequisite: MBAD 5141 or equivalent. An analytical approach to the management process. Generalized models for decision making with major emphasis on application of the scientific method to management problems.

MBAD 6131. Management Accounting. (3) Prerequisite: MBAD 5131 or equivalent. Analyzing financial statements and using accounting information for strategic, tactical, and operating decisions with a focus on strategic cost management. Emphasis is on using cost and other management accounting information in making sound decisions, its effect on managerial behavior, and its use in formulating and implementing strategy, and issues of design and operation of management control systems including the intended and unintended consequences of performance measurement.

MBAD 6141. Operations Management. (3) Prerequisite: MBAD 5141 or equivalent. Design, operation, and control of service and manufacturing systems. Emphasis on using analytical tools for problem solving in process analysis and re-engineering, work-force management, material and inventory management, aggregate planning, total quality management, and others.

MBAD 6151. Financial Institutions and Markets. (3)

Cross-listed as FINN 6151. Prerequisite: MBAD 6152. Major financial institutions, particularly commercial banks, and their role in the intermediation process and as suppliers of funds to the money and capital markets. Comparative financial policies of these institutions are examined in the context of their legal and market environment.

MBAD 6152. Financial Management. (3)

Cross-listed as FINN 6152 and MSRE 6152. Prerequisites: MBAD 6112 and MBAD 6131. Theory and practice of corporate finance including asset management, cost of capital and capital budgeting, optimization problems and socio-economic aspects of financial management. Computer technology may be employed when applicable.

MBAD 6153. Investment Management. (3)

Cross-listed as FINN 6153. Prerequisite: MBAD 6152. Theory and practice of investment decisions of individuals and fund managers. Topics include: the status of capital market theory, the efficient market hypothesis literature, and a portfolio performance measurement. Standard institutional and investment analysis topics, futures and options markets, and international investment topics are covered.

MBAD 6154. Applied Business Finance. (3)

Cross-listed as FINN 6154. Prerequisite: MBAD 6152. Examination of business finance topics which typically confront the firm's primary finance functional areas (CFO, Treasurer, Controller). The purpose is to develop advanced analytical skills in those topic areas. The following topics form the basis of the course: lease vs buy (borrow); leveraged buy-outs; merger analysis (emphasis on valuation); international operations of American firms (capital budgeting and cost of capital); capital structure; risk management. Such additional topics as working capital management; risk management; and relevant current topics will be included as time permits.

MBAD 6155. Multinational Financial Management. (3)

Cross-listed as FINN 6155. Prerequisite: MBAD 6152. Financial management of the multinational firm including management of foreign exchange risk and political risk, and the control and evaluation of financial policies of multinational firms.

MBAD 6156. Commercial Bank Management. (3)

Cross-listed as FINN 6156. Prerequisite: MBAD 6152. Techniques for the management of commercial banks. Topics of study include industry structure, administrative organization, management of assets, liabilities, and capital, and financial analysis of the banking firm.

MBAD 6157. Advanced Corporate Finance. (3)

Cross-listed as FINN 6157. Prerequisite: MBAD 6152. Theories of modern corporate finance, including theory of efficient capital markets; uncertainty and the theory of choice; market equilibrium asset pricing models (capital asset pricing model, arbitrage pricing theory, Black-Scholes); theories of capital structure and the cost of capital; dividend policy; and leasing.

MBAD 6158. Real Estate Finance and Investment. (3)

Cross-listed as MSRE 6158. Prerequisite: MBAD 6152. Focuses on the techniques used to analyze, finance and structure real estate transactions. Topics include: an overview of the real estate space and capital markets; the techniques of financial analysis; project ownership, taxation and financial structure; determining the financial feasibility of real estate development; and corporate real estate strategies.

MBAD 6159. Real Estate Development. (3)

Cross-listed as GEOG 6103 and MSRE 6159. An introduction to the real estate development process. Identification and evaluation of the critical assumptions and issues related to market and site feasibility, financial feasibility, planning, acquisition, construction, and operation of economically viable commercial real estate projects. Students work in groups on a semester project to select a site and prepare an appropriate development plan that emphasizes the market and financial feasibility of the real estate development.

MBAD 6160. Real Estate Capital Markets. (3)

Cross-listed as MSRE 6160. Prerequisite: MBAD 6152. The techniques used to analyze, finance and structure real estate transactions, and emphasizes the role of the capital markets in facilitating development and investment in commercial real estate. Topics include: real estate in an investment portfolio; valuation and investment analysis for direct (private) real estate equity investment including coverage of valuation using real option methodology; primary and secondary commercial mortgage markets (CMBS); and, analysis of publicly traded equity real estate investment trusts (REITs).

MBAD 6161. Human Behavior in Organizations. (3)

Behavioral knowledge and skills essential to becoming an effective manager/leader including behavior and motivation in an environment of complexity and rapid change and ethical implications of actions and their effects on demographically diverse and increasingly international work force.

MBAD 6162. Leadership in Organizations. (3)

Prerequisite: MBAD 6161. Continuation of MBAD 6161. Examines performance determinants and appraisal, design of complex organizations, team

building, organizational change, career development and conflict management.

MBAD 6163. Managing People for Competitive Advantage. (3)

Prerequisite: MBAD 6161. An examination of the current critical issues and strategic questions associated with managing employees. Case material, readings, and audiovisual material are used to stimulate discussion of the most important and strategic questions to be tackled by general managers today and in the future in the relationship between management and workers.

MBAD 6164. Executive Communication. (3)

Intensive study of communication in organizations from middle and upper management perspectives with special attention to corporate communication, media relations, technologically mediated communication, crisis communication and public affairs. Case studies, readings, and project assignments are used in a variety of business situations.

MBAD 6165. Negotiation and Conflict Management. (3)

Negotiation is the art and science of securing agreement between two or more independent parties. Conflict management involves resolving situations where the interests of two or more parties differ. Involves developing a repertoire of skills and techniques for negotiation and conflict management to develop a systematic and positive approach for negotiating with multiple stakeholders. Case studies, readings, and simulations are used.

MBAD 6166. Ethics and Global Capitalism. (3)

Prerequisite: Must be a Belk College of Business graduate student or permission of the MBA Program Director. Study of ethical arguments supporting and critical of capitalist economic and social systems in relation to business strategy and public policy. Topics include: property rights, justice, desert, equality, and sustainable capitalism.

MBAD 6191. Entrepreneurship. (3)

Prerequisite: MBAD 6131, MBAD 6152, MBAD 6270, or permission of the MBA Program Director. An examination of entrepreneurship and entrepreneurs. Focus on planning the start-up of a fast-growth enterprise with the aim of rewarding the founders and initial investors with significant capital gains. Extensive use of case studies will provide a background of classroom activities to assist students in the preparation of a detailed plan for the hypothetical start-up of a fast-growth firm.

MBAD 6192. Business Ethics and Corporate Responsibility. (3)

Analysis of ethical issues that arise in contemporary business practice, both domestically and globally. Topics may include

ethical issues concerning labor practices, marketing, financial services, environmental practices, human rights, and emerging technologies. Students will be taught to recognize, analyze, and address ethical challenges as they arise in their careers.

Consideration will also be given to public policies and global ethics codes that inform business decision making. Case studies are used.

MBAD 6193. Global Business Environment. (3)

Prerequisites: MBAD 6152, MBAD 6270, or permission of the MBA Program Director. An overview of international business management. Specifically, the functional areas of business are covered to provide an international perspective.

MBAD 6194. Global Strategic Management. (3)

Prerequisite: All courses in the primary and intermediate block of the Functional Component or permission of the Director of the MBA program. Examination of the need to integrate the functional activities of the firm in planning corporate objectives and achieving operating results. Emphasis on ability to identify issues and problems of the firm as a whole, to explore alternatives and to make decisions which recognize the interrelationships of the functional specialties within the total organization. Application and integration of knowledge and skills of analysis developed in the preceding courses of the MBA program.

MBAD 6196. Strategic Planning. (3)

Prerequisite: Permission of instructor. Strategic planning within a rapidly changing environment including changing industry conditions as well as technological, social, political and economic changes. Examination of strategic planning techniques being developed by researchers and by corporate practitioners.

MBAD 6197. Managing the Multinational Enterprise. (3)

Prerequisites: MBAD 6152 and MBAD 6270. Management challenges associated with the development of international strategies and the management of organizations in business enterprises whose operations stretch across national boundaries; how multinational enterprises (MNEs) work. Case studies, projects, and presentations are used to help students apply concepts and theories.

MBAD 6198. Professional Applications. (3)

Prerequisites: Completion of the Functional Component. Team-taught, multidisciplinary course based on (1) structured, written cases and (2) contemporary management problems/issues presented in a non-structured, non-case format. Requires formal written position papers evaluating current business problems which are presented and defended before an audience of peers, faculty members, and business leaders.

MBAD 6201. Business Intelligence and Analytics. (3)

Cross-listed as DSBA 6201. Prerequisite: MBAD 5121 or equivalent. An overview of the business approach to identifying, modeling, retrieving, sharing, and evaluating an enterprise's data and knowledge assets. Focuses on the understanding of data and knowledge management, data warehousing, data mining (including rule-based systems, decision trees, neural networks, etc.), and other business intelligence concepts. Covers the organizational, technological and management perspectives.

MBAD 6202. Managing IT-Enabled Business Processes and Systems. (3)

Examination of key issues involved in managing IT-enabled business processes and systems. Topics include: systems analysis and design, data management, evaluation of IT investments, and management of emerging technologies.

MBAD 6203. Information Systems Economics, Strategy and Policy. (3)

Prerequisite: MBAD 5121 or equivalent. Examines a collection of topics that deal with the strategic use of information systems. Topics include: Business Value of IS, Network Economics, use of IS for competitive advantage, IS Planning and policy setting, IS evaluation selection and sourcing.

MBAD 6204. Management of Information Security and Privacy. (3)

Prerequisite: MBAD 5121 or equivalent. Managing key security and privacy challenges faced by IT managers. Examines computer network concepts, threat environments, security tools, methods, and controls for risk management and the development of IS security management and policy. Also examines various IS security and privacy standards and evaluation criteria.

MBAD 6207. Business Project Management. (3)

Cross-listed as DSBA 6207. Prerequisites: MBAD 5121 or equivalent, and MBAD 6141. Project management is widely used in a variety of business environments to manage complex, non-routine endeavors. Examples of projects include consulting and process improvement projects, advertising projects, and technology projects. This course focuses on tools, techniques, and skills for business project management, with attention to both the quantitative and the qualitative aspects of project management. Topics include: project evaluation, estimation, monitoring, risk management, audit, managing global projects, outsourcing, and project portfolio management. Students also gain experience using Project Management Software.

MBAD 6208. Supply Chain Management. (3) Cross-listed as DSBA 6208. Prerequisite: MBAD 6141 or permission of the department. Supply chain

management is concerned with all of the activities performed from the initial raw materials to the ultimate consumption of the finished product. From a broad perspective, the course is designed to examine the major aspects of the supply chain: the product flows; the information flows; and the relationships among supply chain participants. The course content is interdisciplinary in nature and will cover a variety of topics such as supply chain information technologies, supply chain design, strategic alliances between supply chain participants and supply chain initiatives.

MBAD 6209. Management of Service Operations. (3)

Focuses on the challenges of managing service operations. The major topics covered are those critical to achieving operational excellence, including the design and delivery of services, service productivity, revenue management, risk management, customer contact management, service quality and customer retention, capacity management, and demand management. The course uses cases, readings, lectures and problem-solving tools to provide students with an understanding of these topics.

MBAD 6211. Advanced Business Analytics. (3)

Cross-listed as DSBA 6211. Prerequisite: MBAD 6201, ITCS 6162, or permission of department. An in-depth study of applications of data analytics techniques to discover non-trivial relationships that are understandable, useful, and actionable to decision makers. A case approach is used to emphasize hands-on learning and real-world deployment of business analytics.

MBAD 6212. Enterprise Systems. (3)

Cross-listed as DSBA 6212. Prerequisite: Permission of DSBA Program Director. An overview of Enterprise Resource Planning (ERP). Using business cases and hands-on training with ERP tools, students learn how ERP systems support an organization's core business processes in achieving its strategic and operational goals. The role of ERP systems in business analytics and intelligence, the configuration of ERP systems, and the methods of evaluation, selection and implementation of ERP systems are also covered.

MBAD 6213. Applied Healthcare Business Analytics. (3)

Cross-listed as DSBA 6213 and HCIP 6213. Prerequisites: Demonstrated proficiency with Microsoft Excel; and either HCIP 5123, STAT 5123, HADM 6108 (for students with background in healthcare administration), HCIP 6108 (for students with background in healthcare informatics), or equivalent. Focuses on applying business analytics within the healthcare setting. Students learn analytical tools used to synthesize big data into meaningful management information that is used in making key

business decisions that impact the delivery of healthcare services. Case studies are utilized to prepare students for delivering boardroom level presentations of their findings.

MBAD 6238. Real Estate and Urban Economics. (3)

Prerequisite: ECON 2102. Cross-listed as ECON 6238 and MSRE 6238. Focuses on the fundamental economic forces that create urban areas, with a special emphasis on land markets. Integrates economic theory to better understand the market forces that impact applied real estate development projects. Topics include: urban growth and development; land valuation; the modelling and estimation of agglomeration economies; the costs of cities and their internal structure with emphasis on land use regulations and transportation; amenities and the local supply of labor; the sizes and functions of cities; affordable housing; and local public finance.

MBAD 6258. Site Feasibility Analysis. (3) Cross-listed as GEOG 6305 and MSRE 6258. Prerequisite: Permission of instructor. Examination of factors affecting the feasibility of land parcels for commercial and residential development with emphasis on the physical evaluation of a given site, the market support for its intended use, and the financial support for the proposed development.

MBAD 6259. Applied Real Estate Development. (3)

Cross-listed as GEOG 6105 and MSRE 6259. Prerequisite: MBAD 6159, MSRE 6159, or GEOG 6103. The application of the processes involved in real estate development. Students will work in groups on a semester project to select a site and prepare an appropriate development plan that emphasizes the market and financial feasibility of the real estate development.

MBAD 6270. Marketing Management. (3)

Prerequisite: MBAD 6112. A managerial approach to strategic marketing decision-making. Topics include: market segmentation, product strategy, pricing strategy, promotion strategy, distribution strategy, demand analysis, future market projection and global marketing. Case studies, readings, and simulations are used.

MBAD 6271. Consumer Behavior and Strategy. (3)

Prerequisite: MBAD 6270. The consumer is the central focus of all business activity. Designed to help understand consumption-related behaviors and develop marketing strategies to influence those behaviors. Behavioral concepts are applied to develop dynamic and effective marketing strategies from the perspective of the marketing manager.

MBAD 6272. Marketing Analysis and Decision Making. (3)

Prerequisite: MBAD 6270. Planning,

execution, analysis, and evaluation of marketing research activities. Emphasis on the techniques and methodology used in the collection, analysis and interpretation of economic, demographic and sociological data for use in marketing decision-making.

MBAD 6273. Brand Building and New Product Strategy. (3)

Prerequisite: MBAD 6270. A strategic approach to branding, building new brands, measuring brand strength and equity and the management of existing brands and brand extensions. Understanding of new product development and the launch process for a new market offering or extending an existing market offering.

MBAD 6274. Advertising and Promotion Strategy. (3)

Prerequisite: MBAD 6270. Opportunities and challenges for an organization through advertising, personal selling, sales promotion and publicity. Includes analysis of the legal and ethical problems involved in this area. Case studies and a project assignment are used.

MBAD 6275. Global Marketing Strategy. (3)

Prerequisite: MBAD 6270. Study of opportunities, problems, and techniques involved in marketing globally. Analysis of environmental forces affecting global marketing and the methods used to market effectively on a global scale.

MBAD 6276. Consumer Analytics. (3)

Cross-listed as DSBA 6276. Prerequisite: MBAD 6270 or permission of department. The utilization of analytics techniques in marketing decision-making and consumer strategy. Involves the extraction of hidden insight about consumers from structured and unstructured Big Data, and the translation of that insight into a market advantage. Applications in areas such as consumer targeting, product innovation, and promotion strategy.

MBAD 6277. Social Media Marketing and Analytics. (3)

Cross-listed as DSBA 6277. Prerequisite: MBAD 6270 or permission of department. The utilization of social media in marketing strategy and tactics. Topics include: the use of social media in building brand strength and equity, as a customer acquisition tool, and as a customer relationship management tool. The utilization of analytics in effective social media marketing.

MBAD 6278. Innovation Analytics. (3)

Cross-listed as DSBA 6278. Prerequisite: MBAD 6270 or permission of department. The comprehension and application of text analytics as a tool to examine unstructured qualitative information to generate innovations. Identifying the various sources of consumer insight and using them in innovation

strategy. Understand how to differentiate between what consumers want versus what they say.

MBAD 6279. Design Thinking and Innovation. (3)

Prerequisite: MBAD 6270. The theoretical and practical components of innovation. Introduction to design thinking and the innovation process from idea generation to early design to declaration of importance to delivery to the end user. Implementation of innovations.

MBAD 6280. Market Change and Innovating the Future. (3) Prerequisite: MBAD 6270. The prediction and exploitation of marketplace change and the development of strategies to dominate future markets through innovative transformation. Frameworks to help market-driven organizations change before circumstances force them to do so and to create innovation-driven consumer strategy for the future. Understanding demographic and consumer trends.

MBAD 6281. Pricing and Positioning Strategy. (3) Prerequisite: MBAD 6270. Advances in pricing and positioning strategies. Topics include: marketing, economic, organizational, psychological, legal, and ethical factors of pricing strategies. Emphasis on current pricing and positioning techniques, such as conjoint analysis and hierarchical value analysis, and practice creating and using spreadsheet simulators to model consumer response to pricing and positioning decisions in competitive markets.

MBAD 6282. Marketing of Sports. (3) Prerequisite: MBAD 6270. Marketing concepts and practices applied to the marketing of sports products and services to the sports consumer. Emphasis on strategic marketing planning. Strategies to segment markets and identify customers; generate revenue, fan loyalty, and build the brand; collect and use marketing research data; promotional strategies including endorsements and sponsorships; pricing strategies (ticket prices) for sports teams/individuals in competition.

MBAD 6283. Mobile Marketing and Analytics. (3) Prerequisite: MBAD 6270 or permission of MBA Director. The utilization of mobile platforms, architecture, and security in marketing strategy and tactics. Topics include: developing an integrated mobile marketing campaign and global mobile marketing strategy. Understand how to analyze mobile data and the emerging market opportunities.

MBAD 6310. Sports Economics. (3) Prerequisite: MBAD 5110 or equivalent. Economic concepts in the decision-making process as applied to sport. Topics include: demand and supply analysis and market structure in sports; market efficiency issues in sports; salary and ticket pricing issues in sports; economic

impact studies of sports; and labor market studies in sports including collective bargaining agreements and discrimination. Regression analysis is covered and used in this course.

MBAD 6361. Management of Motorsports. (1.5)

Prerequisite: MBAD 6161. The application of management concepts and theories to motorsports including leadership, structure, and human resources, especially labor relations. History of motorsports management including the role and impact of the media. Ownership, governance and governing bodies in motorsports, their authority and functions, eligibility requirements, and sanctions and appeals processes.

MBAD 6362. Management of Professional Team Sports. (1.5) Prerequisite: MBAD 6161. The

application of management concepts and theories to the professional team's franchise including leadership, organizational design, and human resources, especially labor relations. History of professional team sports management in the United States and the world. Ownership, governance and governing bodies in professional sports including league organizations (major and minor), their authority and functions; eligibility requirements, and sanctions and appeals processes. In addition, the role and impact of television on professional team sports management will be explored.

MBAD 6500. Cooperative Education and 49ership Experience. (0) Prerequisite: Completion of nine

hours of graduate coursework. Participation in the Co-op/49ership program enables MBA students to pursue practical work experience that is complementary to their major course of studies. Each student's program must be approved by the director of the MBA program. Acceptance into the Experiential Learning Program by the University Career Center is required. Participating students pay a course registration fee for transcript notation (49ership and co-op) and receive full-time student status (co-op only). Assignments must be arranged and approved in advance. *May be repeated. Grading is on a Pass/Unsatisfactory basis.* Open only to Master's level students. Ph.D. level students are encouraged to contact their academic department to inquire about academic or industrial internship options for credit. For more information, contact the University Career Center.

MBAD 6890. Directed Individual Study. (3)

Prerequisite: Permission of a member of the graduate faculty who would direct the study and permission of the MBA Program Director. Directed individual study and in-depth analysis of a special area of management, economics, business or accounting. The course may be used to satisfy up to six credit

hours of graduate credit requirements in the Master of Business Administration degree program. *May be repeated for credit with different area of study.*

MBAD 6962. Energy Markets. (3) Cross-listed as EMGT 5962. Prerequisite: Basic math and economics, or permission of instructor. Pre-or corequisite: ECON 5181, EMGT 5961, or SEGR 4961. Energy and power systems in regulated and competitive environments and implications on business decisions for firms in these industries. Topics include: mechanism of energy markets; comparative market systems; determination of prices under different market structures; gas, oil, coal, and electricity market architecture; electricity market design; dispatch and new build decisions; smart grid and renewable energy in electricity markets; risk and risk management in energy including demand and price volatility and use of financial derivatives; and the impact of financial market trends and current and proposed policies on the energy industry.

MBAD 7090. Special Topics in Business. (1-4) Special topics in any of the functional areas of business. Topics will vary. *May be repeated for credit with change in topic.*

Data Science and Business Analytics

- **M.S. in Data Science and Business Analytics**
- **Graduate Certificate in Data Science and Business Analytics**

Data Science and Business Analytics Program

analytics.uncc.edu

Graduate Program Director

Dr. David Wilson

Director of Student Services

Carly Mahedy

The program in Data Science and Business Analytics (DSBA) is a joint venture between the Belk College of Business, College of Computing and Informatics, and the Graduate School at UNC Charlotte. The program offers both a Graduate Certificate and a Master of Science degree designed to prepare students for the complex and rapidly changing data science and business analytics environment.

MASTER OF SCIENCE IN DATA SCIENCE AND BUSINESS ANALYTICS

The Professional Science Master's (PSM) program in Data Science and Business Analytics (DSBA) is an interdisciplinary program at the intersection of business, computer and information sciences, statistics, and operations research. The program leads to an M.S. in Data Science and Business Analytics. It is a unique blend of business acumen, data understanding, exposure to a diverse set of advanced analytics methods, and hands-on experience designed to help students apply learned knowledge on representative business problems. DSBA graduates are well equipped for employment in a wide variety of data intensive industries, such as financial services, energy, retail/supply chain, or healthcare, where the need for business analysts with quantitative, computational, and sophisticated analytical skills is growing at an explosive pace.

Admission Requirements

Applicants must meet the general Graduate School requirements for admission to Master's Degree programs. Applications must include all of the

materials listed by the Graduate School as typical for Master's Degree application submissions. In addition to the general requirements for admission to the Graduate School, an earned baccalaureate degree from an accredited college or university in any scientific, engineering or business discipline or a closely related field. Acceptable scores on the GRE or GMAT are also required in order to apply for the Master's Degree. Applicants holding a terminal degree (e.g., J.D., M.D., D.D.S., or Ph.D.) may request a waiver from this requirement. Applicants to the Data Science and Business Analytics program may also request a GMAT/GRE score waiver provided they:

- Were accepted into the Graduate Certificate in Data Science and Business Analytics
- Successfully complete a minimum of two of the required courses with a GPA of 3.5 or above and with no more than one grade of B
- Secure a letter of recommendation from at least one of the instructors teaching those courses supporting their admission into the master's program

In addition, prior to matriculation, the program requires:

- A current working knowledge of at least one higher-level (procedural) language; and a familiarity with computer applications
- A minimal background in mathematics is also required, including two semesters of calculus and one semester of statistics

Individuals who have worked at a high professional level in the computer industry or business may be able to substitute work experience for specific subject area admission requirements. Individuals without a business degree or business experience are required to complete an online business fundamentals course prior to enrolling in the program.

Degree Requirements

Thirty-three graduate credit hours are required for the DSBA PSM. Of the 33 graduate credit hours, 24 credit hours are required core courses (inclusive of 3 hours for the internship), and 9 credit hours of electives. A minimum of 24 credit hours contributing to the M.S. in Data Science and Business Analytics must be from courses numbered 6000 or higher. A maximum of 6 hours of graduate credit may be transferred. Students may apply all of the credits earned in the Graduate Certificate in Data Science and Business Analytics toward the M.S. in Data Science and Business Analytics with the approval of the DSBA Program Director. All students take the following courses:

Core Requirements (24 credit hours)

DSBA 5122 Visual Analytics (3)
 DSBA 6100 Big Data Analytics for Competitive Advantage (3)
 DSBA 6156 Machine Learning (3)
 DSBA 6160 Database Systems (3)
 DSBA 6201 Business Intelligence and Analytics (3)
 DSBA 6211 Advanced Business Analytics (3)
 DSBA 6276 Consumer Analytics (3)
 DSBA 6400 Internship (3)

Elective Courses (9 credit hours)

In addition, students choose 3 elective courses from a growing list of Data Science and Business Analytics courses or propose a three-course specialization for approval by the DSBA Program Director. In choosing their 3 elective courses, students must select at least one course from each of the following areas:

Data Science Elective Courses

DSBA 5121 Information Visualization (3)
 DSBA 5510 Web Mining (3)
 DSBA 6155 Knowledge-Based Systems (3)
 DSBA 6162 Knowledge Discovery in Databases (3)
 DSBA 6190 Cloud Computing for Data Analysis (3)
 DSBA 6265 Advanced Topics in Knowledge Discovery in Databases (3)
 DSBA 6500 Complex Adaptive Systems (3)
 DSBA 6520 Network Science (3)

Business Analytics Elective Courses

DSBA 6112 Graduate Econometrics (3)
 DSBA 6122 Decision Modeling and Analysis via Spreadsheets (3)
 DSBA 6207 Project Management (3)
 DSBA 6208 Supply Chain Management (3)
 DSBA 6277 Social Media Marketing and Analytics (3)
 DSBA 6278 Innovation Analytics (3)

Student-Structured Elective Courses Option

Students may propose a three-course specialization (9 credit hours) in a significant area of interest for approval by the Director of the PSM DSBA Program. In addition to the courses listed in the Data Science and Business Analytics specializations listed above, this specialization may include graduate courses from the M.S. in Computer Science, M.S. in Information Technology, MBA, M.S. in Mathematics with Concentration in Applied Statistics, M.S. in Mathematical Finance, M.S. in Economics, and other programs or departments within the University with approval of the related department.

GRADUATE CERTIFICATE IN DATA SCIENCE AND BUSINESS ANALYTICS

The Graduate Certificate in Data Science and Business Analytics provides post-baccalaureate

students with the opportunity to reach a demonstrated level of competence in the area of data science and business analytics. The certificate requires 15 graduate credit hours of coursework. The certificate may be pursued concurrently with a related graduate degree program at UNC Charlotte.

Admission Requirements

The Graduate Certificate in DSBA is open to all students who hold a B.S. or M.S. degree in any scientific, engineering or business discipline and either are enrolled and in good standing in a graduate degree program at UNC Charlotte or complete their undergraduate degree with a minimum 3.0 GPA.

In addition, the program requires a current working knowledge of at least one higher-level (procedural) language; and a familiarity with computer applications. A minimal background in mathematics is also required, including two semesters of calculus and one semester of statistics. Individuals who have worked at a high professional level in the computer industry or business may be able to substitute work experience for specific subject area admission requirements. Individuals without a business degree or business experience are required to complete an online business fundamentals course prior to enrolling in the program. Transfer credit from another institution is not accepted into this certificate program.

Program Requirements

The certificate is awarded upon completion of five graduate level courses (15 credits) in the area of data science and business analytics. A cumulative GPA of 3.0 is required and, at most, one course with a grade of C may be allowed towards the certificate. Students must take five courses, as outlined below, to receive the Graduate Certificate in Data Science and Business Analytics.

Core Requirements

DSBA 6100 Big Data Analytics for Competitive Advantage (3)
 DSBA 6160 Database Systems (3)
 DSBA 6201 Business Intelligence and Analytics (3)

Select one of the following courses:

DSBA 5122 Visual Analytics (3)
 DSBA 6520 Network Science (3)

Select one of the following courses:

DSBA 6122 Decision Modeling and Analysis via Spreadsheets (3)
 DSBA 6211 Advanced Business Analytics (3)
 DSBA 6276 Consumer Analytics (3)

COURSES IN DATA SCIENCE AND BUSINESS ANALYTICS (DSBA)

DSBA 5110. Applied Regression Analysis. (3) Cross-listed as STAT 5110. Prerequisites: MATH 2164; and STAT 2122, STAT 3128, or equivalent; or permission of department. Theoretical and practical training in statistical modeling with particular emphasis on the application of linear regression and multivariate statistical analysis. The basic fundamentals and statistical inference techniques associated with regression models are introduced. Students also learn how to apply the statistical techniques to extract information from data generated in various application areas using statistical software. Topics include: linear regression, model adequacy checking and diagnostics, generalized linear regression, and multivariate statistical analysis.

DSBA 5121. Information Visualization. (3) Cross-listed as ITCS 5121 and HCIP 5121. Prerequisites: Full graduate standing and enrollment in the DSBA PSM or Graduate Certificate program. Information visualization concepts, theories, design principles, popular techniques, evaluation methods, and information visualization applications.

DSBA 5122. Visual Analytics. (3) Cross-listed as ITCS 5122 and HCIP 5122. Prerequisites: Full graduate standing, enrollment in the DSBA PSM or Graduate Certificate program, and approval of the Program Director. Introduces the new field of visual analytics, which integrates interactive analytical methods and visualization. Topics include: critical thinking, visual reasoning, perception/cognition, statistical and other analysis techniques, principles of interaction, and applications.

DSBA 5510. Web Mining. (3) Cross-listed as ITIS 5510. Pre- or corequisites: ITIS 6120, full graduate standing, and enrollment in the DSBA PSM or Graduate Certificate program. Topics include: measuring and modeling the Web; crawling, Web search and information retrieval; unsupervised learning, supervised learning, semi-supervised learning in Web context; social network analysis and hyperlink analysis; text parsing and knowledge representation.

DSBA 6100. Big Data Analytics for Competitive Advantage. (3) Cross-listed as HCIP 6103 and ITCS 6100. Prerequisites: Full graduate standing and enrollment in the DSBA PSM or Graduate Certificate program. An introduction to the use of big data as a strategic resource. A focus is placed on integrating the knowledge of analytics tools with an understanding of how companies leverage data analytics to gain strategic advantage. A case

approach is used to emphasize hands-on learning and a real-world view of big data analytics.

DSBA 6112. Graduate Econometrics. (3) Cross-listed as ECON 6112. Prerequisites: Full graduate standing and enrollment in the DSBA PSM or Graduate Certificate program. Advanced study of the theory and application of statistics to economic problems. Topics include: derivation of least-squares estimators; maximum likelihood estimation; and problems of multicollinearity, heteroskedasticity, and autocorrelation.

DSBA 6115. Statistical Learning with Big Data. (3) Cross-listed as STAT 6115. Prerequisite: DSBA 5110, STAT 5110, STAT 5123, or permission of department. A survey of major statistical learning concepts and methods for big data analysis, including both supervised and unsupervised learning such as resampling methods, support vector machines, model selection and regularization, tree-based methods and ensembles, and statistical graphics. Students learn how and when to apply statistical learning techniques, their comparative strengths and weaknesses, and how to critically evaluate the performance of learning algorithms in case studies in financial investment, gene identification, and feature selection in high-dimensional spaces.

DSBA 6122. Decision Modeling and Analysis via Spreadsheets. (3) Cross-listed as MBAD 6122. Prerequisite: MBAD 5141 or equivalent, full graduate standing, and enrollment in the DSBA PSM or Graduate Certificate program. An analytical approach to the management process. Generalized models for decision making with major emphasis on application of the scientific method to management problems.

DSBA 6155. Knowledge-Based Systems. (3) Cross-listed as ITCS 6155. Prerequisites: ITCS 6162, full graduate standing, and enrollment in the DSBA PSM or Graduate Certificate program. Knowledge systems; knowledge discovery; association rules; action rules, hierarchical classifiers, cascade classifiers, query languages and their semantics; cooperative and collaborative systems; ontology and metadata; flexible query answering; chase algorithms and data sanitization methods; decision support systems in medicine; and automatic indexing of music.

DSBA 6156. Applied Machine Learning. (3) Cross-listed as HCIP 6156. Prerequisites: Full graduate standing and enrollment in the DSBA PSM or Graduate Certificate program. Practical perspectives and applications of machine learning methods and techniques including: acquisition of declarative knowledge; organization of knowledge into new, more effective representations; development of new skills through instruction and practice; and discovery

of new facts and theories through observation and experimentation.

DSBA 6160. Database Systems. (3) Cross-listed as HCIP 6160 and ITCS 6160. Prerequisites: Full graduate standing and enrollment in the DSBA PSM or Graduate Certificate program. The modeling, programming, and implementation of database systems. Focuses on relational database systems, but may also address non-relational databases or other advanced topics. Topics include: (1) modeling: conceptual data modeling, ER diagram, relational data model, schema design and refinement; (2) programming: relational algebra and calculus, SQL, constraints, triggers, views; (3) implementation: data storage, indexing, query execution, query optimization, and transaction management; and (4) advanced: semi-structured data model, XML, and other emerging topics.

DSBA 6162. Knowledge Discovery in Databases. (3) Cross-listed as HCIP 6162, ITCS 6162, and ITIS 6162. Prerequisites: DSBA 6160, full graduate standing, and enrollment in the DSBA PSM program. The entire knowledge discovery process is covered. Topics include: setting up a problem, data preprocessing and warehousing, data mining in search for knowledge, knowledge evaluation, visualization and application in decision making. A broad range of systems, such as OLAP, LERS, DatalogicR+, C4.5, AQ15, Forty-Niner, CN2, QRAS, and discretization algorithms are discussed.

DSBA 6190. Cloud Computing for Data Analysis. (3) Cross-listed as ITCS 6190 and ITCS 8190. Prerequisites: ITCS 6114 or permission of department; familiarity with Java, Unix, Data Structures and Algorithms, Linear Algebra, and Probability and Statistics; good programming skills; and a solid mathematical background. Introduction to the basic principles of cloud computing for data-intensive applications. Focuses on parallel computing using Google's MapReduce paradigm on Linux clusters, and algorithms for large-scale data analysis applications in web search, information retrieval, computational advertising, and business and scientific data analysis. Students read and present research papers on these topics, and implement programming projects using Hadoop, an open source implementation of Google's MapReduce technology, and related NoSQL technologies for analyzing unstructured data.

DSBA 6201. Business Intelligence and Analytics. (3) Cross-listed as MBAD 6201. Prerequisites: MBAD 5121, full graduate standing, and enrollment in the DSBA PSM or Graduate Certificate program. An overview of the business approach to identifying, modeling, retrieving, sharing, and evaluating an

enterprise's data and knowledge assets. Focuses on the understanding of data and knowledge management, data warehousing, data mining (including rule-based systems, decision trees, neural networks, etc.), and other business intelligence concepts. Covers the organizational, technological and management perspectives.

DSBA 6207. Business Project Management. (3)

Cross-listed as MBAD 6207. Prerequisites: MBAD 5121 or equivalent; MBAD 6141; full graduate standing; and enrollment in the DSBA PSM or Graduate Certificate program. Project management is widely used in a variety of business environments to manage complex, non-routine endeavors. Examples of projects include consulting and process improvement projects, advertising projects, and technology projects. Focuses on tools, techniques, and skills for business project management, with attention to both the quantitative and the qualitative aspects of project management. Topics include: project evaluation, estimation, monitoring, risk management, audit, managing global projects, outsourcing, and project portfolio management. Students also gain experience using Project Management Software.

DSBA 6208. Supply Chain Management. (3) Cross-listed as MBAD 6208. Prerequisites: MBAD 6141, full graduate standing, and enrollment in the DSBA PSM or Graduate Certificate program. Supply chain management is concerned with all of the activities performed from the initial raw materials to the ultimate consumption of the finished product. From a broad perspective, the course is designed to examine the major aspects of the supply chain: the product flows; the information flows; and the relationships among supply chain participants. The course content is interdisciplinary in nature and covers a variety of topics such as supply chain information technologies, supply chain design, strategic alliances between supply chain participants and supply chain initiatives.

DSBA 6211. Advanced Business Analytics. (3) Cross-listed as MBAD 6211. Prerequisites: MBAD 6201 or ITCS 6162; full graduate standing; and enrollment in the DSBA PSM or Graduate Certificate program. An in-depth study of applications of data analytics techniques to discover non-trivial relationships that are understandable, useful, and actionable to decision makers. A case approach is used to emphasize hands-on learning and real-world deployment of business analytics.

DSBA 6212. Enterprise Systems. (3) Cross-listed as MBAD 6212. Prerequisite: Permission of DSBA Program Director. An overview of Enterprise Resource Planning (ERP). Using business cases and hands-on training with ERP tools, students learn how

ERP systems support an organization's core business processes in achieving its strategic and operational goals. The role of ERP systems in business analytics and intelligence, the configuration of ERP systems, and the methods of evaluation, selection and implementation of ERP systems are also covered.

DSBA 6213. Applied Healthcare Business Analytics.

(3) Cross-listed as HCIP 6213 and MBAD 6213. Prerequisites: Demonstrated proficiency with Microsoft Excel; and HCIP 5123, STAT 5123, HADM 6108 (for students with background in healthcare administration), HCIP 6108 (for students with background in healthcare informatics), or equivalent. Focuses on applying business analytics within the healthcare setting. Students learn analytical tools used to synthesize big data into meaningful management information that is used in making key business decisions that impact the delivery of healthcare services. Case studies are utilized to prepare students for delivering boardroom level presentations of their findings.

DSBA 6265. Advanced Topics in Knowledge

Discovery in Databases. (3) Cross-listed as ITCS 6265. Prerequisites: DSBA 6162 or permission of instructor; full graduate standing; and enrollment in the DSBA PSM program. Information visualization in data mining and knowledge discovery, predictive data mining, mining of multimedia sources, mining of unstructured data, distributed data mining, mining of Web data/information, mining complex types of data, mining of biotechnology data, applications, and trends in data mining.

DSBA 6276. Consumer Analytics. (3) Cross-listed as MBAD 6276. Prerequisites: MBAD 6270, full graduate standing, and enrollment in the DSBA PSM or Graduate Certificate program. The utilization of analytics techniques in marketing decision-making and consumer strategy. Involves the extraction of hidden insight about consumers from structured and unstructured Big Data, and the translation of that insight into a market advantage. Applications in areas such as consumer targeting, product innovation, and promotion strategy.

DSBA 6277. Social Media Marketing and Analytics.

(3) Cross-listed as MBAD 6277. Prerequisites: MBAD 6270, full graduate standing, and enrollment in the DSBA PSM or Graduate Certificate program. The utilization of social media in marketing strategy and tactics. Topics include: the use of social media in building brand strength and equity, as a customer acquisition tool, and as a customer relationship management tool. The utilization of analytics in effective social media marketing.

DSBA 6278. Innovation Analytics. (3) Cross-listed as

MBAD 6278. Prerequisites: MBAD 6270 or permission of department; full graduate standing; and enrollment in the DSBA PSM or Graduate Certificate program. The comprehension and application of text analytics as a tool to examine unstructured qualitative information to generate innovations. Identifying the various sources of consumer insight and using them in innovation strategy. Understand how to differentiate between what consumers want versus what they say.

DSBA 6400. Internship. (3) Prerequisite: Completion of 21 credit hours of core course requirements. A data science or business analytics project is chosen and completed under the guidance of an industry partner. Each student's internship project program must be approved by the program director. A proposal form must be completed and approved prior to registration and the commencement of the internship. A mid-term report and a final report to be evaluated by the industry partner and supervising faculty. Grading is by the supervising faculty in consultation with off-campus supervisor at the internship organization. *Graded on a Pass/No Credit basis.*

DSBA 6500. Complex Adaptive Systems. (3) Cross-listed as HCIP 6500, ITCS 6500, ITCS 8500, ITIS 6500 and ITIS 8500. Prerequisites: Full graduate standing and enrollment in the DSBA PSM or Graduate Certificate program. Complex adaptive systems (CAS) are networked (agents/part interact with their neighbors and, occasionally, distant agents), nonlinear (the whole is greater than the sum of its parts), adaptive (the system learns to change with its environment), open (new resources are being introduced into the environment), dynamic (the change is a norm), emergent (new, unplanned features of the system get introduced through the interaction of its parts/agents), and self-organizing (the parts organize themselves into a hierarchy of subsystems of various complexity). Ant colonies, networks of neurons, the immune system, the Internet, social institutions, organization of cities, and the global economy are a few examples where the behavior of the whole is much more complex than the behavior of the parts. Covers those and similar topics in an interactive manner. Examples of our current research effort are provided. Topics include: Self-organization; emergent properties; learning; agents; localization affect; adaptive systems; nonlinear behavior; chaos; complexity.

DSBA 6520. Network Science. (3) Cross-listed as HCIP 6520, ITIS 6520, and ITIS 8520. Prerequisites: Full graduate standing and enrollment in the DSBA PSM or Graduate Certificate program. Network Science helps students design faster, more resilient communication networks; revise infrastructure systems such as electrical power grids,

telecommunications networks, and airline routes; model market dynamics; understand synchronization in biological systems; and analyze social interactions among people. It examines the various kinds of networks (regular, random, small-world, influence, scale-free, and social) and applies network processes and behaviors to emergence, epidemics, synchrony, and risk. This course integrates concepts across computer science, biology, physics, social network analysis, economics, and marketing.

Economics

- **M.S. in Economics**
- **M.S. /M.Sc. Dual Degree** (*in conjunction with the Copenhagen Business School*)
- **Graduate Certificate in Applied Econometrics**

Department of Economics

belkcollege.uncc.edu/departments/economics
msecon.uncc.edu

Graduate Program Director

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Graduate Faculty

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Dr. John E. Connaughton, Professor
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Dr. Peter M. Schwarz, Professor
Dr. Lisa Schulkind, Assistant Professor
Dr. Ellen Sewell, Assistant Professor
Dr. Dmitry Shapiro, Associate Professor
Dr. Carol Stivender, Clinical Professor
Dr. Carol Swartz, Clinical Professor
Dr. Jennifer L. Troyer, Professor
Dr. Hui-Kuan Tseng, Associate Professor
Dr. Kelly Vosters, Assistant Professor
Dr. Arthur Zillante, Chair and Associate Professor

MASTER OF SCIENCE IN ECONOMICS

The Master of Science (M.S.) in Economics degree program features a curriculum that is flexible yet thorough in its approach to theoretical training and applied coursework. The program offers four concentrations in: (1) Quantitative Methods in Economics, (2) Quantitative Financial Economics, (3) Financial Management, and (4) Applied Economic Analysis. Students completing this program are prepared for analytical and management positions that require the integration of economic analysis and advanced quantitative methods. Employment opportunities for economists with a master's degree exist in both the public and private sectors. In addition, students with a master's degree may choose to pursue additional graduate education leading to a

doctoral degree in Economics, Finance, or Public Policy.

Additional Admission Requirements

In addition to the general requirements for admission to the Graduate School, the following are required for graduate study in Economics:

- 1) Undergraduate coursework that includes: Calculus, Econometrics (or equivalent), Intermediate Macroeconomic Theory, Intermediate Microeconomic Theory, and Mathematical Economics (preferred). (*Students missing some of these courses can still be admitted with permission of Program Director.*)
- 2) A satisfactory score on the aptitude portions of the Graduate Record Examination. (*The Graduate Management Aptitude Test may be substituted for the GRE with the permission of the Program Director.*)

Degree Requirements

The program leading to the Master of Science degree in Economics requires at least 30 hours of graduate credit, with a maximum of six hours of transfer credit accepted from an accredited institution. (Credit applied toward an awarded graduate degree will not be accepted as transfer credit.) Courses taken at other accredited institutions after enrollment may receive residence credit if approved by the department and the Dean of the Graduate School. No more than two grades of C are permitted in the program and at least 18 credit hours must be completed before admission to candidacy. A GPA of at least 3.0 is required to graduate. The program is organized into three curriculum components:

- 1) Core Curriculum in economic theory and quantitative methods
- 2) Thesis or Research Project
- 3) Concentration selected from one of the four described below

Core Courses (12 credit hours)

ECON 6201 Advanced Macroeconomic Theory (3)
ECON 6202 Advanced Microeconomic Theory (3)
ECON 6112 Graduate Econometrics (3)
ECON 6218 Advanced Business and Economic Forecasting (3)

Concentrations

Quantitative Methods in Economics Concentration

The Concentration in Quantitative Methods in Economics is designed for students who want to study quantitative methods in detail. It is an ideal option for those students interested in applying quantitative modeling and methods for economic analysis in their chosen field or pursuing an Economics Ph.D. after

completion of the M.S. in Economics program. This concentration can be completed in one and a half years of study.

Students in this concentration must complete the core curriculum and the thesis or research project for the M.S. in Economics. In addition, they must complete:

ECON 6217 Advanced Microeconometrics
ECON 6219 Financial Econometrics

And two of the following:

ECON 6203 Financial Economic Theory
ECON 6206 Game Theory and Experiments
ECON 6235 Monetary and Financial Theory
ECON 6257 Applied Computational Economics

OR a combination of the above courses and approved elective courses that total 6 credit hours

Quantitative Financial Economics Concentration

The Concentration in Quantitative Financial Economics is designed for students interested in pursuing careers in portfolio management or financial risk management. This concentration can also provide an excellent foundation for students who wish to pursue additional graduate study leading to a doctoral degree in Finance. The concentration can be completed in one and a half years of study.

Students in this concentration must complete the core curriculum and the thesis or research project for the M.S. in Economics. In addition, they must complete:

ECON 6203 Financial Economic Theory (3)
ECON 6219 Financial Econometrics (3)
FINN 6210 Financial Elements of Derivatives (3)

And one of the following:

FINN 6211 Fixed Income Securities and Credit Risk (3)

ECON 6235 Monetary and Financial Theory (3)

An approved elective course

Financial Management Concentration

The Concentration in Financial Management is designed for students interested in pursuing careers in corporate finance or financial planning. This concentration can be completed in one full year of study if the student chooses the thesis option.

Students in this concentration must complete the core curriculum and the thesis or research project for the M.S. in Economics. In addition, they must complete:

FINN 6152 Financial Management (3)
FINN 6153 Investment Management (3)
FINN 6157 Advanced Corporate Finance (3)

And one of the following:

FINN 6155 Multinational Financial Management (3)
ECON 6235 Monetary and Financial Theory (3)
An approved elective course

Applied Economic Analysis Concentration

The Concentration in Applied Economic Analysis is designed for students who wish to pursue a specialized course of study. This concentration can be completed in one full year of study if the student chooses the thesis option.

Students in this concentration must complete the core curriculum and the thesis or research project for the M.S. in Economics. In addition, they must complete 12 credit hours of elective courses chosen from among 5000 level and higher ECON courses, 6000 level and higher FINN courses, or courses approved by the program director.

Thesis or Research Project

Thesis Option

Students who choose the thesis track must successfully complete six credit hours of ECON 6999. The thesis must be written and defended within six calendar years after admission into the M.S. in Economics program. The Thesis Committee, which must be approved by the Graduate Program Director, will consist of a Chair and at least two other faculty members. ECON 6999 is graded on an A, B, C, or U basis.

ECON 6999 Graduate Thesis Research (3)

Research Project/Non-Thesis Option

Students enrolled in the non-thesis option must complete the following research courses:

ECON 6901 Research Methods for Economists I (3)
ECON 6902 Research Methods for Economists II (3)

Advising

Prior to, or concurrent with, the first semester of study, each student will be expected to complete a program of study listing each class the student expects to take as a part of the program. The program of study requires the approval of the coordinator.

Application for Degree

Each student should make application for his/her degree by completing the online Application for Degree through Banner Self Service no later than the filing date specified in the University Academic Calendar.

Minor

The Department of Economics participates in the program leading to an interdisciplinary Graduate

Minor in Operations Research. See the Mathematics and Statistics heading in the “College of Liberal Arts & Sciences” section of this *Catalog* for complete information and program requirements.

Program Certifications/Accreditations

The Belk College of Business is accredited by the Association to Advance Collegiate Schools of Business (AACSB).

M.S. IN ECONOMICS/M.Sc. IN ECONOMICS AND BUSINESS ADMINISTRATION DUAL DEGREE

The Belk College of Business, in partnership with Copenhagen Business School (CBS), offers a dual degree program in which a student may earn the Belk College M.S. in Economics with Concentration in Financial Management and a M.Sc. in Economics and Business Administration with Concentration in Applied Economics and Finance from CBS. This is a 48 credit hour program in which students earn 24 credit hours at UNC Charlotte and spend one year at CBS to earn the additional 24 credit hours. The dual degree program requires a thesis to be written while at CBS which will also satisfy the research portion of the UNC Charlotte degree. All courses are taught in English.

Visit globalbusiness.uncc.edu for additional information.

GRADUATE CERTIFICATE IN ECONOMETRICS

The Graduate Certificate in Applied Econometrics provides students with a strong foundation in applied econometrics, a skill set that is increasingly in demand. Additionally, students considering graduate study in economics have the opportunity to explore material prior to formally committing to a full graduate degree program.

Additional Admission Requirements

In addition to the general requirements for admission to the Graduate School, the following are required for graduate study in Economics:

- A bachelor's degree, or its equivalent, from a regionally accredited college or university
- GPA of at least 2.75 (based on a 4.0 scale) on all previous work completed beyond high school (secondary school)
- An online application through the Graduate School's application system

- A statement of purpose
- Unofficial transcripts of all college course work attempted
- Official and satisfactory scores on the Test of English as a Foreign Language (TOEFL) or the International English Language Testing System (IELTS), if English is not the applicant's native language and he or she has not earned a post-secondary degree from a U.S. institution

Certificate Requirements

The Graduate Certificate in Applied Econometrics requires completion of 12 credit hours of 6000-level courses in econometrics. Transfer credits are not accepted into the Graduate Certificate in Applied Econometrics program.

Core Courses (9 credit hours)

ECON 6112 Graduate Econometrics (3)
ECON 6217 Advanced Microeconomics (3)
ECON 6218 Advanced Business and Economic Forecasting (3)

Elective Course (3 credit hours)

Select one of the following:

ECON 6219 Financial Econometrics (3)
ECON 6257 Applied Computational Economics (3)

Grade Requirements

Students must earn a grade of B or above in all four courses that make up the certificate program.

COURSES IN ECONOMICS (ECON)

ECON 5116. Public Finance. (3) Revenue and expenditure problems of governmental units, intergovernmental financial relationships and the impact of federal fiscal policy upon the American economy.

ECON 5135. Economics of Growth and Development. (3) Theories of economic growth and development applied to varying economic and social systems. Current theoretical models and their relevance to efficient allocation of resources to both the developed and the developing nations.

ECON 5160. Economics of Transportation. (3) Analysis of transportation systems. Topics include: the historical development of various modes, costs and rate-making, regulation and national transportation policy.

ECON 5171. Economics of International Trade. (3) Theory of international trade including determination of international trade patterns, welfare implications of international trade, economic integration, and effects of tariffs and quotas.

ECON 5172. Economics of International Finance. (3)

Survey of international monetary theory. Topics include: exchange rate determination, balance of payments and adjustment, international liquidity, capital movements, international financial organizations, and monetary reform proposals.

ECON 5180. Industrial Organization and Public Policy. (3)

An examination of monopolistic competition, oligopoly, and monopoly and questions of public policy in dealing with problems created by industrial concentration.

ECON 5181. Energy and Environmental Economics. (3)

Economic issues of both energy and environment. Energy issues include the historical development of energy resources, supply and demand considerations, and projections of the future energy balance. Environmental issues are externalities, common property resources, and government regulation. Policy considerations include environmental standards, pollution charges, and property rights. Cost-benefit analysis and microeconomic theory are applied.

ECON 6001. Advanced Topics in Macroeconomics. (3)

Prerequisites: ECON 6112, ECON 6201, and ECON 6202. Advanced treatment of selected issues in macroeconomics.

ECON 6002. Advanced Topics in Microeconomics. (3)

Prerequisites: ECON 6112, ECON 6201, and ECON 6202. Advanced treatment of selected issues in microeconomics.

ECON 6090. Topics in Economics. (1-3) Prerequisite: permission of the department. Topics from various areas of economics. Credit hours will vary with the topic offered. *May be repeated for credit with change in topic.*

ECON 6100. Graduate Mathematical Economics. (3)

Economic problems are analyzed with quantitative techniques. Topics covered include the study of economic growth models, utility maximization, homogeneous functions, dynamic systems, applications of linear programming, and constrained optimization.

ECON 6112. Graduate Econometrics. (3)

Cross-listed as DSBA 6112. Prerequisites: Admission to graduate program and permission of Graduate Program Director. Advanced study of the theory and application of statistics to economic problems. Topics include: derivation of least-squares estimators; maximum likelihood estimation; and problems of multicollinearity, heteroskedasticity, and autocorrelation.

ECON 6113. Cross-Section and Time-Series Econometrics. (3)

Cross-listed as STAT 6113.

Prerequisite: Permission of Graduate Program Director. Introduces the advanced study of the theory and application of statistics to economic problems. Topics include: derivation of the least-squares estimator; methods with which to detect and correct for potential problems with the classical regression model; maximum likelihood estimation; instrumental variables regression; the problems with multicollinearity, heteroscedasticity, and autocorrelation; introduction to the time-series estimation, including ARIMA models and basic forecasting tools.

ECON 6201. Advanced Macroeconomic Theory. (3)

Cross-listed as PPOL 8701. Prerequisites: Admission to graduate program and permission of Graduate Program Director. Theories of aggregate income determination, inflation, unemployment, interest rates and economic growth; macro-economic consumption and investment behavior; the business cycle.

ECON 6202. Advanced Microeconomic Theory. (3)

Cross-listed as PPOL 8703. Prerequisite: Admission to graduate program and permission of Graduate Program Director. Theories of the firm, of the consumer, and of resource owners; determination of prices under different market structures; general equilibrium analysis and welfare economics.

ECON 6203. Financial Economic Theory. (3)

Cross-listed as FINN 6203. Prerequisite: Admission to the graduate program and permission of Program Director. The fundamental principles of risk pricing and risk allocation in a unified framework. Discrete-time model is employed to underscore the relationship between the techniques used in finance and the economic analysis of risk. The objective is to understand the economics of asset pricing and how derivatives and options are used in practice and their limitations.

ECON 6206. Game Theory and Experiments. (3)

Cross-listed as PPOL 8707. Prerequisite: Permission of the Graduate Program Director. Focuses on game theoretic analysis and the experimental methodology which can be used to test game theoretic models. The primary topics in game theory include: static games with complete information, dynamic games with complete information, static games with incomplete information, and dynamic games with incomplete information. Some topics are introduced by way of an economic experiment, and the experiment is followed by a rigorous analysis of the game theoretic solution to the game. The latter part of the course focuses on how to design economic

experiments as a means of testing the predictions of game theoretic models.

ECON 6217. Advanced Microeconometrics. (3)

Prerequisite: ECON 6112 or ECON 6113. Underlying assumptions regarding the population, specification, estimation, and testing of microeconomic models. Students become acquainted with a variety of extensions of conventional linear models for cross-sectional and panel data, including, but not limited to: panel data models, instrumental variables models, and qualitative response models.

ECON 6218. Advanced Business and Economic Forecasting. (3)

Prerequisite: ECON 6112. Develops forecasting techniques used in business decision making and techniques used in forecasting macroeconomic variables. Topics include: estimation, identification and prediction using ARMAX, state space, and Box-Jenkins models; spectral analysis; linear filtering.

ECON 6219. Financial Econometrics. (3) Cross-listed as FINN 6219. Prerequisite: ECON 6113, ECON 6218, or MATH 6201. Advanced time series with financial applications. Topics include: time series regressions (univariate and multivariate, stationary and non-stationary) and time series models (including ARMA, ARCH, GARCH, stochastic volatility and factor models). The emphasis will be on model properties, estimators, test statistics, and applications in finance.

ECON 6235. Monetary and Financial Theory. (3)

Cross-listed as PPOL 8711. Prerequisites: ECON 6201 or ECON 6202, and ECON 6112. Theory and empirical tests of money supply, money demand, and financial markets; portfolio theory with special attention to portfolio choices of banks; term structure of interest rates; dynamic models of money and economic activity.

ECON 6238. Real Estate and Urban Economics. (3)

Prerequisite: ECON 2102. Cross-listed as MBAD 6238 and MSRE 6238. Focuses on the fundamental economic forces that create urban areas, with a special emphasis on land markets. Integrates economic theory to better understand the market forces that impact applied real estate development projects. Topics include: urban growth and development; land valuation; the modelling and estimation of agglomeration economies; the costs of cities and their internal structure with emphasis on land use regulations and transportation; amenities and the local supply of labor; the sizes and functions of cities; affordable housing; and local public finance.

ECON 6240. Economics of International Finance. (3)

Prerequisites: ECON 6201, ECON 6202, and ECON

6112. Open economy macroeconomics, international transmission of inflation and unemployment, internal and external balance; balance of payments and international payments mechanisms; determination of exchange rates and effects of hedging and speculation.

ECON 6241. Economics of International Trade. (3)

Prerequisites: ECON 6201, ECON 6202, and ECON 6112. Examines the causes and consequences of trade using Ricardian and neoclassical models. Considers extensions, modifications, and empirical tests of these models. Analysis of tariffs, quotas, other trade restrictions, export subsidies, and trends in current trade policy.

ECON 6250. Advanced Urban and Regional Economics. (3) Cross-listed as PPOL 8705.

Prerequisite: Admission to graduate program. Applications of microeconomic theory to problems of cities, metropolitan areas and regions; methods in regional analysis, location theory, land-use planning, measurement of economic activity; transportation, housing, poverty, and growth issues.

ECON 6255. Benefit-Cost Analysis. (3) Principles, practices, and applications for defining and comparing the benefits and costs of public policy programs and private sector projects, including techniques useful for organizing and analyzing data, evaluating programs systematically, and developing a framework for decision making while recognizing ethical implications, measurement problems, and time value problems.

ECON 6256. Public Economics. (3) Cross-listed as PPOL 8709. Prerequisite: MATH 1241 or equivalent, and permission of the Graduate Program Director. Public economics is the study of the way governments choose spending, taxation, and regulatory policy; the ways such policies may affect economic welfare; and mechanisms to evaluate the economic effects of such policies.

ECON 6257. Applied Computational Economics. (3)

Prerequisites: ECON 6201 and ECON 6202, or permission of the Graduate Program Director. Introduction to computational approaches for solving economic models. Topics include: interpolation and approximation techniques, numerical optimization, numerical solutions to systems of nonlinear equations, quadrature formulas for numerical integration, Monte Carlo simulation, and basic solution algorithms for economic dynamics.

ECON 6260. Economics of Health and Healthcare. (3)

Cross-listed as PPOL 8667 and HSRD 8004. Prerequisite: Admission to graduate program or permission of the instructor. Uses economic theory

and econometrics to analyze the functioning of the health care sector and appropriate public policy. Topics include: how markets for medical care differ from other markets, the demand for medical care, the demand and supply of health insurance, the role of competition in medical markets, managed care, managed competition, and the role of the public sector in regulating and financing health care. The topic list is flexible, and student input will be solicited and welcomed.

ECON 6800. Directed Study in Economics. (1-3)

Prerequisite: Admission to graduate program.

Independent study of a theoretical and/or a policy problem in a special area of economics. Topics of the investigation may originate from the student or from the faculty member supervising the study. *May be repeated for credit up to 6 credits and permission of Graduate Program Director.*

ECON 6901. Research Methods for Economists I. (3)

Prerequisites: ECON 6112 or ECON 6113; and either ECON 6201, ECON 6202, or ECON 6203. Research programs in economics; problem identification; interpretation of statistical results; bibliographic search; data sources and collection; selection of statistical technique; preparation of reports and proposals.

ECON 6902. Research Methods for Economists II. (3)

Prerequisite: ECON 6901. Critique of economic research and reports, presentation of econometric results and reports. The student will develop a research project, perform statistical tests, and present the results orally and in a major research paper.

ECON 6999. Graduate Thesis Research. (1-6)

Individual investigation culminating in the preparation and presentation of a thesis. *May be repeated for credit.*

Mathematical Finance

• M.S. in Mathematical Finance

Graduate Program

mathfinance.uncc.edu

Graduate Program Director

Dr. Weidong Tian

Graduate Faculty

Finance

Dr. Steven P. Clark, Associate Professor

Dr. Tao-Hsien Dolly King, Professor

Dr. Christopher M. Kirby, Professor

Dr. David C. Mauer, Professor

Dr. Faith Neal, Associate Professor

Dr. Weidong Tian, Professor

Mathematics and Statistics

Dr. Jaya Bishwal, Associate Professor

Dr. Michael Grabchak, Assistant Professor

Dr. Mohammad A. Kazemi, Professor

Dr. Mingxin Xu, Associate Professor

Dr. Yang Li, Assistant Professor

Dr. Adriana Ocejo Monge, Assistant Professor

Dr. Jiancheng Jiang, Associate Professor

Economics

Dr. Craig Depken, Professor

Dr. Hwan-Chyang Lin, Associate Professor

Dr. Rob Roy McGregor, Professor

Dr. Jennifer Troyer, Professor

MASTER OF SCIENCE IN MATHEMATICAL FINANCE

The Master of Science in Mathematical Finance program is designed to prepare students to pursue careers in quantitative finance. Increasingly firms of all types, but especially financial institutions, investment banks, and commodities firms, rely upon highly sophisticated mathematical models to identify, measure, and manage risk. The advent of these models triggered the emergence of a new discipline, Mathematical Finance. This discipline, sometimes also referred to as “financial engineering,” “computational finance,” or “quantitative finance,” requires professionals with extensive skills in both finance and mathematics.

The Mathematical Finance program at UNC Charlotte is a joint program of the Departments of Finance and Economics in the Belk College of Business and the Department of Mathematics and Statistics in the College of Liberal Arts & Sciences. Students take

courses from all three departments in an integrated curriculum. Students may use electives to tailor the program to their specific interests.

Additional Admission Requirements

In addition to the general requirements for admission to the Graduate School, the following are required for admission to the Master of Science in Mathematical Finance program.

- 1) A baccalaureate degree in a related field with a minimum GPA of 3.0 on a 4.0 scale.
- 2) Acceptable scores on each portion of the GRE or GMAT.
- 3) For applicants from non-English speaking countries, a language requirement score of 557 on the TOEFL or 220 on the new computer-based TOEFL or 78% on the MELAB. Non-native speakers of English, may, at the discretion of either the Graduate School or the Program Committee for the MS in Mathematical Finance, be required to enroll in English as a Second Language (ESL) courses at the English Language Training Institute.
- 4) Specific coursework equivalent to the following: introductory course in the Theory of Finance; a standard two-semester sequence in Calculus; Linear algebra; and at least one upper-level course in Probability and Statistics. Students are strongly recommended to be familiar with at least one programming language, most preferably C or C++. Students lacking this coursework may be admitted subject to the condition that they satisfactorily complete such coursework during the first two semesters that they are enrolled in the program and prior to their taking any program courses where prerequisites are missing.

Prerequisite Requirements

Students may enter this program from a variety of undergraduate backgrounds, including finance, mathematics, economics, computer science, actuarial science, statistics, information systems and engineering. As a result, many students admitted will not have the required background to immediately begin taking advanced courses from each of three areas of study. In such cases, the student may be required to take prerequisite courses prior to enrolling in advanced courses in specific fields. These prerequisites would be in addition to the advanced 30 credit hours required for the degree. In general students must have the following background in each field before taking advanced courses in that field:

- 1) Finance: Have earned an acceptable grade in an introductory course in finance from an AACSB-accredited business school at either the undergraduate or MBA level.

- 2) Economics: Have earned an acceptable grade in microeconomics at either the undergraduate or MBA level.
- 3) Mathematics: Have earned acceptable grades in the equivalent of a two course sequence in calculus (differential and integral calculus), a course in linear algebra, and an upper-level course in probability and statistics.

Students are strongly recommended to be familiar with at least one programming language, most preferably C or C++. Again, students may be admitted to the program without meeting all of these requirements. The Program Director, in conjunction with the Departmental Graduate Coordinators, will evaluate each incoming student's academic background to determine in which prerequisite courses the student will be required to enroll. A student who meets the prerequisites in a field may begin taking advanced courses in that field while still taking prerequisite courses in another field. A student must, however, be making satisfactory progress toward fulfilling his or her prerequisites in all fields to remain enrolled in the program.

Degree Requirements

A minimum of 30 credit hours of coursework beyond the bachelor's degree is required to earn the M.S. in Mathematical Finance degree. Students must complete the required six Program Core courses and four Concentration courses corresponding with the selected concentration.

Program Core Courses

- ECON 6203 Financial Economic Theory (3)
or FINN 6203 Financial Economic Theory (3)
- ECON 6113 Cross-Section and Time Series
Econometrics (3)
or STAT 6113 Cross-Section and Time Series
Econometrics (3)
- FINN 6219 Financial Econometrics (3)
or ECON 6219 Financial Econometrics (3)
- FINN 6210 Financial Elements of Derivatives (3)
- FINN 6211 Fixed Income Securities and Credit Risk
(3)
- MATH 6203 Stochastic Calculus for Finance (3)

Concentrations

The degree program offers three concentrations leading to a M.S. in Mathematical Finance. Students who plan to pursue careers in quantitative modeling and pricing analysis are encouraged to elect the Computational Finance Concentration. Students planning to pursue a career in risk management and insurance are encouraged to pursue the program with the Risk Management Concentration. Students interested in a career in financial data analysis and

applications are encouraged to elect the Financial Data Analytics concentration.

Concentration in Computational Finance

In addition to the six Program Core courses, the following four courses are required for a M.S. in Mathematical Finance with a Concentration in Computational Finance.

MATH 6204 Numerical Methods for Financial Derivatives (3)
 MATH 6205 Financial Computing (3)
 MATH 6206 Stochastic Calculus for Finance II (3)
 FINN 6212 Advanced Financial Derivatives (3)

Concentration in Risk Management

In addition to the six Program Core courses, the following four courses are required for a M.S. in Mathematical Finance with a Concentration in Risk Management.

FINN 6213 Risk Management and Financial Institutions (3)
 FINN 6214 Asset and Portfolio Management (3)
 FINN 6215 Risk Management in Insurance Companies (3)
 FINN 6216 Quantitative Risk Management (3)"

Concentration in Financial Data Analytics

In addition to the six Program Core courses, the following four courses are required for a M.S. in Mathematical Finance with a Concentration in Financial Data Analytics.

ECON 6217 Advanced Microeconometrics (3)
 ITCS 6114 Algorithm and Data Structures (3)
 ITCS 6160 Database Systems (3)
 or ITIS 6120 Applied Databases
 MBAD 6201 Business Intelligence and Analytics (3)

Advising

Advising is done by the Program Director, in conjunction with the Area Coordinators of each of the participating Departments.

Assistantships

A number of assistantships are available each year. In order to be competitive, applications should be submitted by March 15. Additional information is available from the Program Director.

Comprehensive Examination

Student will be required to pass a comprehensive examination. An examining committee will be appointed by the program director and will be constituted from the program's faculty. The exam may be, at the committee's discretion, either written or oral.

Application for Degree

Each student should make application for his/her degree by completing the online Application for Degree through Banner Self Service no later than the filing date specified in the University Academic Calendar.

Transfer Credit

No more than 6 credit hours and only courses with a grade of A or B at an accredited institution. Requires the recommendation of the Program Director and approval of the Graduate School.

COURSES IN MATHEMATICAL FINANCE

Economics Courses (ECON)

See descriptions of ECON courses under "Economics" in the Belk College of Business section of this *Catalog*.

Mathematics Courses (MATH)

See descriptions of MATH courses under "Mathematics and Statistics" in the College of Liberal Arts & Sciences section of this *Catalog*.

Finance (FINN)

FINN 5158. Student Managed Investment Fund I. (3)
 Cross-listed as MBAD 5158. Prerequisites: FINN 3120 or MBAD 6152, FINN 3222 or FINN/MBAD 6153, and permission of instructor. Management of an actual portfolio consisting of a portion of the University's Endowment Fund. Students are required to take FINN 5159 following this course.

FINN 5159. Student Managed Investment Fund II. (3)
 Cross-listed as MBAD 5159. Prerequisites: FINN 5158, FINN 3120 or MBAD 6152, FINN 3222 or FINN/MBAD 6153, and permission of instructor. Management of an actual portfolio consisting of a portion of the University's Endowment Fund.

FINN 5275. Corporate Risk Management. (3)
 Prerequisite: FINN 3271 or permission of department chair. An in-depth discussion of risk management in non-financial firms, including analysis of techniques that firms use to manage risks. Risk handling devices and how they are applied to business problems are discussed. Some of the techniques examined include self-insurance, captives, financial instruments, and retentions.

FINN 6058. Special Topics in Financial Services. (3)
 Cross-listed as MBAD 6160. Prerequisite: MBAD 6152. Each year, the subject matter of this course deals with a different specialized and contemporary

topic of interest to students who are preparing for management careers in the financial services industry. The topics are chosen and covered in a way that builds on and supplements the topics covered in other courses in the Financial Institutions/Commercial Banking concentration. Emphasis is placed on the managerial implications of the subject matter as well as the impact on the financial system. *May be repeated for credit one time.*

FINN 6151. Financial Institutions and Markets. (3)

Cross-listed as MBAD 6151. Major financial institutions, particularly commercial banks, and their role in the intermediation process and as suppliers of funds to the money and capital markets. Comparative financial policies of these institutions are examined in the context of their legal and market environment.

FINN 6152. Financial Management. (3) Cross-listed as MBAD 6152 and MSRE 6152. Theory and practice of corporate finance including asset management, cost of capital and capital budgeting, optimization problems and socio-economic aspects of financial management. Computer technology may be employed when applicable.

FINN 6153. Investment Management. (3) Cross-listed as MBAD 6153. Prerequisite: MBAD 6152. Theory and practice of investment decisions of individuals and fund managers. Topics include: the status of capital market theory, the efficient market hypothesis literature, and a portfolio performance measurement. Standard institutional and investment analysis topics, futures and options markets, and international investment topics are covered.

FINN 6154. Applied Business Finance. (3) Cross-listed as MBAD 6154. Prerequisite: MBAD 6152. Examination of business finance topics which typically confront the firm's primary finance functional areas (CFO, Treasurer, Controller). The purpose is to develop advanced analytical skills in those topic areas. Topics include: lease vs. buy (borrow); leveraged buy-outs; merger analysis (emphasis on valuation); international operations of American firms (capital budgeting and cost of capital); capital structure; risk management. Such additional topics as working capital management; risk management; and relevant current topics are included as time permits.

FINN 6155. Multinational Financial Management. (3)

Cross-listed as MBAD 6155. Prerequisite: MBAD 6152. Financial management of the multinational firm including management of foreign exchange risk and political risk, and the control and evaluation of financial policies of multinational firms.

FINN 6156. Commercial Bank Management. (3)

Cross-listed as MBAD 6156. Prerequisite: MBAD 6152. Techniques for the management of commercial banks. Topics include: industry structure, administrative organization, management of assets, liabilities, and capital, and financial analysis of the banking firm.

FINN 6157. Advanced Corporate Finance. (3)

Cross-listed as MBAD 6157. Prerequisite: MBAD 6152. Theories of modern corporate finance, including theory of efficient capital markets; uncertainty and the theory of choice; market equilibrium asset pricing models (capital asset pricing model, arbitrage pricing theory, Black-Scholes); theories of capital structure and the cost of capital; dividend policy; and leasing.

FINN 6203. Financial Economic Theory. (3)

Cross-listed as ECON 6203. Prerequisite: Admission to the graduate program and permission of Program Director. The fundamental principles of risk pricing and risk allocation in a unified framework. Discrete-time model is employed to underscore the relationship between the techniques used in finance and the economic analysis of risk. The objective is to understand the economics of asset pricing and how derivatives and options are used in practice and their limitations.

FINN 6210. Financial Elements of Derivatives. (3)

Corequisite: FINN 6203 or permission of department. Examines the nature and functions of futures and options markets. Topics include: hedging for risk reduction and the role of derivative instruments in the capital markets. Focuses on basic pricing techniques which are derived from no-arbitrage relations.

FINN 6211. Fixed Income Securities and Credit Risk. (3)

Prerequisite: FINN 6210 or permission of department. The fixed income securities and portfolios, as well as the theory and practice of fixed income markets. Topics include: fixed income instruments and sectors, duration and convexity, term structure of interest rates, securitization, portfolio management, hedging, and credit risk.

FINN 6212. Advanced Financial Derivatives. (3)

Prerequisite: FINN 6210 or permission of department. Multi-factor derivative pricing models. Topics include: the discrete-time and discrete-state models, Ito processes, relevant topics on stochastic calculus, Risk Neutral Valuation, and review of the Black-Scholes model. Additional topics include: commodity pricing models, stochastic volatility models, multi-period discrete-time (GARCH) models, and the interest rate models such as the Vasicek and CIR models.

FINN 6213. Risk Management and Financial Institutions. (3) Prerequisite: FINN 6203 or permission of department. Topics include: How market risk, credit risk and operational risk are quantified; Basel II regulatory framework; estimation of aggregate economical capital; calculation and use of RAROC; and recent bank risk management tools: back test, CCAR and Dodd-Frank proposals. Also addresses recent big losses that have occurred in financial markets and how they can be avoided.

FINN 6214. Asset and Portfolio Management. (3) Prerequisite: FINN 6203 or permission of department. Provides a foundation in investments and portfolio management from the perspective of an institutional investor. Particular attention is given to the issues associated with managing assets of an insurance company. Topics include: measuring and modeling return and risk, expected return models, information ratio, valuation theory and practice, forecasting, portfolio construction, transaction costs, turnover and trading, performance analysis, asset allocation, securities analysis, and the legal and regulatory landscape of institutional investing.

FINN 6215. Risk Management in Insurance Companies. (3) Prerequisite: FINN 6203 or permission of department. Examines the operations and risks of an insurance firm and how to evaluate and manage those operations and risks in a dynamic business environment. Topics include: the role of insurance firms within the financial services industry; the functions of insurance firms with emphasis on operations unique to insurers; insurer financial and risk management in the complex regulatory environment; and financial and strategic analysis of insurance firms.

FINN 6216. Quantitative Risk Management. (3) Prerequisite: FINN 6203 or permission of department. The quantitative techniques and tools for the risk management, beginning with basic concepts and methodologies. Topics include: risk measures such as VaR and Expected Shortfall, univariate and multivariate models, copulas and tail dependence in risk management framework, and back testing. Also discusses how to estimate VaR and Expected Shortfall parametrically, semi parametrically and non-parametrically.

FINN 6219. Financial Econometrics. (3) Cross-listed as ECON 6219. Prerequisite: ECON 6218, ECON 6113, or STAT 6113. Advanced time series with financial applications. Topics include: time series regressions (univariate and multivariate, stationary and non-stationary) and time series models (including ARMA, ARCH, GARCH, stochastic volatility and factor models). Emphasis placed on model properties, estimators, test statistics, and applications in finance.

Real Estate and Development

- **M.S. in Real Estate (MSRE)**
- **MBA with a Concentration in Real Estate Finance and Development** *(see Business Administration section)*
- **MBA Plus with a Concentration in Real Estate Finance and Development** *(see Business Administration section)*
- **MSRE/JD Dual Degree** *(in conjunction with the Charlotte School of Law)*
- **Graduate Certificate in Real Estate and Development**

Graduate Program

realestate.uncc.edu

Graduate Program Director

Ms. Alyson Metcalfe

Graduate Faculty

Dr. Steve Billings, Associate Professor, Economics
Dr. William Graves, Associate Professor, Geography
Dr. Kiplan Womack, Assistant Professor, Finance

MASTER OF SCIENCE IN REAL ESTATE

The Master of Science degree in Real Estate (MSRE) is designed to provide students with the skills necessary to analyze, evaluate and execute complex real estate investment and development transactions. The curriculum draws from academic disciplines such as architecture, engineering, finance, and geography to emphasize the multidisciplinary nature of the real estate industry and the diverse skill set required for success. Students graduating from the program will have the skills necessary to qualify for positions such as development associates, underwriters, brokers, asset and property managers, acquisition specialists, and financial analysts.

MSRE courses are scheduled to accommodate both full-time and part-time students. The program is structured to allow full-time students to complete the curriculum within one calendar year. Full-time students may enroll in up to thirteen (13) credit hours each semester and are expected to complete a capstone course and international study tour in the summer following the first academic year in the

program. Part-time students may enroll in four (4) to seven (7) credit hours each semester and are expected to complete the capstone course and international study tour in the summer following the completion of all other program requirements. All courses required to complete the curriculum are offered in the evening at UNC Charlotte's Center City Campus.

Additional Admission Requirements

In addition to the general requirements for admission to the Graduate School, the following are required for graduate study in Real Estate:

- 1) A general satisfactory undergraduate record from an accredited college or university and an undergraduate GPA of at least 3.0
- 2) A satisfactory score on the Graduate Management Admission Test (GMAT) or the Graduate Record Examination (GRE)
- 3) A satisfactory score on the Test of English as a Foreign Language (TOEFL) or the International English Language Testing System (IELTS) for applicants from non-English speaking countries
- 4) A full resume or a description of significant work experience

Degree Requirements

The MSRE degree requires the completion of a 32 graduate credit hours. Necessary preparatory work will be determined during the admissions process and courses to meet the specific need will be available in the MSRE program's prerequisite course requirements. All students in the program must meet the Graduate School's requirements for a Master's Degree.

Prerequisite Courses (6 credit hours)

Prerequisite courses may be taken after admission to the MSRE program. The courses must, however, be completed before enrolling in 6000-level courses except by permission of the MSRE Graduate Program Director.

MSRE 5110 Foundations in Economics (3)

MSRE 5131 Fundamentals of Financial Accounting & Financial Management (3)

Required Core Courses (32 credit hours)

MSRE 6101 Real Estate Seminar (1) (*must be taken twice for credit*)*

MSRE 6102 International Real Estate Study Tour (3)**

MSRE 6120 Real Estate Law and Land Use Policy (3)****

MSRE 6130 Site Planning, Building Design and Construction Fundamentals (3)

MSRE 6152 Financial Management (3)

MSRE 6158 Real Estate Finance and Investment (3)

MSRE 6159 Real Estate Development (3)

MSRE 6160 Real Estate Capital Markets (3)

MSRE 6220 Financial Analysis of Real Estate Investment (3)

MSRE 6230 Construction Management (3)***

MSRE 6238 Real Estate and Urban Economics (3)****

MSRE 6258 Site Feasibility Analysis (3)****

MSRE 6999 Real Estate Capstone (3)

**MSRE 6101 is a one credit hour course that students must take twice for credit before graduation. Students enrolled in the course will be required to participate in real estate trade organization meetings, engage in leadership and negotiation training, attend guest lecturers covering emerging trends in real estate and ethical business practices, and complete professional development seminars.*

***MSRE 6102 is a study abroad experience that requires students to travel to an emerging international real estate market and examine local real estate development practices over the course of one week.*

****MSRE 6230 is not part of the required courses in the curriculum but, when offered, may substitute for another course at the discretion of the Director of the M.S. in Real Estate Program.*

*****MSRE students may elect to take MSRE 6250 in lieu of MSRE 6120. Students may elect to take MSRE 6258 in lieu of MSRE 6238. All other courses included in the functional component of the curriculum must be completed by MSRE students unless otherwise stated.*

Assistantships

A limited number of assistantships are available each year. In order to be competitive, applications should be submitted by March 15. Additional information is available in the office of the Center for Real Estate and on the Graduate School website.

Advising

Advising is provided by the Graduate Program Director of the MSRE program.

Transfer Credit

Up to six hours of appropriate graduate credit may be accepted for transfer from another AACSB-accredited (or equivalent) graduate program. Only courses where grades of B or above have been earned will be considered. Approval of the Program Director and the Graduate School is also required. All other Graduate School policies regarding transfer credit apply.

Program Certifications/Accreditation

The MSRE Program and all degree and certificate programs offered by the Belk College of Business are

accredited by the Association to Advance Collegiate Schools of Business (AACSB-International).

MSRE/JD DUAL DEGREE

This dual degree program allows students to earn a Master of Science in Real Estate (MSRE) degree from the Belk College of Business at UNC Charlotte and a Juris Doctor (JD) degree from the Charlotte School of Law in eight semesters of study.

Prospective dual-degree program students must apply separately to both UNC Charlotte and the Charlotte School of Law. Full-time students spend the first full year of study at either UNC Charlotte or the Charlotte School of Law. They then spend their entire second or third year at the other institution. For the remainder of the program, students take classes at both UNC Charlotte and the Charlotte School of Law. Each school grants nine (9) units of credit for courses taken at the other school.

Visit realestate.uncc.edu and charlottelaw.edu for additional information.

GRADUATE CERTIFICATE IN REAL ESTATE AND DEVELOPMENT

The Graduate Certificate in Real Estate and Development requires completion of 15 credit hours (one core and four elective courses) of 6000-level courses in real estate finance and development. Transfer credits are not accepted into the Graduate Certificate in Real Estate Finance and Development program. Students must earn a grade of B or above in all five courses that make up the certificate program.

Certificate Requirements

This 15-credit certificate program consists of:

Core Requirement (3 credit hours)

MSRE 6152 Financial Management (3)

Elective Courses (12 credit hours)

Select four of the following:

MSRE 6158 Real Estate Finance and Investment (3)

MSRE 6159 Real Estate Development (3)

MSRE 6160 Real Estate Capital Markets (3)

MSRE 6258 Site Feasibility Analysis (3)

MSRE 6259 Applied Real Estate Development (3)

ECON 6250 Advanced Urban and Regional Economics (3)

Admissions Requirements

In addition to the general requirements for admission to the Graduate School, the following are required for graduate study in Real Estate and Development:

- 1) A generally satisfactory undergraduate record from an accredited college or university
- 2) Basic proficiency in using spreadsheet computer software
- 3) Completion of MBAD 5131 (Fundamentals of Financial Accounting and Financial Management) or its equivalent
- 4) A minimum of six years of business experience is strongly preferred

Note: MBA students concentrating in real estate finance and development are ineligible to enroll in the Graduate Certificate in Real Estate and Development program.

Applications are reviewed on a continuous basis. Participants may enroll for the first time in Fall, Spring, or Summer terms.

COURSES IN REAL ESTATE (MSRE)

MSRE 5110. Foundations of Economics. (3) Cross-listed as MBAD 5110. Focuses on topics related to the scope and methodology of economics as a social science, the analysis of markets, the development of market structure, the characteristics of market failure, problems of economic concentration, the theory of income distribution, the measurement of national income, the theory of national income determination, money and banking, monetary and fiscal policy, and international economics.

MSRE 5131. Fundamentals of Financial Accounting and Financial Management. (3) Cross-listed as MBAD 5131. Accelerated and in-depth study of conceptual foundations and applications of financial accounting and financial management with emphasis placed on building accounting and finance information bases for external decision making.

MSRE 6101. Real Estate Seminar. (1) Designed to provide students with exposure to emerging trends in the real estate industry. Students are required to participate in real estate trade organization meetings, engage in leadership and negotiation training, attend guest lecturers covering real estate trends and ethical business practices, and complete professional development seminars. *May be repeated for credit with change of topic.*

MSRE 6102. International Real Estate Study Tour. (3) Students travel to an international city to study real estate development. Opportunities and challenges in

the regional real estate market will be explored through the completion of a series of study tours, presentations, reading assignments and short essays. Emphasis will be placed on issues such as urban planning, sustainable growth, economic development and global market integration.

MSRE 6120. Real Estate Law and Land Use Policy. (3)

Prerequisites: MSRE 5110 and MSRE 5131. Provides an overview of common legal issues involved in the acquisition, development, financing, ownership and operation of real estate assets. Emphasis is placed on legal forms of ownership, real estate sale and lease transactions, and government regulation and taxation of land.

MSRE 6130. Site Planning, Building Design, and Construction Fundamentals. (3)

Introduces essential principles of site planning, design and construction. Special emphasis is placed on programming and sustainability issues for different project types. The nature and characteristics of construction materials, equipment, and systems used in modern buildings will be presented and how they affect function and feasibility.

MSRE 6152. Financial Management. (3) Cross-listed as MBAD 6152 and FINN 6152. Prerequisites: MSRE 5110 and MSRE 5131. Theory and practice of corporate finance including asset management, cost of capital and capital budgeting, optimization programs and socio-economic aspects of financial management. Computer technology may be employed when applicable.

MSRE 6158. Real Estate Finance and Investment. (3)

Cross-listed as MBAD 6158. Prerequisite: MSRE 5110 and MSRE 5131. Focuses on the techniques used to analyze, finance and structure real estate transactions. Topics include: an overview of the real estate space and capital markets; the techniques of financial analysis and valuation; project ownership structures, taxation and financial structure; real estate in an investment portfolio; and determining the financial feasibility of real estate development.

MSRE 6159. Real Estate Development. (3) Cross-listed as GEOG 6103 and MBAD 6159. Prerequisites: MSRE 5110 and MSRE 5131. An introduction to the real estate development process. Identification and evaluation of the critical assumptions and issues related to market and site feasibility, financial feasibility, planning, acquisition, and operation of economically viable commercial real estate projects. Students work in groups on a semester project to select a site and prepare an appropriate development plan that emphasizes the market and financial feasibility of the real estate development.

MSRE 6160. Real Estate Capital Markets. (3) Cross-listed as MBAD 6160. Prerequisite: MSRE 6152. The techniques used to analyze, finance and structure real estate transactions, and emphasizes the role of the capital markets in facilitating development and investment in commercial real estate. Topics include: real estate in an investment portfolio; valuation and investment analysis for direct (private) real estate equity investment including coverage of valuation using real option methodology; primary and secondary commercial mortgage markets (CMBS); and, analysis of publicly traded equity real estate investment trusts (REITs).

MSRE 6220. Financial Analysis of Real Estate Investments. (3)

Prerequisite: MSRE 6158, MSRE 6159, or permission of instructor. Provides students with the analytical and computer skills necessary to evaluate the financial feasibility of real estate investment opportunities, including acquisition and development opportunities for land, commercial, industrial, or multi-family deals. Accounting and taxation issues influencing the financial viability of real estate investment opportunities are also considered.

MSRE 6230. Construction Management. (3)

Addresses the various roles and responsibilities of the contractor and construction manager in the development process including discussion of the owner/designer/constructor relationship. Emphasis is placed on sustainable design and other public policy objectives advanced by specific types of development, as well as the role the public sector may play in the success of real estate projects.

MSRE 6238. Real Estate and Urban Economics. (3)

Prerequisite: ECON 2102. Cross-listed as ECON 6238 and MBAD 6238. Focuses on the fundamental economic forces that create urban areas, with a special emphasis on land markets. Integrates economic theory to better understand the market forces that impact applied real estate development projects. Topics include: urban growth and development; land valuation; the modelling and estimation of agglomeration economies; the costs of cities and their internal structure with emphasis on land use regulations and transportation; amenities and the local supply of labor; the sizes and functions of cities; affordable housing; and local public finance.

MSRE 6250. Advanced Urban and Regional Economics. (3)

Cross-listed as ECON 6250. Prerequisites: MSRE 5110 and MSRE 5131. Applications of microeconomic theory to problems of cities, metropolitan areas and regions, methods in regional analysis, location theory, land-use planning, measurement of economic activity; transportation, housing, poverty and growth issues.

MSRE 6258. Site Feasibility Analysis. (3) Cross-listed as GEOG 6305 and MBAD 6258. Prerequisites: MSRE 5110 and MSRE 5131. Examination of factors affecting the feasibility of land parcels for commercial and residential development with emphasis on the physical evaluation of a given site, the market support for its intended use, and the financial support for the proposed development.

MSRE 6259. Applied Real Estate Development. (3) Cross-listed as GEOG 6105 and MBAD 6259. Prerequisite: MSRE 6159, MBAD 6159, or GEOG 6103. The application of the processes involved in real estate development. Students work in groups on a semester project to select a site and prepare an appropriate development plan that emphasizes the market and financial feasibility of the real estate development.

MSRE 6999. Real Estate Capstone. (3) Prerequisites: All prerequisite and required core courses of the MSRE curriculum. Designed to bring together the topics covered in the MSRE program and examine how they relate to each other. Students complete applied group projects, as well as conduct independent research, to explore issues of interest to the real estate industry. All of these projects encourage students to develop their leadership and negotiation skills, as well as consider ethical issues commonly faced by real estate professionals.



College of Computing and Informatics

cci.uncc.edu

Dean: *Dr. Yi Deng*

Associate Deans: *Dr. Manuel A. Pérez Quiñones, Dr. William Tolone*

The College of Computing and Informatics at the University of North Carolina at Charlotte aspires to be a national leader in advancing the role of computing and informatics as a catalyst for the 21st Century economy. The mission of the College is: to be a preeminent enabler and provider of talent and intellectual capital to major industries in the region and state; to lead the drive to develop “T”-shaped talent to advance the crosscutting role of technology in the economy and across society; and, to lead impact-driven innovation in computing and informatics education and research. As the only school of its kind in the Carolinas, students are prepared to shape the future of computing by participating in educational and research programs that respond directly to the needs of government and business. At the core its research and educational programs is the development of “T”-shaped talent, which is the combination of strong technical knowledge with broad domain understanding and workforce skills. The world has become a computing and informatics-based society. All industries require some level of computing and informatics talent. Many industries are fast becoming a computing and informatics industry. As such, demand for computing and informatics talent and innovation will continue to grow. The UNC Charlotte College of Computing and Informatics advances the field with its combination of the latest science, industry expertise, and dedicated faculty and students. The College is designated as a National Center of Academic Excellence in Information Assurance Education by the National Security Agency and the U.S. Department of

Homeland Security. Hard at work on a full spectrum of research topics, the College of Computing and Informatics has broken new ground in bioinformatics, computer science, computer security, data and visual analytics, data science, health informatics, human-centered computing, information technology, robotics, and visualization applications.

Areas of interest to College of Computing and Informatics researchers include: 3D HCI, Access Control, Authentication and Identification, Bioinformatics, Biomedical Imaging and Instrumentation, Biomedical Signal Processing, Case-Based Reasoning, Communication Networks, Complex Adaptive Systems, Computational Biophysics, Computational Mass Spectrometry, Computer and Parallel Architecture, Computer Assisted Collaborative Work, Computer Graphics, Computer Integrated Manufacturing, Computer System Engineering, Computer Vision, Context-Aware Software Design, Cryptography and Applications, Data Mining, Enterprise Security, Enterprising Integration, Evolutionary Computation, Flexible Query Processing, Foundations of Security, Future Proof Security Systems, Genome Annotation, Genome Wide Association Analysis, Haptics, Heuristic Search, High Throughput Data Analysis, Human Computer Interaction, Image/Video Processing, Information Environments, Information Security and Assurance, Information System Personalization, Insider Threat Prevention and Detection, Intelligent Systems, Intrusion Prevention and Detection, Knowledge Based Systems, Knowledge Discovery, Metagenomics,

Modeling and Simulation of Information Infrastructure, Modeling for Computer Security, Multi-Agent Systems, Multimedia Databases, Network and Distributed Systems Security, Neural Systems, Neural Networks, Ontological Engineering, Pervasive Security, Privacy Preserving Technology, Provably Secure Systems, Robotics, Scientific and Information Visualization, Secure Electronic Commerce, Secure Information Systems, Secure Peer-to-Peer Computing, Secure Software Engineering, Security Protocols, Semantically Rich Information Systems, Signcryption, Soft Computing, Software Design Patterns and Architectures, Software Design Verification and Validation, Software Process Improvement, Software Requirements Engineering, Software Testing, Structural Bioinformatics, Survivable Security Systems, Systems Biology, Virtual Reality, Vision, Web Security, Wireless Networks, and Wireless Security.

Graduate Degree Programs

- Ph.D. in Bioinformatics and Computational Biology
- Ph.D. in Computing and Information Systems
- Professional Science Master's in Bioinformatics
- Professional Science Master's in Data Science and Business Analytics (*see the "College of Business" section of this Catalog*)
- Professional Science Master's in Health Informatics
- Master of Science in Computer Science
- Master of Science in Information Technology
- Master of Architecture and Master of Science in Computer Science or Information Technology Dual Degree

Graduate Non-Degree Programs

- Certificate in Advanced Databases and Knowledge Discovery
- Certificate in Bioinformatics Applications
- Certificate in Bioinformatics Technology
- Certificate in Data Science and Business Analytics (*see the "College of Business" section of this Catalog*)
- Certificate in Game Design and Development
- Certificate in Health Informatics
- Certificate in Information Security and Privacy
- Certificate in Information Technology Management
- Certificate in Network Security
- Certificate in Secure Software Development

Bioinformatics and Genomics

- **Ph.D. in Bioinformatics and Computational Biology**
- **M.S. in Bioinformatics**
- **Graduate Certificate in Bioinformatics Applications**
- **Graduate Certificate in Bioinformatics Technology**

Department of Bioinformatics and Genomics

bioinformatics.uncc.edu

Graduate Program Directors

Dr. Cynthia Gibas, Ph.D. Program
Dr. Jessica Schlueter, Professional Science Master's and Graduate Certificate Programs

Graduate Faculty

Dr. Cory Brouwer, Director, Bioinformatics Services Division, and Associate Professor
Dr. Xiuxia Du, Associate Professor
Dr. Anthony Fodor, Associate Professor
Dr. Cynthia Gibas, Professor
Dr. Jun-Tao Guo, Associate Professor
Dr. Daniel Janies, Carol Grottnes Belk Distinguished Professor of Bioinformatics and Genomics
Dr. Ann Loraine, Associate Professor
Dr. Weijun Luo, Research Assistant Professor
Dr. Lawrence Mays, Professor and Department Chair
Dr. Jessica Schlueter, Associate Professor
Dr. Susan Sell, Professor
Dr. Wei Sha, Research Assistant Professor
Dr. Mindy Shi, Assistant Professor
Dr. ZhengChang Su, Associate Professor
Dr. Way Sung, Assistant Professor
Dr. Jennifer Weller, Associate Professor

Participating BCB Ph.D. Faculty

Dr. Brian Cooper, Associate Professor, Chemistry
Dr. Donald Jacobs, Professor, Physics and Optical Science
Dr. Jean-Luc Mougeot, Adjunct Professor, Biological Sciences
Dr. Irina Nesmelova, Associate Professor, Physics and Optical Science
Dr. James Oliver, Bonnie E. Cone Distinguished Professor of Teaching, Biological Sciences
Dr. Christine Richardson, Associate Professor, Biological Sciences

PH.D. IN BIOINFORMATICS AND COMPUTATIONAL BIOLOGY

The Ph.D. in Bioinformatics and Computational Biology (BCB) is granted for planning, execution, and defense of original research resulting in significant contributions to the discipline's body of knowledge. Moreover, the BCB Ph.D. program also requires didactic coursework to prepare the student for research success. Student progress is primarily assessed by: (a) satisfactory coursework performance, (b) the Qualifying Examination, (c) the Dissertation Proposal, and (d) the Dissertation Defense. Courses and the Qualifying Examination are used to ensure that the student has sufficient breadth of knowledge. The Dissertation Proposal is used to ensure that the scope of dissertation research is important, that the plan is well thought out and that the student has sufficient skills and thoughtfulness needed for success. The Dissertation Defense is used to assess the outcomes of the dissertation research, and whether or not the plan agreed upon by the Dissertation Committee has been appropriately followed.

Degree Requirements

The BCB program requires 72 credit hours in 8000-level BINF courses, or prior approved substitutions. All students must complete two Research Rotations in the first year of the program; each provides a semester of faculty supervised research experience to supplement regular course offerings. Students must complete the Core Courses prior to taking the Qualifying Exam. In consultation with their Academic Advisor and/or Program Director, students frequently also take an appropriate selection of the Gateway Courses in order to be prepared for the Core Courses. For example, an incoming student with a Computer Science background would be expected to take BINF 8100 and BINF 8101, but not BINF 8111. All students must complete the Core Courses prior to taking the Qualifying Examination. Each Ph.D. student must complete two Research Rotations in the first year. Each Research Rotation provides a semester of faculty supervised research experience to supplement regular course offerings. Graduate Research Seminar is taken every semester until the semester following advancement to candidacy. Finally, many additional Elective Courses are available, but are not explicitly required.

Gateway Courses

(as needed, based on student's background)

BINF 8100 Biological Basis of Bioinformatics (3)

BINF 8101 Energy and Interaction in Biological Modeling (3)

BINF 8111 Bioinformatics Programming I (3)

BINF 8111L Bioinformatics Programming I Lab (0)

Core Courses

BINF 8112 Bioinformatics Programming II (3)

BINF 8112L Bioinformatics Programming II Lab (0)

BINF 8200 Statistics for Bioinformatics (3)

BINF 8200L Statistics for Bioinformatics Lab (0)

BINF 8201 Molecular Sequence Analysis (3)

BINF 8201L Molecular Sequence Analysis Lab (0)

BINF 8202 Computational Structural Biology (3)

BINF 8202L Computational Structural Biology Lab (0)

Research Rotations

BINF 8911 Research Rotation I (2)

BINF 8912 Research Rotation II (2)

Graduate Research Seminar

BINF 8600 Bioinformatics Seminar (1) *(Must be taken every semester until the semester following advancement to candidacy)*

Research Hours

BINF 8991 Doctoral Dissertation Research (1-9)
(Must take a minimum of 18 hours)

Responsible Conduct of Research

Select one of the following

GRAD 8002 Responsible Conduct of Research (2)

BINF 8151 Professional Communications (1)

Electives

Any graduate level BINF prefix course may be taken as a pre-approved elective. Other courses may be taken with department approval.

Qualifying Examination

Prior to defining a research topic, students are required to pass a Qualifying Examination to demonstrate proficiency in bioinformatics and computational biology, as well as competence in fundamentals common to the field. The Qualifying Examination must be passed prior to the fifth semester of residence. It is composed of both written and oral components that emphasize material covered in the Core Courses listed above.

Dissertation Proposal

Each student must present and defend a Ph.D. Dissertation Research Proposal within two semesters of passing the Qualifying Examination. The Dissertation Proposal defense will be conducted by the student's Dissertation Committee, and will be open to faculty and students. The proposal must address a significant, original and substantive piece of research. The proposal must include sufficient preliminary data and a timeline such that the Dissertation Committee can assess its feasibility.

Dissertation

Each student must complete a well-designed original research contribution, as agreed upon by the student and Dissertation Committee at the Dissertation Proposal. The Ph.D. Dissertation is a written document describing the research and its results, and their context in the sub-discipline. The Dissertation Defense is a public presentation of the findings of the research, with any novel methods that may have been developed to support the conclusions. The student must present the Dissertation and defend its findings publicly, and in a private session with the Dissertation Committee immediately thereafter.

MASTER OF SCIENCE IN BIOINFORMATICS

A unique master's degree merging the biological sciences and computer technology, the Professional Science Master's (PSM) program leading to the M.S. in Bioinformatics is an interdisciplinary program at the intersection of the disciplines of Biology, Chemistry, Mathematics and Statistics, Computing and Informatics, and Engineering. It is expected that students entering the program will have completed an undergraduate major in either a life science or a quantitative discipline. The degree requires additional training and demonstrated competence in both life sciences and scientific programming. The PSM program is structured to provide students with the skills and knowledge to develop, evaluate, and deploy bioinformatics and computational biology applications. The program is designed to prepare students for employment in the biotechnology sector, where the need for knowledgeable life scientists with quantitative and computational skills has exploded in the past decade.

Additional Admission Requirements

In addition to the general requirements for admission to the Graduate School, the following are required for study toward the M.S. in Bioinformatics:

Under most circumstances, students admitted to the program will have:

- 1) A baccalaureate degree from an accredited college or university in Biology, Biochemistry, Chemistry, Physics, Mathematics, Statistics, Computer Science, or another related field that provides a sound background in life sciences, computing, or both
- 2) A minimum undergraduate GPA of 3.0 (4.0 scale) and 3.0 in the major
- 3) A minimum combined score of 300 on the verbal and quantitative portions of the GRE, and an acceptable score on the analytical section (*this requirement is waived for Early Entry program*

applicants who meet the University's overall GPA requirement (3.2 and 75-90 hours of completed undergraduate coursework) in Biology, Chemistry, Physics, Math, SIS or CS, or another UNC Charlotte major if the department determines the student's preparation is appropriate)

- 4) A combined TOEFL score of 220 (computer-based), 557 (paper-based), or 83 (Internet-based) is required if the previous degree was from a country where English is not the common language
- 5) Three positive letters of recommendation

Degree Requirements

The M.S. in Bioinformatics degree requires a minimum of 34 graduate credit hours, and a minimum of 30 credit hours of formal coursework. A minimum of 24 credit hours presented toward an M.S. in Bioinformatics must be from courses numbered 6000 or higher. A maximum of 6 hours of graduate credit may be transferred from other institutions.

The PSM program requires 34 post-baccalaureate credit hours. Because of the interdisciplinary nature of this program, which is designed to provide students with a common graduate experience during their professional preparation for the M.S. in Bioinformatics degree, all students will be required to take a general curriculum that includes a two-year sequence of courses as described below:

Core Requirements

Core Bioinformatics Courses

All students must take the following Core Courses. Students who have previously taken a course with a syllabus that closely follows one of the Core Courses may test out of the core requirement by passing a written exam, and may then substitute an advanced elective for the required Core Course.

BINF 6101 Energy and Interaction in Biological Modeling (3)

BINF 6112 Bioinformatics Programming II (3)

BINF 6112L Bioinformatics Programming II Lab (0)

BINF 6200 Statistics for Bioinformatics (3)

BINF 6200L Statistics for Bioinformatics Lab (0)

BINF 6201 Molecular Sequence Analysis (3)

BINF 6201L Molecular Sequence Analysis Lab (0)

BINF 6211 Design and Implementation of Bioinformatics Databases (3)

BINF 6211L Design and Implementation of Bioinformatics Databases (0)

Plus one of the following courses and its corresponding lab:

BINF 6202 Computational Structural Biology (3) and

BINF 6202L Computational Structural Biology Lab (0)

BINF 6203 Genomics (3) and

BINF 6203L Genomics Lab (0)

Gateway Courses

The department offers two intensive graduate-level courses designed to provide accelerated training in a second discipline that complements the student's undergraduate training. Students entering the program without preparatory coursework in computing or biology may need to take the Gateway course that is appropriate for their background. These courses are not required core courses for all students, but are designed to satisfy core course prerequisites for students who have not encountered the material presented in a previous course. For students entering from computing backgrounds, BINF 6100 should be chosen, while students entering from biological science backgrounds should choose BINF 6111 and BINF 6111L.

BINF 6100 Biological Basis of Bioinformatics (3)

-OR-

BINF 6111 Bioinformatics Programming I (3) and

BINF 6111L Bioinformatics Programming I Lab (0)

Professional Preparation Requirement

Students are required to take at least 6 credit hours of elective courses designed to prepare them to function effectively and ethically in a professional environment.

BINF 5171 Business of Biotechnology (3)

BINF 5191 Life Sciences and the Law (3)

GRAD 6002 Responsible Conduct of Research (2)

GRAD 6020 Transferable Skills for Career Success (2)

GRAD 6030 Workplace Communications (2)

ITIS 6362 Information Technology Ethics, Policy, and Security (3)

PHIL 6050 Topics in Philosophy (1-3)

Note: Additional elective choices that may fulfill this requirement can be identified by the student and the PSM Executive Committee.

Elective Courses

The remaining 6 credit hours of required coursework can be satisfied by elective courses. The PSM Graduate Coordinator, in conjunction with the Executive Committee, reviews the student's plan of study each semester.

Bioinformatics Elective Courses

Any courses with BINF numbers, with the exception of Gateway courses are open to PSM students seeking to complete their coursework requirements.

Recommended Elective Courses Offered By Other Departments

A wide range of graduate courses in Biology, Chemistry, Computer Science, Health Informatics, Software and Information Systems, and other programs may be appropriate electives for PSM in Bioinformatics students. As course offerings change frequently, the Bioinformatics Program maintains a list of current recommended electives online at bioinformatics.uncc.edu.

Elective Clusters

Students are encouraged to choose their electives with a topical focus that reflects their scientific and career interests. Courses from one of the following recommended clusters of advanced electives can be selected, or the student can design his or her own elective focus with the approval of the PSM Executive Committee.

Genomic Biology Cluster

BINF 6205 Computational Molecular Evolution (3)

BINF 6310 Advanced Statistics for Genomics (3)

BINF 6310L Advanced Statistics for Genomics Lab (0)

BINF 6318 Computational Proteomics and Metabolomics (3)

BINF 6350 Biotechnology and Genomics Lab (3)

BINF 6350L Biotechnology and Genomics Hands-On Lab (0)

Modeling and Simulation Cluster

BINF 6202 Computational Structural Biology (3)

BINF 6202L Computational Structural Biology Lab (0)

BINF 6204 Mathematical Systems Biology (3)

BINF 6210 Machine Learning for Bioinformatics (3)

BINF 6311 Biophysical Modeling (3)

Computing and Technology Cluster

BINF 6210 Machine Learning for Bioinformatics (3)

BINF 6310 Advanced Statistics for Genomics (3)

BINF 6310L Advanced Statistics for Genomics Lab (0)

BINF 6380 Advanced Bioinformatics Programming (3)

BINF 6380L Advanced Bioinformatics Programming Lab (0)

BINF 6382 Accelerated Bioinformatics Programming (3)

BINF 6382L Accelerated Bioinformatics Programming Lab (0)

Other Requirements

Bioinformatics Seminar and Internship

In addition to 30 credit hours of formal coursework, students are required to enroll in the Bioinformatics Program seminar (BINF 6600) for at least one semester (1 credit hour) and to enroll in either Principles of Team Science (BINF 6399), internal or external internship (BINF 6400), or a faculty-supervised

original research project leading to a thesis (BINF 6900).

BINF 6600 Bioinformatics Seminar (1)

Plus one of the following:

BINF 6399 Principles of Team Science (3)

BINF 6400 Internship Project (1-3)

BINF 6900 Master's Thesis (1-3)

Grade Requirements

An accumulation of three C grades will result in suspension of the student's enrollment in the graduate program. If a student makes a grade of U in any course, enrollment in the program will be suspended.

Amount of Transfer Credit Accepted

A maximum of 6 credit hours of coursework from other institutions will count toward the M.S. in Bioinformatics degree requirements. Only courses with grades of A or B from accredited institutions are eligible for transfer credit.

GRADUATE CERTIFICATE IN BIOINFORMATICS APPLICATIONS

The Graduate Certificate in Bioinformatics Applications trains students in the application of established bioinformatics methods for analysis of biological sequence, structure, and genomic data. The certificate requires twelve (12) credit hours of coursework. The certificate may be pursued concurrently with a related graduate degree program at UNC Charlotte or as a standalone program.

Admission Requirements

For admission into the certificate program, applicants must meet the following requirements:

- 1) A bachelor's degree in a life science discipline, that includes advanced coursework in molecular biology and genetics.
- 2) Practical experience and confidence with computers, for instance use of common web browsers, word processing, plotting, and spreadsheet applications.

Program Requirements

Students will take four courses that introduce core methods for analysis of molecular biological data:

BINF 6200 Statistics for Bioinformatics (3)

BINF 6200L Statistics for Bioinformatics Lab (0)

BINF 6203 Genomics (3)

BINF 6203L Genomics Lab (0)

And two of the following courses with accompanying lab:

BINF 6201 Molecular Sequence Analysis (3) and
BINF 6201L Molecular Sequence Analysis Lab (0)

BINF 6211 Design and Implementation of
Bioinformatics Databases (3) and
BINF 6211L Design and Implementation of
Bioinformatics Databases Lab (0)

BINF 6215 Bioinformatics Pipeline Programming (3)

BINF 6350 Biotechnology and Genomics Laboratory
(3) and BINF 6350L Biotechnology and Genomics
Hands-On Lab (0)

If a student wishes to enter the program having completed coursework that is equivalent to one or more of the core requirements, the requirements may be waived at the discretion of the certificate coordinator. In this case, the required 12 credit hours may be selected from other advanced graduate courses offered by the Department of Bioinformatics and Genomics.

Transfer credit may not be applied toward this certificate.

It is suggested that students in the Graduate Certificate Program arrange formal co-mentorship by a Department of Bioinformatics and Genomics faculty member, if the student is concurrently enrolled in another thesis-based degree program on campus and intends to extend or enable their thesis research through the application of bioinformatics methods.

GRADUATE CERTIFICATE IN BIOINFORMATICS TECHNOLOGY

The Graduate Certificate in Bioinformatics Technology trains students in method development for analysis of large-scale biological data and modeling of complex biological systems, with a focus on acquiring complementary skill sets in life sciences and in programming, statistical analysis, and database development. The certificate requires fifteen (15) credit hours of coursework. The certificate may be pursued concurrently with a related graduate degree program at UNC Charlotte.

Admission Requirements

For admission into the certificate program, applicants must meet the following requirements:

- 1) A bachelor's degree in related field, including, but not limited to, a life science, physical science, mathematics, or computing discipline.
- 2) Practical experience and confidence with computers, for instance use of common web

browsers, word processing, plotting, and spreadsheet applications.

Program Requirements

Students will follow one of two pathways through the program, depending on their bachelor's degree field and previous experience. The following courses make up the required core:

If the bachelor's degree is in life sciences:

BINF 6111 Bioinformatics Programming I (3)
 BINF 6111L Bioinformatics Programming I Lab (0)
 BINF 6112 Bioinformatics Programming II (3)
 BINF 6112L Bioinformatics Programming II Lab (0)
 BINF 6200 Statistics for Bioinformatics (3)
 BINF 6200L Statistics for Bioinformatics Lab (0)
 BINF 6203 Genomics (3)
 BINF 6203L Genomics Lab (0)

If the bachelor's degree is in computing or mathematics:

BINF 6100 Biological Basis of Bioinformatics (3)
 BINF 6112 Bioinformatics Programming II (3)
 BINF 6112L Bioinformatics Programming II Lab (0)
 BINF 6200 Statistics for Bioinformatics (3)
 BINF 6200L Statistics for Bioinformatics Lab (0)
 BINF 6203 Genomics (3)
 BINF 6203L Genomics Lab (0)

And one of the following courses with accompanying lab:

BINF 6201 Molecular Sequence Analysis (3) and
 BINF 6201L Molecular Sequence Analysis (0)
 BINF 6211 Design and Implementation of
 Bioinformatics Databases (3) and
 BINF 6211L Design and Implementation of
 Bioinformatics Databases Lab (0)

If a student wishes to enter the program having completed coursework that is equivalent to the core course requirements, the core requirements may be waived at the discretion of the certificate coordinator. In this case, the required 15 coursework hours may be selected from the electives listed above, or from other advanced graduate courses offered by the Department of Bioinformatics and Genomics.

Transfer credit may not be applied toward this certificate.

It is suggested that students in the Graduate Certificate Program arrange formal co-mentorship by a Department of Bioinformatics and Genomics faculty member, if the student is concurrently enrolled in another thesis-based degree program on campus and intends to extend or enable their thesis research through the application of bioinformatic methods.

COURSES IN BIOINFORMATICS (BINF)

BINF 5171. Business of Biotechnology. (3)

Prerequisite: Admission to a graduate program. Introduces students to the field of biotechnology and how biotech businesses are created and managed. Students should be able to define biotechnology and understand the difference between a biotech company and a pharmaceutical company. Additional concepts covered will include platform technology, biotechnology's history, biotechnology products and development processes, current technologies used by biotech companies today, biotechnology business fundamentals, research and development within biotech companies, exit strategies, and careers in the biotech field.

BINF 5191. Life Sciences and the Law. (3)

Prerequisite: Admission to a graduate program. Law and regulations permeate our daily lives, and nowhere is this truer than in areas of life sciences. This course explores what the law is, how our current laws developed, and factors currently affecting the evolution of the law. It provides a general overview of U.S. law, including constitutional law, criminal law, contract law, tort law, property law (especially intellectual property law), business law (especially legal aspects of forming a new company), and administrative law. It then focuses on specific aspects of the law affecting the life sciences, such as ownership of tissues and organisms, regulation of drugs and medical devices, regulation of research in the life sciences, the history and regulation of medicine, the economics and various types of health care delivery, and food production.

BINF 6010. Topics in Bioinformatics. (3)

Prerequisite: permission of the department. Topics in bioinformatics and genomics selected to supplement the regular course offerings. A student may register for multiple sections of the course with different topics in the same semester or in different semesters.

BINF 6100. Biological Basis of Bioinformatics. (3)

Prerequisites: Admission to graduate standing in Bioinformatics and undergraduate training in Computer Science or other non-biological discipline. This course provides a foundation in molecular genetics and cell biology focusing on foundation topics for graduate training in bioinformatics and genomics.

BINF 6101. Energy and Interaction in Biological Modeling. (3)

Prerequisite: Admission to graduate standing in Bioinformatics. This course covers: (a) the major organic and inorganic chemical features of biological macromolecules; (b) the physical forces

that shape biological molecules, assemblies and cells; (c) the chemical driving forces that govern living systems; (d) the molecular roles of biological macromolecules and common metabolites; (e) and the pathways of energy generation and storage. Each section of the course builds upon the relevant principles in biology and chemistry to explain the most common mathematical and physical abstractions used in modeling in the relevant context.

BINF 6111. Bioinformatics Programming I. (3)

Prerequisite: Admission to graduate standing in Bioinformatics or permission of instructor.

Corequisite: BINF 6111L. Introduces fundamentals of programming for bioinformatics using a high-level object-oriented language such as Java or Python. Introduces object-oriented programming, analysis of algorithms, and fundamental sequence alignment methods. Students learn productive use of the Unix environment, focusing on Unix utilities that are particularly useful in bioinformatics. Course grade includes performance in BINF 6111L.

BINF 6111L. Bioinformatics Programming I

Laboratory. (0) Corequisite: BINF 6111. Hands-on experience in programming to solve bioinformatics problems.

BINF 6112. Bioinformatics Programming II. (3)

Prerequisite: BINF 6111 or permission of instructor.

Corequisite: BINF 6112L. Continuation of BINF 6111. In this second semester, students practice and refine skills learned in the first semester. New topics include: (a) programming as part of a team, using sequence analysis algorithms in realistic settings; (b) writing maintainable and re-usable code; and (c) graphical user interface development. Course grade includes performance in BINF 6111L.

BINF 6112L. Bioinformatics Programming II

Laboratory. (0) Corequisite: BINF 6112L or permission of instructor. Hands-on experience in programming to solve bioinformatics problems.

BINF 6151. Professional Communication. (1) Cross-listed as GRAD 6151. Principles and useful techniques for effective oral presentations, poster presentations, scientific writing, use of references and avoiding plagiarism. Students in the course critique and help revise each other's presentations and learn how to avoid common pitfalls. In addition, students learn how to properly organize and run a meeting.

BINF 6152. Program and Professional Orientation.

(1) Students learn to identify key Bioinformatics skill sets and where they are applied in research and industry settings, join appropriate professional networks, use the major professional and research journals in the field, identify key organizations and

companies driving intellectual and technology development in bioinformatics, and achieve beginner-level proficiency with key molecular data repositories.

BINF 6153. Career Development in Bioinformatics.

(1) Students prepare intensively for the job search, from developing a resume, to identifying appropriate opportunities, to preparing for the interview. Students are expected to complete a final interview practicum with faculty and members of the PSM Executive Board.

BINF 6200. Statistics for Bioinformatics. (3)

Prerequisite: Permission of department. Corequisite: BINF 6200L. Introduces students to statistical methods commonly used in bioinformatics. Basic concepts from probability, stochastic processes, information theory, and other statistical methods are introduced and illustrated by examples from molecular biology, genomics and population genetics with an outline of algorithms and software. R is introduced as the programming language for homework. Course grade includes performance in BINF 6200L.

BINF 6200L. Statistics for Bioinformatics Laboratory.

(0) Corequisite: BINF 6200. Introduces R and its application in solving common statistical problems in bioinformatics. Basic relevant concepts from probability, probability distributions, and statistical inference are introduced and illustrated by examples from bioinformatics applications using R.

BINF 6201. Molecular Sequence Analysis. (3)

Prerequisite: BINF 6100 or equivalent. Corequisite: BINF 6201L. Introduction of the basic computational methods and open sources software commonly used in molecular sequence analysis. Topics include: biological sequence data formats and major public databases, concepts of computer algorithms and complexity, introductions to principle components analysis and data clustering methods, dynamics of genes in populations, evolutionary models of DNA and protein sequences, derivation of amino acid substitution matrices, algorithms for pairwise sequence alignments and multiple sequence alignments, algorithms for fast sequence database search, methods for molecular phylogenetic analysis, hidden Markov models and neural networks for sequence pattern and family recognition, and introductions to genome evolution and omics data analysis. Course grade includes performance in BINF 6201L.

BINF 6201L. Molecular Sequence Analysis

Laboratory. (0) Prerequisite: BINF 6100 or equivalent. Corequisite: BINF 6201. Hands-on experience with common software methods for biological sequence data analysis. Topics include:

Basic UNIX utilities, principle component analysis, clustering analysis, global and local pair-wise sequence alignments, multiple sequence alignments, sequence database search methods, phylogenetic tree constructions, hidden Markov models, and neural networks.

BINF 6202. Computational Structural Biology. (3)

Prerequisites: BINF 6101 and BINF 6201 or their equivalents. Corequisite: BINF 6202L. Topics include: (a) the fundamental concepts of structural biology (chemical building blocks, structure, superstructure, folding, etc.); (b) structural databases and software for structure visualization; (c) Structure determination and quality assessment; (d) protein structure comparison and the hierarchical nature of biomacromolecular structure classification; (e) protein structure prediction and assessment; and (f) sequence- and structure-based functional site prediction. Course grade includes performance in BINF 6202L.

BINF 6202L. Computational Structural Biology Laboratory. (0) Corequisite: BINF 6202. The use and application of: (a) structural classification databases; (b) software for visualization of biological structures; (c) computational methods to evaluate and compare biological structures; (d) computational methods to align biological structures; and (f) computational methods to predict biological structures from sequence.

BINF 6203. Genomics. (3) Prerequisite: BINF 6100 or equivalent. Corequisite: BINF 6203L. Surveys the application of high-throughput molecular biology and analytical biochemistry methods and data interpretation for those kinds of high volume biological data most commonly encountered by bioinformaticians. The relationship between significant biological questions, modern genomics technology methods, and the bioinformatics solutions that enable interpretation of complex data is emphasized. Topics include: genome sequencing and assembly, annotation, and comparison; genome evolution and individual variation; function prediction; gene ontologies; transcription assay design, data acquisition, and data analysis; and metabolic pathways and databases and their role in genome analysis. Course grade includes performance in BINF 6203L.

BINF 6203L. Genomics Laboratory. (0) Prerequisite: BINF 6100 or equivalent. Corequisite: BINF 6203. Hands-on experience with software methods for genome-scale data analysis. Topics include: Genome sequencing and assembly, genome annotation, genome comparison. Functional classification and gene ontologies. Genome evolution and individual variation. Transcriptomic and epigenetic assay design, data acquisition, and data analysis.

BINF 6204. Mathematical Systems Biology. (3)

Prerequisites: BINF 6200 and BINF 6210 or equivalents. Introduces basic concepts, principles and common methods used in systems biology. Emphasizes molecular networks, models and applications, and covers the following topics: (a) the structure of molecular networks; (b) network motifs, their system properties and the roles they play in biological processes; complexity and robustness of molecular networks; (c) hierarchy and modularity of molecular interaction networks; kinetic proofreading; (d) optimal gene circuit design; and (e) the rules for gene regulation.

BINF 6205. Computational Molecular Evolution. (3)

Prerequisites: BINF 6201 and BINF 6200 or permission of the instructor. Covers major aspects of molecular evolution and phylogenetics with an emphasis on the modeling and computational aspects of the fields. Topics will include: models of nucleotide substitution, models of amino acid and codon substitution, phylogenetic reconstruction, maximum likelihood methods, Bayesian methods, comparison of phylogenetic methods and tests on trees, neutral and adaptive evolution and simulating molecular evolution. Students will obtain an in-depth knowledge of the various models of evolutionary processes, a conceptual understanding of the methods associated with phylogenetic reconstruction and testing of those methods and develop an ability to take a data-set and address fundamental questions with respect to genome evolution.

BINF 6210. Machine Learning for Bioinformatics. (3)

Prerequisites: BINF 6200, BINF 6200L, and Calculus. Introduction of commonly used machine learning methods in the field of bioinformatics. Topics include: dimension reduction using principal component analysis, singular value decomposition, and linear discriminant analysis, clustering using k-means, hierarchical, expectation maximization approaches, classification using k-nearest neighbor and support vector machines. To help understand these methods, basic concepts from linear algebra, optimization, and information theory are explained. Application of these machine learning methods to solving bioinformatics problems are illustrated using examples from the literature.

BINF 6211. Design and Implementation of Bioinformatics Databases. (3)

Prerequisite: Permission of instructor. Corequisite: BINF 6211L. The fundamentals of database modeling as used in bioinformatics. By the end of the course, students should be able to: understand different types of data models, know how hierarchical and relational models work and give examples that are widely used for biological databases, understand the capabilities of a

standard, open source RDBMS, understand the tasks required for data integration and how to use SQL as a research tool. Introduction to ML, XML Schema, and BioOntologies as widely used data exchange and organization tools in bioinformatics databases. Course grade includes performance in BINF 6211L.

BINF 6211L. Design and Implementation of Bioinformatics Databases Laboratory. (0)

Prerequisite: Permission of instructor. Corequisite: BINF 6211. Practice of skills described in the lecture, particularly design principles for the relational model and using SQL. Students complete projects in which they design, implement, prototype, and use a research biological database. Students obtain correctly formatted data from public repositories and use XML, XML Schema, and BioOntologies as tools in the data integration process. The use of SQL to create, populate, and perform complex queries on genomics databases.

BINF 6215. Bioinformatics Pipeline Programming. (3)

Prerequisite: BINF 6203. The concept of pipelines – assemblies of basic bioinformatics tools and data sources to solve complex data processing problems. The pipeline concept is introduced with simple UNIX command line methods, and then extended to the use of preconfigured commercial and extensible open-source workflow management systems. Reproducibility of analysis, collection of analytic provenance information, and database integration is also covered.

BINF 6310. Advanced Statistics for Genomics. (3)

Prerequisite: BINF 6200 or equivalent. Corequisite: BINF 6310L. Canonical linear statistics (t-test, ANOVA, PCA) and their non-parametric equivalents. Examines application of Bayesian statistics, Hidden Markov Models and machine learning algorithms to problems in bioinformatics. Students should have fluency in a high-level programming language (PERL, Java, C#, Python or equivalent) and are expected, in assignments, to manipulate and analyze large public data sets. Utilizes the R statistical package with the bioconductor extension. Course grade includes performance in BINF 6310L.

BINF 6310L. Advanced Statistics for Genomics Laboratory. (0)

Prerequisite: BINF 6200 or equivalent. Corequisite: BINF 6310. Hands-on experience with using the R programming language.

BINF 6311. Biophysical Modeling. (3) Topics include: (a) overview of mechanical force fields; (b) energy minimization; (c) dynamics simulations (molecular and coarse-grained); (d) Monte-Carlo methods; (e) systematic conformational analysis (grid searches); (f) classical representations of electrostatics (Poisson-Boltzmann, Generalized Born and

Colombic); (g) free energy decomposition schemes; and (h) hybrid quantum/classical (QM/MM) methods.

BINF 6312. Computational Comparative Genomics. (3)

Prerequisite: BINF 6201 or equivalent. Introduces computational methods for comparative genomics analysis. Topics include: (a) the architecture of prokaryotic and eukaryotic genomes; (b) the evolutionary concept in genomics; (c) databases and resources for comparative genomics; (d) principles and methods for sequence analysis; evolution of genomes; (e) comparative gene function annotation; (f) evolution of the central metabolic pathways and regulatory networks; (g) genomes and the protein universe; (h) cis-regulatory binding site prediction; (i) operon and regulon predictions in prokaryotes; and (j) regulatory network mapping and prediction.

BINF 6313. Structure, Function, and Modeling of Nucleic Acids. (3)

Prerequisites: BINF 6100 and BINF 6101, or their equivalents. Topics include: (a) atomic structure, macromolecular structure-forming tendencies and dynamics of nucleic acids; (b) identification of genes which code for functional nucleic acid molecules, cellular roles and metabolism of nucleic acids; (c) 2D and 3D abstractions of nucleic acid macromolecules and methods for structural modeling and prediction; (d) modeling of hybridization kinetics and equilibria; and (e) hybridization-based molecular biology protocols, detection methods and molecular genetic methods, and the role of modeling in designing these experiments and predicting their outcome.

BINF 6318. Computational Proteomics and Metabolomics. (3)

Prerequisite: BINF 6200 or equivalent. Introduces commonly used computational algorithms, software tools, and databases for analyzing mass spectrometry-based proteomics and metabolomics data. Students learn how to: 1) implement algorithms for processing raw mass spectrometry data and extracting qualitative and quantitative information about proteins and metabolites; 2) align multiple datasets; 3) perform differential analysis of proteomics and metabolomics datasets; and 4) use commonly used protein and metabolite databases. Introduction of chromatography, mass spectrometry, and isotopic patterns of proteins and metabolites to provide background information for students to understand the nature of mass spectrometry data.

BINF 6350. Biotechnology and Genomics Laboratory. (3)

Prerequisite: A background in molecular biology and biochemistry or permission of the instructor. Corequisite: BINF 6350L. Introduction of the molecular biological methods by which samples are converted to a state from which sequence information can be produced. When sequence data is

produced in a highly parallel fashion across a large fraction of a genome it is the basis of genomics. For historical reasons, the sample put on a sequencer is called a library, and the art of genomics lies in library construction. The experimental design and the technical details of library construction significantly affect the analyses that are appropriate and the conclusions that can be made. Lectures cover the design of experiments, how to critically read the literature to select an appropriate protocol for a variety of experimental purposes, and follow it to transform a sample into high quality sequence data. Quality control and library validation methods are explained. Topics include: selecting applications tuned to the experiment design to ensure proper data analysis and interpretation. Course grade includes performance in BINF 6350L.

BINF 6350L. Biotechnology and Genomics Hands on Laboratory. (0) Corequisite: BINF 6350. Hands-on experience producing sequencing templates and libraries. Introduction to the practical skills needed to carry out a series of experiments that result in sequence data. The unifying concept is to characterize allelic variants of selected genes from related organisms. Students purify nucleic acid and then produce a selected subset of each genome using PCR. Quality control via spectroscopy, gel electrophoresis and quantitative PCR are performed. Sequencing libraries are produced and run on the Ion Torrent PGM and the ABI 3130 Genetic Analyzer. The CLCbio Genomics Workbench software for assessing data quality and identifying polymorphisms will be utilized. Students expected to keep laboratory notebooks that allow all aspects of experiments to be reconstructed.

BINF 6380. Advanced Bioinformatics Programming. (3) Prerequisite: BINF 6112 or equivalent or permission of instructor. Corequisite: BINF 6380L. Advanced algorithms in bioinformatics with an emphasis placed on the implementation of bioinformatics algorithms in the context of parallel processing. Topics covered depend on instructor expertise and student interest, but may include assembly of short read fragments from next-generation sequencing platforms, clustering algorithms, machine learning, development of multi-threaded applications, developing for multi-core processors and utilization of large clusters and “cloud” supercomputers. Students are expected to complete a significant independent project. Course grade includes performance in BINF 6380L.

BINF 6380L. Advanced Bioinformatics Programming Laboratory. (0) Prerequisite: BINF 6112 or equivalent. Corequisite: BINF 6380. Hands-on experience with multi-threaded programming.

BINF 6382. Accelerated Bioinformatics

Programming. (3) Prerequisite: BINF 6112 or equivalent or permission of instructor. Corequisite: BINF 6382L. Computationally intensive algorithms in bioinformatics with an emphasis placed on the implementation of bioinformatics algorithms in the context of parallel processing using modern hardware processor accelerators such as GPUs and FPGAs. Topics covered depend on instructor expertise and student interest but may include multi-threaded applications and developing for multi-core processors and for large clusters and other “cloud” computers. Students are expected to complete a significant independent project. Course grade includes performance in BINF 6382L.

BINF 6382L. Accelerated Bioinformatics

Programming Laboratory. (0) Prerequisite: BINF 6112 or equivalent, or permission of instructor. Corequisite: BINF 6382. Hands-on experience with accelerated programming in bioinformatics.

BINF 6399. Principles of Team Science. (3)

Prerequisite: Permission of department. Introduction of appropriate project design, implementation, and management skills needed to function as a small team solving typical problems in Bioinformatics. Students are given realistic problems and are required to develop specifications, deliverables, timelines, and costs. Under faculty supervision, the group assigns roles, responsibilities, and deadlines in order to complete the project and then execute the project. At the end of the course, the group produces a written document with deliverables and makes a formal presentation of the project.

BINF 6400. Internship Project. (1-3) Prerequisite: Admission to graduate standing in Bioinformatics. Project is chosen and completed under the guidance of an industry partner, and results in an acceptable technical report.

BINF 6600. Bioinformatics Seminar. (1) Cross-listed as BINF 8600. Prerequisite: Admission to graduate standing in Bioinformatics. Weekly seminars are given by bioinformatics researchers from within the University and across the world.

BINF 6601. Bioinformatics Journal Club. (1)

Prerequisite: Admission to graduate standing in Bioinformatics. Each week, a student in the course is assigned to choose and present a paper from the primary bioinformatics literature.

BINF 6880. Independent Study. (1-3) Faculty supervised research experience to supplement regular course offerings.

BINF 6900. Master's Thesis. (1-3) Prerequisites: 12 graduate credit hours and permission of instructor. Project is chosen and completed under the guidance of a graduate faculty member, and will result in an acceptable master's thesis and oral defense.

BINF 8010. Topics in Bioinformatics. (3)

Prerequisite: Permission of department. Topics in bioinformatics and genomics selected to supplement the regular course offerings. A student may register for multiple sections of the course with different topics in the same semester or in different semesters.

BINF 8100. Biological Basis of Bioinformatics. (3)

Prerequisites: Admission to graduate standing in Bioinformatics and undergraduate training in Computer Science or other non-biological discipline. Provides a foundation in molecular genetics and cell biology focusing on foundation topics for graduate training in bioinformatics and genomics.

BINF 8101. Energy and Interaction in Biological Modeling. (3)

Prerequisites: Admission to graduate standing in Bioinformatics. Topics include: the major organic and inorganic chemical features of biological macromolecules; the physical forces that shape biological molecules, assemblies and cells; the chemical driving forces that govern living systems; the molecular roles of biological macromolecules and common metabolites; and the pathways of energy generation and storage. Each section of the course builds upon the relevant principles in biology and chemistry to explain the most common mathematical and physical abstractions used in modeling in the relevant context.

BINF 8111. Bioinformatics Programming I. (3)

Prerequisite: Admission to graduate standing in Bioinformatics or permission of instructor. Corequisite: BINF 8111L. Introduces fundamentals of programming for bioinformatics using a high-level object-oriented language such as Java or Python. Also introduces object-oriented programming, analysis of algorithms and fundamental sequence alignment methods. Students learn productive use of the Unix environment, focusing on Unix utilities that are particularly useful in bioinformatics. Course grade includes performance in BINF 8111L.

BINF 8111L. Bioinformatics Programming I Laboratory. (0)

Corequisite: BINF 8111. Hands-on experience in programming to solve bioinformatics problems.

BINF 8112. Bioinformatics Programming II. (3)

Prerequisite: BINF 8111 or permission of instructor. Corequisite: BINF 8112L. Continuation of BINF 8111. In this second semester, students practice and refine skills learned in the first semester. New topics

include: programming as part of a team, using sequence analysis algorithms in realistic settings; writing maintainable and re-usable code; and graphical user interface development. Course grade includes performance in BINF 8112L.

BINF 8112L. Bioinformatics Programming II Laboratory. (0)

Corequisite: BINF 8112L or permission of instructor. Hands-on experience in programming to solve bioinformatics problems.

BINF 8151. Professional Communications. (1)

Cross-listed as GRAD 6151 and GRAD 8151. Principles and useful techniques for effective oral presentations, poster presentations, scientific writing, use of references and avoiding plagiarism. Students critique and help revise each other's presentations and learn how to avoid common pitfalls. In addition, students learn how to properly organize and run a meeting. Students prepare a CV, job application letter, and job talk.

BINF 8200. Statistics for Bioinformatics. (3)

Prerequisite: Permission of department. Corequisite: BINF 8200L. Introduction of statistical methods commonly used in bioinformatics. Basic concepts from probability, stochastic processes, information theory, and other statistical methods are introduced and illustrated by examples from molecular biology, genomics and population genetics with an outline of algorithms and software. R is introduced as the programming language for homework. Course grade includes performance in BINF 8200L.

BINF 8200L. Statistics for Bioinformatics Laboratory. (0)

Corequisite: BINF 8200. Introduces R and its application in solving common statistical problems in bioinformatics. Basic relevant concepts from probability, probability distributions, and statistical inference are introduced and illustrated by examples from bioinformatics applications using R.

BINF 8201. Molecular Sequence Analysis. (3)

Prerequisite: BINF 8100 or equivalent. Corequisite: BINF 8201L. Introduction of the basic computational methods and open sources software commonly used in molecular sequence analysis. Topics include: biological sequence data formats and major public databases, concepts of computer algorithms and complexity, introductions to principle components analysis and data clustering methods, dynamics of genes in populations, evolutionary models of DNA and protein sequences, derivation of amino acid substitution matrices, algorithms for pairwise sequence alignments and multiple sequence alignments, algorithms for fast sequence database search, methods for molecular phylogenetic analysis, hidden Markov models and neural networks for sequence pattern and family recognition, and

introductions to genome evolution and omics data analysis. Course grade includes performance in BINF 8201L.

BINF 8201L. Molecular Sequence Analysis

Laboratory. (0) Prerequisite: BINF 8100 or equivalent. Corequisite: BINF 8201. Hands-on experience with common software methods for biological sequence data analysis. Topics include: Basic UNIX utilities, principle component analysis, clustering analysis, global and local pair-wise sequence alignments, multiple sequence alignments, sequence database search methods, phylogenetic tree constructions, hidden Markov models, and neural networks.

BINF 8202. Computational Structural Biology. (3)

Prerequisites: BINF 8101 and BINF 8201, or their equivalents. Corequisite: BINF 8202L. Topics include: (a) the fundamental concepts of structural biology (chemical building blocks, structure, superstructure, folding, etc.); (b) structural databases and software for structure visualization; (c) Structure determination and quality assessment; (d) protein structure comparison and the hierarchical nature of biomacromolecular structure classification; (e) protein structure prediction and assessment; and (f) sequence- and structure-based functional site prediction. Course grade includes performance in BINF 8202L.

BINF 8202L. Computational Structural Biology

Laboratory. (0) Corequisite: BINF 8202. The use and applications of: (a) structural classification databases; (b) software for visualization of biological structures; (c) computational methods to evaluate and compare biological structures; (d) computational methods to align biological structures; and (f) computational methods to predict biological structures from sequence.

BINF 8203. Genomics. (3) Prerequisite: BINF 8100 or equivalent. Corequisite: BINF 8203L. Surveys the application of high-throughput molecular biology and analytical biochemistry methods and data interpretation for those kinds of high volume biological data most commonly encountered by bioinformaticians. The relationship between significant biological questions, modern genomics technology methods, and the bioinformatics solutions that enable interpretation of complex data is emphasized. Topics include: genome sequencing and assembly, annotation, and comparison; genome evolution and individual variation; function prediction; gene ontologies; transcription assay design, data acquisition, and data analysis; metabolic pathways and databases and their role in genome analysis. Course grade includes performance in BINF 8203L.

BINF 8203L. Genomics Laboratory. (0) Prerequisite: BINF 8100 or equivalent. Corequisite: BINF 8203. Hands-on experience with software methods for genome-scale data analysis. Topics include: Genome sequencing and assembly, genome annotation, genome comparison. Functional classification and gene ontologies. Genome evolution and individual variation. Transcriptomic and epigenetic assay design, data acquisition, and data analysis.

BINF 8204. Mathematical Systems Biology. (3)

Prerequisites: BINF 8200 and BINF 8210, or equivalents. Introduces basic concepts, principles and common methods used in systems biology. Emphasizes on molecular networks, models and applications, and covers the following topics: the structure of molecular networks; network motifs, their system properties and the roles they play in biological processes; complexity and robustness of molecular networks; hierarchy and modularity of molecular interaction networks; kinetic proofreading; optimal gene circuit design; and the rules for gene regulation.

BINF 8205. Computational Molecular Evolution. (3)

Prerequisites: BINF 8200 and BINF 8201, or permission of the instructor. Major aspects of molecular evolution and phylogenetics with an emphasis on the modeling and computational aspects of the fields. Topics include: models of nucleotide substitution, models of amino acid and codon substitution, phylogenetic reconstruction, maximum likelihood methods, Bayesian methods, comparison of phylogenetic methods and tests on trees, neutral and adaptive evolution and simulating molecular evolution. Students obtain an in-depth knowledge of the various models of evolutionary processes, a conceptual understanding of the methods associated with phylogenetic reconstruction and testing of those methods and develop an ability to take a data-set and address fundamental questions with respect to genome evolution.

BINF 8210. Machine Learning for Bioinformatics. (3)

Prerequisites: BINF 8200, BINF 8200L, and Calculus. Introduces commonly used machine learning methods in the field of bioinformatics. Topics include: dimension reduction using principal component analysis, singular value decomposition, and linear discriminant analysis, clustering using k-means, hierarchical, expectation maximization approaches, classification using k-nearest neighbor and support vector machines. To help understand these methods, basic concepts from linear algebra, optimization, and information theory are explained. Application of these machine learning methods to solving bioinformatics problems are illustrated using examples from the literature.

BINF 8211. Design and Implementation of Bioinformatics Databases. (3)

Prerequisite: Permission of instructor. **Co-requisite:** BINF 8211L. Introduces the fundamentals of database modeling as used in bioinformatics. By the end of the course, students are able to: understand different types of data models, know how hierarchical and relational models work and give examples that are widely used for biological databases, understand the capabilities of a standard, open source RDBMS, understand the tasks required for data integration and how to use SQL as a research tool. Introduction of XML, XML Schema, and BioOntologies as widely used data exchange and organization tools in bioinformatics databases. Course grade includes performance in BINF 8211L.

BINF 8211L. Design and Implementation of Bioinformatics Databases Laboratory. (0)

Prerequisite: Permission of instructor. **Corequisite:** BINF 8211. The practice of skills described in the lecture, particularly design principles for the relational model and using SQL, and complete projects in which they design, implement, prototype and use a research biological database. Students are able to obtain correctly formatted data from public repositories and use XML, XMLSchema, and BioOntologies as tools in the data integration process; and use SQL to create, populate and perform complex queries on genomics databases.

BINF 8310. Advanced Statistics for Genomics. (3)

Prerequisite: BINF 8200 or equivalent. **Corequisite:** BINF 8310L. Canonical linear statistics (t-test, ANOVA, PCA) and their non-parametric equivalents. Examines the application of Bayesian statistics, Hidden Markov Models and machine learning algorithms to problems in bioinformatics. Students should have fluency in a high-level programming language (PERL, Java, C#, Python or equivalent) and are expected, in assignments, to manipulate and analyze large public data sets. Utilizes the R statistical package with the bioconductor extension. Course grade includes performance in BINF 8310L.

BINF 8310L. Advanced Statistics for Genomics Laboratory. (0)

Prerequisite: BINF 8200 or equivalent. **Corequisite:** BINF 8310. Hands-on experience with using the R programming language.

BINF 8311. Biophysical Modeling. (3) Topics include: an overview of mechanical force fields; energy minimization; dynamics simulations (molecular and coarse-grained); Monte-Carlo methods; systematic conformational analysis (grid searches); classical representations of electrostatics (Poisson-Boltzmann, Generalized Born and Coulombic); free energy decomposition schemes; and hybrid quantum/classical (QM/MM) methods.

BINF 8312. Computational Comparative Genomics. (3)

Prerequisite: BINF 8201 or equivalent. Introduces computational methods for comparative genomics analyses. The course covers the following topics: the architecture of prokaryotic and eukaryotic genomes; the evolutionary concept in genomics; databases and resources for comparative genomics; principles and methods for sequence analysis; evolution of genomes; comparative gene function annotation; evolution of the central metabolic pathways and regulatory networks; genomes and the protein universe; cis-regulatory binding site prediction; operon and regulon predictions in prokaryotes; and regulatory network mapping and prediction.

BINF 8313. Structure, Function, and Modeling of Nucleic Acids. (3)

Prerequisite: BINF 8100-8101 or equivalent. The course covers the following topics: atomic structure, macromolecular structure-forming tendencies and dynamics of nucleic acids; identification of genes which code for functional nucleic acid molecules, cellular roles and metabolism of nucleic acids; 2D and 3D abstractions of nucleic acid macromolecules and methods for structural modeling and prediction; modeling of hybridization kinetics and equilibria; and hybridization-based molecular biology protocols, detection methods and molecular genetic methods, and the role of modeling in designing these experiments and predicting their outcome.

BINF 8318. Computational Proteomics and Metabolomics. (3)

Prerequisites: BINF 8200 or equivalent. Introduces commonly used computational algorithms, software tools, and databases for analyzing mass spectrometry-based proteomics and metabolomics data. Students learn how to: 1) implement algorithms for processing raw mass spectrometry data and extracting qualitative and quantitative information about proteins and metabolites; 2) align multiple datasets; 3) perform differential analysis of proteomics and metabolomics datasets; and 4) use commonly used protein and metabolite databases. Also introduces chromatography, mass spectrometry, and isotopic patterns of proteins and metabolites to provide background information for understanding the nature of mass spectrometry data.

BINF 8350. Biotechnology and Genomics Laboratory (3).

Prerequisite: A background in molecular biology and biochemistry or permission of instructor. **Corequisite:** BINF 8350L. Introduction to the molecular biological methods by which samples are converted to a state from which sequence information can be produced. When sequence data is produced in a highly parallel fashion across a large fraction of a

genome it is the basis of genomics. For historical reasons, the sample put on a sequencer is called a library, and the art of genomics lies in library construction. The experimental design and the technical details of library construction significantly affects the analyses that are appropriate and the conclusions that can be made. Lectures cover the design of experiments, how to critically read the literature to select an appropriate protocol for a variety of experimental purposes, and follow it to transform a sample into high quality sequence data. Quality control and library validation methods are explained. Topics include selecting applications tuned to the experiment design to ensure proper data analysis and interpretation. Course grade includes performance in BINF 8350L.

BINF 8350L. Biotechnology and Genomics Hands on Laboratory. (0) Corequisite: BINF 8350. Hands-on experience producing sequencing templates and libraries, discussed in the lecture. Introduces students to the practical skills needed to carry out a series of experiments that result in sequence data. The unifying concept is to characterize allelic variants of selected genes from related organisms. Students purify nucleic acid and then produce a selected subset of each genome using PCR. Quality control via spectroscopy, gel electrophoresis and quantitative PCR is performed. Sequencing libraries are produced and run on the Ion Torrent PGM and the ABI 3130 Genetic Analyzer. The CLCbio Genomics Workbench software for assessing data quality and identifying polymorphisms is utilized. Students are expected to keep laboratory notebooks that allow all aspects of experiments to be reconstructed.

BINF 8380. Advanced Bioinformatics Programming. (3) Prerequisite: BINF 8112 or equivalent, or permission of instructor. Corequisite: BINF 8380L. Advanced algorithms in bioinformatics with an emphasis placed on the implementation of bioinformatics algorithms in the context of parallel processing. Topics covered depend on instructor expertise and student interest, but may include assembly of short read fragments from next-generation sequencing platforms, clustering algorithms, machine learning, development of multi-threaded applications, developing for multi-core processors and utilization of large clusters and “cloud” supercomputers. Students are expected to complete a significant independent project. Course grade includes performance in BINF 8380L.

BINF 8380L. Advanced Bioinformatics Programming Laboratory. (0) Prerequisite: BINF 8112 or equivalent. Corequisite: BINF 8380. Hands-on experience with multi-threaded programming.

BINF 8382. Accelerated Bioinformatics Programming. (3) Prerequisite: BINF 8112 or equivalent, or permission of instructor. Corequisite: BINF 8382L. Computationally intensive algorithms in bioinformatics with an emphasis placed on the implementation of bioinformatics algorithms in the context of parallel processing using modern hardware processor accelerators such as GPUs and FPGAs. Topics covered depend on instructor expertise and student interest but may include multi-threaded applications and developing for multi-core processors and for large clusters and other “cloud” computers. Students are expected to complete a significant independent project. Course grade includes performance in BINF 8382L.

BINF 8382L. Accelerated Bioinformatics Programming Laboratory. (0) Prerequisite: BINF 8112 or equivalent, or permission of instructor. Corequisite: BINF 8382. Hands-on experience with accelerated programming in bioinformatics.

BINF 8600. Bioinformatics Seminar. (1) Cross-listed as BINF 6600. Prerequisite: Admission to graduate standing in Bioinformatics. Departmental seminar. Weekly seminars will be given by bioinformatics researchers from within the University and across the world. *May be repeated for credit.*

BINF 8601. Bioinformatics Journal Club. (1) Prerequisite: Admission to graduate standing in Bioinformatics. Each week, a student in the class is assigned to choose and present a paper from the primary bioinformatics literature.

BINF 8911. Bioinformatics Research Rotation I. (2) Faculty supervised research experience in bioinformatics to supplement regular course offerings.

BINF 8912. Bioinformatics Research Rotation II. (2) Faculty supervised research experience in bioinformatics to supplement regular course offerings.

BINF 8991. Doctoral Dissertation Research. (1-9) Individual investigation culminating in the preparation and presentation of a doctoral dissertation. A student may register for multiple sections of this course in the same semester or different semesters.

Computer Science

- **M.S. in Computer Science**
- **Master of Architecture and M.S. in Computer Science or Information Technology Dual Degree** *(see under Architecture in the "College of Arts + Architecture" section)*
- **Graduate Certificate in Advanced Databases and Knowledge Discovery**
- **Graduate Certificate in Game Design and Development**

Department of Computer Science

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Graduate Program Directors

Dr. Dewan Ahmed, M.S. in Computer Science and Graduate Certificate in Game Design and Development
 Dr. Zbigniew Ras, Graduate Certificate in Advanced Databases and Knowledge Discovery

Graduate Faculty

Dr. Dewan Ahmed, Assistant Teaching Professor
 Dr. Srinivas Akella, Professor
 Dr. Tiffany Barnes, Adjunct Associate Professor
 Dr. Keh-Hsun Chen, Professor and Associate Chair
 Dr. Dazhao Cheng, Assistant Professor
 Dr. Bojan Cukic, Professor and Chair
 Dr. Yi Deng, Professor and Dean
 Dr. Mohsen Doroodchi, Associate Teaching Professor
 Dr. Wenwen Dou, Assistant Professor
 Dr. Jianping Fan, Professor
 Dr. Yong Ge, Assistant Professor
 Dr. John Gero, Research Professor
 Dr. Larry Hodges, Adjunct Professor
 Dr. Pawel Jastreboff, Adjunct Professor
 Dr. Robert Kosara, Adjunct Associate Professor
 Dr. Aidong Lu, Associate Professor
 Dr. Taghi Mostafavi, Associate Professor
 Dr. Jamie Payton, Associate Professor
 Dr. Harini Ramaprasad, Associate Teaching Professor
 Dr. Zbigniew Ras, Professor
 Dr. Samira Shaikh, Assistant Professor
 Dr. Erik Saule, Assistant Professor
 Dr. Min Shin, Associate Professor
 Dr. Richard Souvenir, Associate Professor
 Dr. Kalpathi R. Subramanian, Associate Professor
 Dr. Ashit Talukder, Professor and Bank of America Endowed Chair in Information Technology
 Dr. Angelina Tzacheva, Associate Teaching Professor

Dr. Yu Wang, Professor
 Dr. Zachary Wartell, Associate Professor
 Dr. Alicja Wieczorkowska, Adjunct Assistant Professor
 Dr. Jing Xiao, Professor
 Dr. Jing Yang, Professor
 Dr. Michael Youngblood, Adjunct Associate Professor
 Dr. Wlodek Zadrozny, Associate Professor
 Dr. Shaoting Zhang, Assistant Professor

MASTER OF SCIENCE IN COMPUTER SCIENCE

The Master of Science in Computer Science program provides students advanced skills and knowledge in planning, design, implementation, testing, and management of computer systems and applications. These skills form a good foundation for employment in high tech industry, or doctoral study in computer science.

The active research areas in the Department of Computer Science include 3D HCI, Artificial Intelligence, Biomedical Imaging, Biomedical Signal Processing, Biometrics, Communication Networks, Cloud Computing, Cognitive Science, Computer Architecture, Computer Vision, Data Mining, Data Science, Game Design, Graphics, Haptics, Health Informatics, Heuristic Search, Image/Video Processing, Information Visualization, Intelligent Systems, Knowledge Based Systems, Knowledge Discovery, Machine Learning, Natural Language Processing, Neural Systems, Parallel Computing, Recommender Systems, Robotics, Software Engineering, Virtual Reality, Visual Analytics, and Wireless Networks.

Additional Admission Requirements

In addition to the general requirements for admission to the Graduate School, students applying for this program are expected to have knowledge of two higher languages, data structures, algorithm analysis, operating systems or computer architecture, and two additional upper-division computer science courses. Also, knowledge of calculus, discrete mathematics, and linear algebra is required. Students without all the above undergraduate prerequisites in computer science and mathematics may need additional coursework after entering the program, as determined by the Graduate Program Director.

A bachelor's degree in a high quality computer science is desired. Individuals who have worked at a high professional level in the computer industry may be able to substitute work experience for some of the specific subject area requirements, subject to review by the Department Graduate Committee.

Students must have an undergraduate grade point average of (or equivalent to) at least 3.0 (on a 4.0 point scale) and a Junior/Senior GPA of at least 3.0. A satisfactory score on the aptitude portion of the GRE is also required.

Early Entry Program

Exceptional undergraduate students at UNC Charlotte may be accepted into the M.S. in Computer Science and begin work toward a graduate degree before completion of the baccalaureate degree. The criteria for admission are the following:

- 1) A student may be accepted into the Early Entry Program at any time after completion of 75 credit hours of undergraduate work applicable to the appropriate degree, although it is expected that close to 90 hours will have been earned by the time the first graduate course is taken.
- 2) The application process and all required documentation (e.g., test scores, transcripts, letters of recommendation) are the same for early entry students as for other applicants to the program, except that the GRE scores are waived. Admission must be recommended by the Department of Computer Science and approved by the Graduate School. The admission status will be "provisional" pending the award of the undergraduate degree.
- 3) To be accepted into this program an undergraduate student must have at least a 3.2 overall GPA and a minimum 3.3 GPA in the Department of Computer Science.
- 4) If an Early Entry student has not met the normal admission requirements of a 3.0 overall undergraduate GPA and a 3.0 Junior/Senior GPA at the end of his/her baccalaureate degree, she/he will be dismissed from the graduate program.
- 5) Students accepted into an Early Entry Program will be subject to the same policies that pertain to other matriculated graduate students. Generally, it will be assumed that Early Entry students will finish their baccalaureate degrees before they complete 15 hours of graduate work.
- 6) This Early Entry Program is also accelerated in which up to 12 hours earned at the graduate level may be substituted for required undergraduate hours. In other words, up to 12 hours of graduate work may be "double counted" toward both the baccalaureate and graduate degrees.

Degree Requirements

The Master of Science in Computer Science program requires 30 graduate credit hours with a minimum 3.0 GPA, which may optionally include 6 credit hours of thesis. At least 18 credit hours of the courses applied to the degree must be from the Department of

Computer Science, and at least 24 hours must be from the College of Computing and Informatics. At least 15 credit hours must be at the 6000-level or above courses. No more than 6 credit hours may be in Individual Study. A maximum of 6 credit hours of graduate credit may be transferred from other institutions.

Core Courses (9 credit hours)

The three courses taken to satisfy the core requirement must each be passed with an A or a B grade.

ITCS 6112 Software System Design and Implementation (3)

ITCS 6114 Algorithms and Data Structures (3)

ITCS 5102 Survey of Programming Languages (3)
or ITCS 6182 Computer System Architecture (3)

Breadth Courses (9 credit hours)

Select three courses, each from a different category, to satisfy the breadth requirements.

Data Science and Management

ITCS 6100 Big Data Analytics for Competitive Advantage

ITCS 6155 Knowledge Based Systems (3)

ITCS 6157 Visual Databases (3)

ITCS 6160 Database Systems (3)

ITCS 6161 Advanced Topics in Database Systems (3)

ITCS 6162 Knowledge Discovery in Databases (3)

ITCS 6163 Data Warehousing (3)

ITCS 6190 Cloud Computing for Data Analysis (3)

ITCS 6265 Advanced Topics in Knowledge Discovery in Databases (3)

Game Design and Development

ITCS 5133 Numerical Computation Methods and Analysis (3)

ITCS 5180 Mobile Application Development (3)

ITCS 5230 Introduction to Game Design and Development (3)

ITCS 5231 Advanced Game Design and Development (3)

ITCS 5232 Game Design and Development Studio (3)

ITCS 5235 Game Engine Construction (3)

ITCS 5236 AI for Computer Games (3)

ITCS 5237 Audio Processing for Entertainment Computing (3)

ITCS 6153 Neural Networks (3)

ITCS 6159 Intelligent Tutoring Systems (3)

ITCS 6165 Coding and Information Theory (3)

ITCS 6222 Biomedical Signal Processing (3)

ITCS 6224 Biomedical Image Processing (3)

ITCS 6226 Bioinformatics (3)

ITCS 6228 Medical Informatics (3)

Information Security and Privacy

ITIS 5221 Secure Web Application Development (3)

- ITIS 5250 Computer Forensics (3)
- ITIS 6140 Software Testing and Quality Assurance (3)
- ITIS 6150 Software Assurance (3)
- ITIS 6167 Network and Information Security (3)
- ITIS 6200 Principles of Information Security and Privacy (3)
- ITIS 6210 Access Control and Security Architecture (3)
- ITIS 6220 Data Privacy (3)
- ITIS 6230 Information Infrastructure Protection (3)
- ITIS 6240 Applied Cryptography (3)
- ITIS 6250 Open Source Security Systems (3)
- ITIS 6362 Information Technology Ethics, Policy, and Security (3)
- ITIS 6420 Usable Security and Privacy (3)

Intelligent and Interactive Systems

- ITCS 5152 Computer Vision (3)
- ITCS 6050 Topics in Intelligent Systems (3)
- ITCS 6111 Evolutionary Computation (3)
- ITCS 6125 Virtual Environments (3)
- ITCS 6134 Digital Image Processing (3)
- ITCS 6150 Intelligent Systems (3)
- ITCS 6151 Intelligent Robotics (3)
- ITCS 6152 Robot Motion Planning (3)
- ITCS 6156 Machine Learning (3)
- ITCS 6158 Natural Language Processing (3)
- ITCS 6267 Intelligent Information Retrieval (3)
- ITCS 6500 Complex Adaptive Systems (3)

Networked Systems

- ITCS 5145 Parallel Computing (3)
- ITCS 5146 Grid Computing (3)
- ITCS 6132 Modeling and Analysis of Communication Networks (3)
- ITCS 6166 Computer Communications and Networks (3)
- ITCS 6167 Advanced Networking Protocols (3)
- ITCS 6168 Wireless Communication Networks (3)

Visualization and Computer Graphics

- ITCS 5121 Information Visualization (3)
- ITCS 5122 Visual Analytics (3)
- ITCS 5123 Visualization and Visual Communication (3)
- ITCS 6120 Computer Graphics (3)
- ITCS 6124 Illustrative Visualization (3)
- ITCS 6126 Large Scale Information Visualization (3)
- ITCS 6127 Real-Time Rendering Engines (3)
- ITCS 6128 3D Display and Advanced Interfaces (3)
- ITCS 6140 Data Visualization (3)

Concentration Courses (9 credit hours)

Students must take at least three related courses to form an area of concentration. There are six standard concentrations, as listed below. Additionally, students may opt to create their own individualized concentration.

At most, one course can be used to satisfy both breadth and area of concentration requirements. Core courses cannot be used in area of concentration. At least two of the three courses forming an area of concentration should be from the Department of Computer Science, except for the Concentration in Information Security and Privacy. The three courses taken to satisfy the concentration requirement must each be passed with grades of A or B. In addition to the 9 credit hours of concentration coursework, a written study report on a subject in the area must be submitted to and be approved by the student's academic advisor to complete the concentration requirement. Students in the thesis option are waived from the study report requirement.

Concentration in Data Science and Management

Select three of the following:

- ITCS 6100 Big Data Analytics for Competitive Advantage
- ITCS 6155 Knowledge Based Systems (3)
- ITCS 6157 Visual Databases (3)
- ITCS 6160 Database Systems (3)
- ITCS 6161 Advanced Topics in Database Systems (3)
- ITCS 6162 Knowledge Discovery in Databases (3)
- ITCS 6163 Data Warehousing (3)
- ITCS 6190 Cloud Computing for Data Analysis (3)
- ITCS 6265 Advanced Topics in Knowledge Discovery in Databases (3)

Concentration in Game Design and Development

Select three of the following:

- ITCS 5180 Mobile Application Development (3)
- ITCS 5230 Introduction to Game Design and Development (3)
- ITCS 5231 Advanced Game Design and Development (3)
- ITCS 5232 Game Design and Development Studio (3)
- ITCS 5235 Game Engine Construction (3)
- ITCS 5236 Artificial Intelligence for Computer Games (3)
- ITCS 5237 Audio Processing for Entertainment Computing (3)

Concentration in Information Security and Privacy

- ITIS 6200 Principles of Information Security and Privacy (3)

Plus two of the following:

- ITIS 5221 Secure Web Application Development (3)
- ITIS 5250 Computer Forensics (3)
- ITIS 6140 Software Testing and Quality Assurance (3)
- ITIS 6150 Software Assurance (3)
- ITIS 6167 Network and Information Security (3)
- ITIS 6210 Access Control and Security Architecture (3)
- ITIS 6220 Data Privacy (3)
- ITIS 6230 Information Infrastructure Protection (3)
- ITIS 6240 Applied Cryptography (3)

ITIS 6250 Open Source Security Systems (3)
 ITIS 6362 Information Technology Ethics, Policy, and Security (3)
 ITIS 6420 Usable Security and Privacy (3)

Concentration in Intelligent and Interactive Systems

Select three of the following:

ITCS 5152 Computer Vision (3)
 ITCS 6050 Topics in Intelligent Systems (3)
 ITCS 6111 Evolutionary Computation (3)
 ITCS 6125 Virtual Environments (3)
 ITCS 6134 Digital Image Processing (3)
 ITCS 6150 Intelligent Systems (3)
 ITCS 6151 Intelligent Robotics (3)
 ITCS 6152 Robot Motion Planning (3)
 ITCS 6156 Machine Learning (3)
 ITCS 6158 Natural Language Processing (3)
 ITCS 6267 Intelligent Information Retrieval (3)
 ITCS 6500 Complex Adaptive Systems (3)

Concentration in Networked Systems

Select three of the following:

ITCS 5145 Parallel Computing (3)
 ITCS 5146 Grid Computing (3)
 ITCS 6132 Modeling and Analysis of Communication Networks (3)
 ITCS 6166 Computer Communications and Networks (3)
 ITCS 6167 Advanced Networking Protocols (3)
 ITCS 6168 Wireless Communication Networks (3)

Concentration in Visualization and Computer Graphics

Select three of the following:

ITCS 5121 Information Visualization (3)
 ITCS 5122 Visual Analytics (3)
 ITCS 5123 Visualization and Visual Communication (3)
 ITCS 6120 Computer Graphics (3)
 ITCS 6124 Illustrative Visualization (3)
 ITCS 6126 Large Scale Information Visualization (3)
 ITCS 6127 Real-Time Rendering Engines (3)
 ITCS 6128 3D Display and Advanced Interfaces (3)
 ITCS 6140 Data Visualization (3)

Individualized Concentration

An individual concentration is available to students with unique career or professional goals not met by the above six standard concentrations. The three courses forming a student's individualized area of concentration must be approved through graduate academic petition.

Assistantships

Financial assistance for qualified students is available on a competitive basis in the form of graduate teaching and research assistantships. All M.S. students who entered "Yes" in the application form on the question "Assistantship Interest" are automatically

considered. No separate assistantship application is required.

Minor in Operations Research

The Department of Computer Science participates in the program leading to an interdisciplinary graduate Minor in Operations Research. See the Mathematics and Statistics heading under the College of Liberal Arts & Sciences section of this *Catalog* for complete information and program requirements.

GRADUATE CERTIFICATE IN ADVANCED DATABASES AND KNOWLEDGE DISCOVERY

The Graduate Certificate in Advanced Databases and Knowledge Discovery (ADKD) provides graduate students with the opportunity to reach a demonstrated level of competence in the area of databases and knowledge discovery. Coursework towards the Certificate in ADKD can be used for credit towards the M.S. in Computer Science degree. However, its primary purpose is to provide a well-defined target for students who want to advance their knowledge of modern databases and knowledge discovery techniques but do not necessarily wish to complete all requirements for the M.S. in Computer Science. The certificate may be pursued concurrently with any of the graduate degree programs at UNC Charlotte.

Additional Admission Requirements

The Certificate in ADKD is open to all students who hold a B.S. degree in any scientific, engineering, or business discipline and either are enrolled and in good standing in a graduate degree program at UNC Charlotte or have GPA above 2.8 overall and 3.0 for their Junior and Senior years.

In addition, the program requires a current working knowledge of two higher-level languages, including at least one procedural language; and a familiarity with computer applications. The following minimal background in mathematics is also required: two semesters of calculus and one semester of discrete structures. Individuals who have worked at a high professional level in the computer industry may be able to substitute work experience for specific subject area admission requirements.

Certificate Requirements

The certificate will be awarded upon completion of five graduate level courses (15 credit hours) in the area of knowledge discovery and databases.

Required Courses (9 credit hours)

ITCS 6114 Algorithms and Data Structures (3)

or ITCS 6150 Intelligent Systems (3)
 ITCS 6160 Database Systems (3)
 ITCS 6162 Knowledge Discovery in Databases (3)

Elective Courses (6 credit hours)

Select two of the following:

ITCS 6155 KnowledgeBased Systems (3)
 ITCS 6156 Machine Learning (3)
 ITCS 6157 Visual Databases (3)
 ITCS 6161 Advanced Topics in Database Systems (3)
 ITCS 6163 Data Warehousing (3)
 ITCS 6190 Cloud Computing for Data Analysis (3)
 ITCS 6265 Advanced Topics in Knowledge Discovery
 in Databases (3)
 ITCS 6880 Individual Study (13)
 ITIS 5510 Web Mining (3)
 ITIS 6220 Data Privacy (3)
 MBAD 6201 Business Intelligence and Analytics (3)

Grade Requirements

A cumulative GPA of 3.0 is required, and at most one course with a grade of C may be allowed towards the certificate.

GRADUATE CERTIFICATE IN GAME DESIGN AND DEVELOPMENT

The Graduate Certificate in Game Design and Development (GDD) provides graduate students with the opportunity to reach a demonstrated level of competence in game design and development. Coursework towards the certificate in GDD can be used towards the M.S. in Computer Science degree. However, its primary purpose is to provide a well-defined target for students who want to advance their knowledge of modern game design and development techniques and work with a variety of professionals, from artists to writers, to bring the vision for an interactive game or media product to life. The certificate may be pursued concurrently with any of the graduate degree programs at UNC Charlotte.

Additional Admission Requirements

This certificate program is open to all students who hold a B.S. degree in any scientific, engineering, or business discipline and one of the following:

- 1) Are enrolled and in good standing in a graduate degree program at UNC Charlotte
- 2) Have a GPA above 2.8 overall and 3.0 Junior/Senior

In addition, the program expects a current working knowledge of two higher level languages, including at least one procedural language, and a familiarity with computer applications. The following minimal background in mathematics is compulsory: two

semesters of calculus and one semester of discrete structures. Individuals who have worked at a high professional level in the computer industry may be able to substitute work experience for specific subject area admission requirements. Application for the GDD certificate program is made through the Graduate Admissions Office of the University.

Courses used to satisfy requirements of a previous degree are not acceptable. Students with significant game-related work at the undergraduate level may be allowed to substitute advanced game courses for compulsory courses at the discretion of the GDD certificate coordinators. *(Note: the admission process for the Certificate is separate from the admission process for the M.S. degree.)*

Certificate Requirements

The certificate is awarded upon completion of five graduate level courses (15 credits) in the area of game design and development. Course substitutions may be made at the discretion of the GDD Program Director.

Required Courses

ITCS 5230 Introduction to Game Design and Development (3)
 ITCS 5231 Advanced Game Design and Development (3)
 ITCS 5232 Game Design and Development Studio (3)
 ITCS 5120 Computer Graphics (3)
 or ITCS 6120 Computer Graphics (3)

Elective Course

Select one of the following:

ITCS 5235 Game Engine Construction (3)
 ITCS 5236 Artificial Intelligence for Computer Games (3)
 ITCS 5237 Audio Processing for Entertainment Computing (3)
 Another game-related course (generally from ITCS/ITIS at the 5000 level or above) approved by the GDD Program Director

Grade Requirements

A cumulative GPA of 3.0 is required, and at most one course with a grade of C may be allowed towards the certificate.

COURSES IN COMPUTER SCIENCE (ITCS)

ITCS 5010. Topics in Computer Science. (3)

Prerequisite: CCI graduate standing or permission of instructor. Topics in computer science selected to supplement the regular course offerings. A student may register for multiple sections of the course with

different topics in the same semester or in different semesters.

ITCS 5102. Survey of Programming Languages. (3)

Prerequisite: CCI graduate standing or permission of instructor. Study of the concepts underlying various computer languages, and comparing and evaluating various language features. History and development of various languages, such as FORTRAN, ALGOL, PASCAL, MODULA-2, C, C++, Ada, Lisp, Smalltalk, Prolog.; evaluation and comparison of various algorithms and language suitability. Selection of languages for problems/environments. Overview of various languages.

ITCS 5111. Introduction to Natural Language Processing. (3)

The practical methods and techniques of natural language processing and text mining. These techniques, mainly the techniques of syntactic and semantic processing, are illustrated with specific tasks (such as: Information Extraction, Dialogue Systems, Information Retrieval, etc.). Most programming assignments are for the laptop. Selected ones could be done in the cloud (e.g., using AlchemyAPI and/or IBM Bluemix). Students are expected to bring their laptops to each class.

ITCS 5120. Introduction to Computer Graphics. (3)

Prerequisites: CCI graduate standing or permission of instructor. Graphics hardware; raster algorithms; geometric transformations; 2D/3D interactive graphics; 3D viewing and perspective projections; color and lighting models; hidden surface removal; modeling hierarchies; fractals; curved surfaces.

ITCS 5121. Information Visualization. (3)

Cross-listed as DSBA 5121 and HCIP 5121. Prerequisite: CCI graduate standing or permission of instructor. Information visualization concepts, theories, design principles, popular techniques, evaluation methods, and information visualization applications.

ITCS 5122. Visual Analytics. (3)

Cross-listed as DSBA 5122 and HCIP 5122. Prerequisites: Full CCI graduate standing and STAT 1220, STAT 1221, STAT 1222, STAT 2122, STAT 2223, or approval of the instructor. Introduces the new field of visual analytics, which integrates interactive analytical methods and visualization. Topics include: critical thinking, visual reasoning, perception/cognition, statistical and other analysis techniques, principles of interaction, and applications.

ITCS 5123. Visualization and Visual Communication. (3)

Prerequisite: CCI graduate standing or permission of instructor. Understanding the relatively technical field of visualization from the point of view of visual communication, this course draws connections with photography, design, illustration, aesthetics, and art.

Both technical and theoretical aspects of the various fields are covered, and the connections between them are investigated.

ITCS 5128. Programming Languages and Compilers. (3)

Prerequisite: CCI graduate standing or permission of instructor. Introduction to the concepts and techniques used in describing, defining, and implementing programming languages and their compilers. Introduction to parsing and parser construction; LL and LR grammars; syntax directed translation; data object representations; run time structures; intermediate languages; code optimization.

ITCS 5133. Numerical Computation Methods and Analysis. (3)

Prerequisite: CCI graduate standing or permission of instructor. Introduction to principles and techniques behind numerical methods and algorithms that underlie modern scientific and engineering applications. Roots of equations; linear systems (direct methods, LU/QR factorization, iterative methods); Eigen values and vectors; Interpolation, Approximation; Numerical Differentiation/Integration, ODEs and PDEs.

ITCS 5141. Computer Organization and Architecture. (3)

Prerequisite: CCI graduate standing and undergraduate computer architecture course, or permission of instructor. Fundamentals of computer design; instruction set design, basic processor implementation techniques; pipelining; memory hierarchy; input/output. Cost/performance and hardware/software trade-offs.

ITCS 5145. Parallel Computing. (3)

Prerequisite: CCI graduate standing or permission of instructor. Types of parallel computers, programming techniques for multiprocessor and multicomputer systems, parallel strategies, algorithms, and languages.

ITCS 5146. Grid Computing. (3)

Prerequisite: CCI graduate standing or permission of instructor. Grid computing software components, standards, web services, security mechanisms, schedulers and resource brokers, workflow editors, grid portals, grid computing applications.

ITCS 5152. Computer Vision. (3)

Prerequisites: CCI graduate standing and undergraduate course in linear algebra, or permission of instructor. General introduction to Computer Vision and its application. Topics include: low-level vision, 2D and 3D segmentation, 2D description, 2D recognition, 3D description and model-based recognition, and interpretation.

ITCS 5157. Computer-Aided Instruction. (3)

Prerequisite: CCI graduate standing or permission of instructor. History of CAI; study of current CAI

systems; development of man-machine dialogue; programming tools for CAI; information structures for computer-oriented learning.

Advantages/disadvantages/ costs of CAI.

ITCS 5161. Intellectual Property Aspects of Computing. (3) Prerequisite: CCI graduate standing or permission of instructor. Explores the broad field of intellectual property and the many aspects related to computing. Topics include: software copyrights, software patents, trademarks and service marks, employment contracts, non-compete agreements, software licenses, software development contracts, preservation of digital evidence, protection of trade secrets, cyberspace law and the use of mediation in IP disputes.

ITCS 5180. Mobile Application Development. (3) Cross-listed as ITIS 5180. Prerequisite: CCI graduate standing or permission of instructor. Mobile platforms are at the center of attention of users and organizations nowadays. Most organizations and businesses are rapidly migrating toward the cloud and need to provide a fast and easy mechanism for users to stay connected to their services. Mobile applications are the top trend nowadays given the high variety of new mobile devices and platforms such as Apple's iOS and Google's Android. In this course, students are introduced to the foundations of mobile development and its unique requirements and constraints. Students design and build a variety of mobile applications with a hands-on and project-based approach.

ITCS 5181. Microcomputer Interfacing. (3) Prerequisite: CCI graduate standing or permission of instructor. Signal conditioning, A/D conversion, noise, transmission line effects, signal processing, D/A conversion and serial/parallel interfaces.

ITCS 5230. Introduction to Game Design and Development. (3) Prerequisite: CCI graduate standing or permission of instructor. Basic concepts and techniques for electronic game design and development. Topics include: game history and genres, game design teams and processes, what makes a game fun, level and model design, game scripting and programming including computer graphics and animation, artificial intelligence, industry issues, and gender and games.

ITCS 5231. Advanced Game Design and Development. (3) Prerequisite: ITCS 5230. Advanced concepts and techniques for electronic game design and development. A project-centered course where students explore complex gameplay and interactivity. Explores topics from the introductory course in more depth, such as: applying software engineering techniques to developing games,

advanced game programming and scripting, networking, graphics, physics, audio, game data structures and algorithms, and artificial intelligence.

ITCS 5232. Game Design and Development Studio. (3)

Prerequisite: ITCS 5120, ITCS 5231, and permission of instructor. Application of advanced concepts and techniques for electronic game design and development. Teams will use engineering techniques to incorporate game programming and scripting, networking, graphics, physics, audio, game data structures and algorithms, and artificial intelligence into an electronic game. Individuals will develop a complete portfolio of prior work and the course project.

ITCS 5235. Game Engine Construction. (3)

Prerequisite: ITCS 4120, ITCS 6120, or permission of instructor. Introduction to principles and techniques behind modern computer and console game engines. Graphics Rendering Pipeline (transformations, lighting, shading); 2D/3D Texture Mapping; Image Based Rendering; Spatial Data Structures and Acceleration Algorithms; Level of Detail; Collision Detection, Culling and Intersection Methods; Vertex/Pixel Shaders; Pipeline Optimization; Rendering Hardware.

ITCS 5236. Artificial Intelligence for Computer Games. (3)

Prerequisite: ITCS 6150 or permission of instructor. Application of advanced concepts and techniques in artificial intelligence for electronic game design and development. An investigation of the artificial intelligence techniques necessary for an agent to act, or appear to act, intelligently in interactive virtual worlds. Topics include: uncertainty reasoning, machine learning, perception, knowledge representation, search, and planning. Emphasis will be on implementation and experimentation with the goal of building robust intelligent agents in interactive entertainment domains. Elements of multi-agent collaboration and the use of cognitive architectures in interactive computer games will also be discussed.

ITCS 5237. Audio Processing for Entertainment Computing. (3)

Prerequisite: ITCS 6114 or permission of instructor. Introduction to the principles and applications of audio (digital signal) processing focusing on entertainment domains. Topics include: analysis of signals, transforms, digital filter design techniques, audio engine development, file encoding/decoding, spatial sound rendering, optimization, and advanced audio techniques.

ITCS 6010. Topics in Computer Science. (3)

Prerequisite: CCI graduate standing or permission of instructor. Topics in computer science selected to supplement the regular course offerings. A student may register for multiple sections of the course with

different topics in the same semester or in different semesters.

ITCS 6050. Topics in Intelligent Systems. (3)

Prerequisite: CCI graduate standing or permission of instructor. Topics in intelligent systems selected to supplement the regular course offerings. *May be repeated for credit with change of topic.*

ITCS 6080. Topics in Computer Engineering. (3)

Prerequisite: CCI graduate standing or permission of instructor. Topics in computer engineering selected to supplement the regular course offerings. *May be repeated for credit with change of topic.*

ITCS 6100. Big Data Analytics for Competitive Advantage. (3) Cross-listed as DSBA 6100 and HCIP 6103. Prerequisite: CCI graduate standing or permission of instructor. An introduction to the use of big data as a strategic resource. A focus is placed on integrating the knowledge of analytics tools with an understanding of how companies leverage data analytics to gain strategic advantage. A case approach is used to emphasize hands-on learning and a real-world view of big data analytics.

ITCS 6107. Formal Languages and Automata. (3)

Prerequisites: CCI graduate standing or permission of instructor. Detailed study of abstract models for the syntax of programming languages and information processing devices. Languages and their representation; grammars; finite automata and regular sets; context-free grammars and pushdown automata; Chomsky Hierarchy; closure properties of families of languages; syntax analysis.

ITCS 6110. Topics in Programming Languages and Compilers. (3) Prerequisite: ITCS 5128. A continuation of material in ITCS 5128 with emphasis on advanced aspects of optimization, data flow analysis, and error discovery.

ITCS 6111. Evolutionary Computation. (3)

Prerequisite: ITCS 6114 or permission of instructor. General introduction to optimization problems. Optimization techniques: hill climbing, simulated annealing, evolution strategies, and genetic algorithms. Evolution programming techniques.

ITCS 6112. Software System Design and Implementation. (3) Cross-listed as HCIP 6112 and ITIS 6112. Prerequisite: CCI graduate standing or permission of instructor. Introduction to the techniques involved in the planning and implementation of large software systems. Emphasis on human interface aspects of systems. Planning software projects; software design process; top-down design; modular and structured design; management of software projects; testing of software; software

documentation; choosing a language for a software system.

ITCS 6114. Algorithms and Data Structures. (3)

Cross-listed as ITCS 8114. Prerequisite: CCI graduate standing or permission of instructor. Analyzing algorithms and problems; data abstraction and data structures; recursion and induction; time and space complexities; searching and sorting; search trees and tries; hashing; heaps; dynamic programming; graph algorithms; string matching; NP-complete problems.

ITCS 6115. Advanced Topics in Algorithms and Data Structures. (3) Cross-listed as ITCS 8115.

Prerequisite: ITCS 6114. Advanced study on selected topics such as NP-complete and NP-hard problems, approximation algorithms, computational geometry, multithreaded algorithms and parallel algorithms, string processing, number-theoretic algorithms, and cryptography.

ITCS 6120. Computer Graphics. (3) Cross-listed as ITCS 8120. Prerequisite: CCI graduate standing or permission of instructor. Introduction to the design and implementation of interactive graphics systems. Raster and vector display systems, I/O devices; graphics primitives and their attributes; raster algorithms and clipping; 2D/3D geometric transformations; 3D viewing and projections; hierarchical and procedural models; surface representation; color and lighting models; rendering algorithms; global illumination and texture mapping.

ITCS 6124. Illustrative Visualization. (3) Cross-listed as ITCS 8124. Prerequisite: CCI graduate standing or permission of the instructor. The state-of-the-art of illustrative visualization techniques, which transform large-scale, complex datasets to succinct, non-photorealistic visualization styles and at the same time preserve important data features. Topics include: 2D/3D stippling, interactive line drawings, animated visualization, non-photorealistic rendering, design, and evaluation of illustrative visualization approaches.

ITCS 6125. Virtual Environments. (3) Cross-listed as ITCS 8125. Prerequisite: CCI graduate standing or permission of instructor. The current state of the art in the design and implementation of Virtual Environments. Topics include: position tracking, design of head-tracked and head-mounted displays, stereoscopic display, presence in virtual environments, 3D user interface design, and applications of VEs. Previous experience in computer graphics or 3D game design is helpful but not required.

ITCS 6126. Large Scale Information Visualization. (3) Cross-listed as ITCS 8126. Prerequisite: ITCS 4121 or

ITCS 5121. Concept, theory, design principles, data processing techniques, and visual metaphors and interaction techniques for massive, multi-dimensional, multi-source, time-varying information exploration.

ITCS 6127. Real-Time Rendering Engines. (3). Cross-listed as ITCS 8127. Prerequisite: ITCS 5120 or ITCS 6120. Advanced concepts and techniques employed in building real-time rendering systems that support a high level of realism as well as handle large geometric models. Topics include: modern graphics hardware, programmable shaders, shadow and environment mapping, image-based modeling and rendering, large data models (simplification, level of detail), high quality interactive rendering.

ITCS 6128. 3D Display and Advanced Interfaces. (3) Cross-listed as ITCS 8128. Prerequisite: ITCS 4120 or ITCS 6120. The fundamentals of 3D display hardware and software technology. Topics include: human visual spatial perception of natural and synthetic 3D images, 3D display hardware, human computer interface algorithms for effective stereoscopic display, 3D display rendering techniques.

ITCS 6130. Advanced Computer Graphics. (3) Cross-listed as ITCS 8130. Prerequisite: ITCS 6120 or permission of instructor. Implicit and parametric representation; cubic surfaces; advanced reflection models; global illumination models - ray tracing, radiosity; shadow algorithms, texture mapping; volumetric modeling and rendering techniques; animation; advanced modeling techniques; particle systems, fractals.

ITCS 6132. Modeling and Analysis of Communication Networks. (3) Prerequisite: A course in communication networks or permission of instructor. The objective is to develop an understanding of modeling and analysis techniques for communication systems and networks. Enable the student to understand how to comparatively analyze the cost and performance impact of network architecture and protocol design decisions. Modeling techniques for analytical analysis, simulation based analysis, and measurement based analysis will be presented. Topics include: validation/verification of models, workload characterization, metric selection, presentation and interpretation of results. A semester long analysis project will be undertaken.

ITCS 6134. Digital Image Processing. (3) Cross-listed as ECGR 6118 and ECGR 8118. Prerequisite: CCI graduate standing or permission of instructor. Image perception; image types/applications; image restoration and enhancement; edge/boundary detection; image transformation; image segmentation; statistical and syntactical pattern recognition; image information measures and compression.

ITCS 6140. Data Visualization. (3) Prerequisite: CCI graduate standing or permission of instructor. Emphasis on the methodology and application of data visualization to scientific and engineering data; data types and models; visualization methods; volume visualization; scalar, vector and tensor fields; multi-variate visualization; visualization systems and models; visualization applications; visualization software and hardware; research issues; and future trends.

ITCS 6144. Operating Systems Design. (3) Prerequisite: ITCS 6114 or permission of instructor. Introduction to features of a large-scale operating system with emphasis on resource-sharing environments. Computer system organization; resource management; multiprogramming; multi-processing; file systems; virtual machine concepts; protection and efficiency.

ITCS 6148. Advanced Object-Oriented Systems. (3) Cross-listed as ITIS 6148. Prerequisite: ITCS 6112, ITIS 6112, or permission of instructor. Issues related to the design, implementation, integration, and management of large object-oriented systems. Topics include: object models, object modeling, frameworks, persistent and distributed objects, and object-oriented databases.

ITCS 6150. Intelligent Systems. (3) Prerequisite: CCI graduate standing or permission of instructor. Introduces core ideas in Artificial Intelligence (AI). Heuristic versus algorithmic methods; problem solving; game playing and decision making; automatic theorem proving; pattern recognition; adaptive learning; projects to illustrate theoretical concepts.

ITCS 6151. Intelligent Robotics. (3) Prerequisites: CCI graduate standing and undergraduate course in linear algebra, or permission of instructor. General introduction to spatial descriptions and transformations, and manipulator position and motion. More study on robot planning, programming, sensing, vision, and CAD/CAM.

ITCS 6152. Robot Motion Planning. (3) Prerequisite: ITCS 6114 or permission of instructor. Introduction to algorithmic techniques for robot motion planning. Topics include: configuration space representations, roadmap methods, cell decomposition methods, potential field techniques, randomized path planning, collision detection, nonholonomic motion planning, multiple robot coordination, and manipulation planning. These techniques are motivated by applications of motion planning to mobile robots and robot manipulators, assembly planning, computer aided design, computer graphics, and bioinformatics.

ITCS 6153. Neural Networks. (3) Prerequisites: ITCS 6114. Topics include: basic notions and models of artificial neural nets; single layer neural classifiers; multilayer one-way neural nets; single layer feedback networks; neural models of associative memory; self-organizing neural nets; translation between neural networks and knowledge bases; applications of neural networks.

ITCS 6154. Heuristic Search. (3) Prerequisite: ITCS 6150. Heuristics and problem representation; heuristic-search procedures; formal properties and performance analysis of heuristic methods; game-searching strategies and heuristic programming; search with probabilities; knowledge-guided search.

ITCS 6155. Knowledge-Based Systems. (3) Cross-listed as DSBA 6155. Prerequisite: ITCS 6162 or permission of instructor. Knowledge systems; knowledge discovery; association rules; action rules, hierarchical classifiers, cascade classifiers, query languages and their semantics; cooperative and collaborative systems; ontology and metadata; flexible query answering; chase algorithms and data sanitization methods; decision support systems in medicine; and automatic indexing of music.

ITCS 6156. Machine Learning. (3) Prerequisite: ITCS 6150 or permission of instructor. Machine learning methods and techniques including: acquisition of declarative knowledge; organization of knowledge into new, more effective representations; development of new skills through instruction and practice; and discovery of new facts and theories through observation and experimentation.

ITCS 6157. Visual Databases. (3) Prerequisite: ITCS 6160, ITIS 6120, or permission of instructor. Topics include: representation of visual content, querying visual databases, content-based interactive browsing and navigation, system architecture, similarity models, indexing visual databases, data models and knowledge structures, image retrieval by similarity, and video retrieval by content.

ITCS 6158. Natural Language Processing. (3) Prerequisite: ITCS 6150. Principles, methodologies, and programming methods of natural language processing including foundations of natural language understanding, namely: lexical, syntactic, and semantic analysis, discourse integration, and pragmatic and morphological analysis.

ITCS 6159. Intelligent Tutoring Systems. (3) Prerequisite: CCI graduate standing or permission of the instructor. Introduces the issues relevant to creating adaptive learning systems using artificial intelligence and includes a project to build a small

Intelligent Tutoring System (ITS). Topics include: representation of knowledge and cognition, ITS design, adaptive user interfaces, design and evaluation of feedback, experimental methods, educational data mining, history of intelligent tutoring, tutor authoring, and issues for implementation.

ITCS 6160. Database Systems. (3) Cross-listed as DSBA 6160 and HCIP 6160. Prerequisite: CCI graduate standing or permission of instructor. The modeling, programming, and implementation of database systems. Focuses on relational database systems, but may also address non-relational databases or other advanced topics. Topics include: (1) modeling: conceptual data modeling, ER diagram, relational data model, schema design and refinement; (2) programming: relational algebra and calculus, SQL, constraints, triggers, views; (3) implementation: data storage, indexing, query execution, query optimization, and transaction management; and (4) advanced: semi-structured data model, XML, and other emerging topics.

ITCS 6161. Advanced Topics in Database Systems. (3) Prerequisite: ITCS 6160, ITIS 6120, or permission of instructor. Continuation of ITCS 6160. Topics include: deductive databases; semantic query processing; intelligent and cooperative query languages; distributed databases; active databases; heterogeneous databases, multimedia databases; data and knowledge interchange; multidatabase systems; very large databases.

ITCS 6162. Knowledge Discovery in Databases. (3) Cross-listed as DSBA 6162, HCIP 6162, and ITIS 6162. Prerequisite: ITCS 6160, ITIS 6120, or permission of instructor. The entire knowledge discovery process is covered in this course. Topics include: setting up a problem, data preprocessing and warehousing, data mining in search for knowledge, knowledge evaluation, visualization and application in decision making. A broad range of systems, such as OLAP, LERS, DatalogicR+, C4.5, AQ15, Forty-Niner, CN2, QRAS, and discretization algorithms are covered.

ITCS 6163. Data Warehousing. (3) Cross-listed as HCIP 6163 and ITIS 6163. Prerequisite: ITCS 6160, ITIS 6120, or permission of instructor. Topics include: use of data in discovery of knowledge and decision making; the limitations of relational databases and SQL queries; the warehouse data models: multidimensional, star, snowflake; architecture of a data warehouse and the process of warehouse construction; data consolidation from various sources; optimization; techniques for data transformation and knowledge extraction; relations with enterprise modeling.

ITCS 6164. Design and Implementation of Online Management Information Systems. (3)

Prerequisite: ITCS 6114 or permission of instructor. The fundamental concepts and philosophy of planning and implementing an online computer system. Characteristics of online systems; hardware requirements; modeling of online systems; performance measurement; language choice for online systems; organization techniques, security requirements; resource allocation.

ITCS 6165. Coding and Information Theory. (3)

Prerequisite: knowledge of probability theory or permission of instructor. Information theory; coding theory; Shannon's theorem; Markov process; channel capacity; data transmission codes; error correcting codes; data compression; data encryption.

ITCS 6166. Computer Communications and Networks. (3)

Prerequisite: CCI graduate standing or permission of instructor. Introduction to the concepts of communication networks; types of networks; wired and wireless media; communication architectures; network protocols; coding and modulation; multiplexing and multiple access; error and flow control; routing; Internet protocols; transport protocols; assignments include implementation and analysis of network protocols

ITCS 6167. Advanced Networking Protocols. (3)

Prerequisites: ITCS 6166 or ITCS 6168. Advanced networking concepts and protocols related to the design, implementation, integration, and management of networking and communication systems. Topics include: topology control protocols, ad hoc routing protocols, power management protocols, distributed data processing protocols for various networking systems (Internet, wireless mesh networks, ad hoc networks, sensor networks, peer-to-peer networks).

ITCS 6168. Wireless Communication Networks. (3)

Prerequisites: CCI graduate standing in CS, SIS, ECE, or Optics and a prior course in networking, or permission of instructor. An overview of mobile systems and wireless networking technologies. Emphasis on resource management, routing and quality of service at the MAC and networking layers for mobile systems. Students undertake a semester long research project to survey the research literature and identify specific challenges for cellular telecommunications, wireless LANS, ad hoc networks, mesh networks or sensor networks.

ITCS 6170. Logic for Artificial Intelligence. (3)

Prerequisite: ITCS 6150 or permission of instructor. Introduction to basic concepts of logic for artificial intelligence, including declarative knowledge, inference, resolution, non-monotonic reasoning,

induction, reasoning with uncertain beliefs, distributed information systems, intelligent information systems, planning and intelligent-agent architecture.

ITCS 6171. Logic Programming. (3)

Prerequisite: ITCS 6150 or permission of instructor. Prolog programming language; programming techniques in Prolog; foundations of logic programming including computability of Horn clause logic, completeness of resolution principle, complexity of unification algorithms, and verification of logic programs; principles of implementing logic programming systems; selected topics from applications of logic programming to expert systems, intelligent database systems, and/or natural language processing.

ITCS 6175. Computability and Complexity. (3)

Prerequisite: ITCS 6114. Study of computability, unsolvability, computational complexity. Concept of effective computability; recursive functions; mathematical models of computation; universal Turing machines; unsolvable problems; time and space complexity of computations; NP-completeness problems; sub-recursive hierarchies.

ITCS 6181. Switching and Automata Theory. (3)

Prerequisite: permission of instructor. Topics include: sets, relations, lattices, Boolean algebras; functional decomposition and symmetric functions; threshold logic; multiple-valued logic; fault detection and fault tolerant design; finite state machines, incompletely specified machines, minimization; state identification and fault detection experiments; finite state recognizers.

ITCS 6182. Computer System Architecture. (3)

Prerequisite: CCI graduate standing or permission of instructor. Survey of existing and proposed architectures; pipelined, dataflow, multi-bus and parallel system architecture, and interconnection network architectures. This course is project-based and requires written and verbal presentation of projects.

ITCS 6183. Computer Arithmetic. (3)

Prerequisite: CCI graduate standing or permission of instructor. Principles, architecture, and design of fast two operand adders; multi-operand adders, standard multipliers, and dividers. Cellular array multipliers and dividers. Floating point processes, BCD, and excess three adders, multipliers, and dividers.

ITCS 6184. Fault Tolerant Digital Systems. (3)

Prerequisites: CCI graduate standing and undergraduate computer architecture course, or permission of instructor. Design and analysis of fault tolerant digital systems including design techniques, qualitative and quantitative methods of evaluation,

and available fault tolerant digital systems.

ITCS 6186. Application Specifics System Design and Simulation. (3) Prerequisites: CCI graduate standing and undergraduate computer architecture course, or permission of instructor. Project-oriented course on techniques and methodology in design and development of special purpose systems valuable for business, healthcare, and industrial community; course content includes system specifications, interface structure and data communication, interconnection architecture, and techniques for testing and debugging.

ITCS 6190. Cloud Computing for Data Analysis. (3) Cross-listed as DSBA 6190 and ITCS 8190. Prerequisites: ITCS 6114 or permission of instructor; familiarity with Java, Unix, Data Structures and Algorithms, Linear Algebra, and Probability and Statistics; good programming skills and a solid mathematical background. Introduction to the basic principles of cloud computing for data-intensive applications. Focuses on parallel computing using Google's MapReduce paradigm on Linux clusters, and algorithms for large-scale data analysis applications in web search, information retrieval, computational advertising, and business and scientific data analysis. Students read and present research papers on these topics, and implement programming projects using Hadoop, an open source implementation of Google's MapReduce technology, and related NoSQL technologies for analyzing unstructured data.

ITCS 6211. Studio Lab I. (4) Cross-listed as ARCH 7211 and ITIS 6211. The Studio/Lab sequence situates students with varying backgrounds in an educational environment that allows them to develop and test innovative computational design tools, applications and settings. Each semester is jointly taught by faculty from the School of Architecture and the College of Computing and Informatics, and is organized around a topic chosen by the participating faculty. Each focused topic requires expertise both in spatial design and computational design, and results in prototypes and evaluation.

ITCS 6212. Studio Lab II. (4) Cross-listed as ARCH 7212 and ITIS 6212. The Studio/Lab sequence situates students with varying backgrounds in an educational environment that allows them to develop and test innovative computational design tools, applications and settings. Each semester is jointly taught by faculty from School of Architecture and the College of Computing and Informatics, and is organized around a topic chosen by the participating faculty. Each focused topic requires expertise both in spatial design and computational design, and results in prototypes and evaluation.

ITCS 6216. Introduction to Cognitive Science. (3) Cross-listed as PSYC 6216 and ITIS 6216. Multiple perspectives on the study of intelligent systems. Broad coverage of such topics as philosophy of mind; human memory processes; reasoning and problem solving; artificial intelligence; language processing (human and machine); neural structures and processes; and vision. Also included is participation in the cognitive science seminar.

ITCS 6220. Pattern Recognition. (3) Prerequisite: CCI graduate standing or permission of instructor. Topics include: pattern pre-processing and feature extraction (entropy minimization, orthogonal expansion, Fourier expansion, Karhunen-Loeve expansion, PCA); linear decision functions; orthogonal and non-orthogonal systems of functions; pattern classification by distance functions (Nearest Neighbor, K-means, ISODATA); pattern classification by likelihood functions (Bayesian classifiers, estimation of probability density function); trainable classifiers (LMSE, Perceptron, multi-layer perceptrons, fuzzy classifiers); stochastic processes; classification on categorical attributes.

ITCS 6222. Biomedical Signal Processing. (3) Prerequisites: CCI graduate standing. Topics include: fundamental techniques in processing, analysis, feature extraction, and classification of complex signals; origin and processing techniques for biomedical signals, including ECG, ENG, EEG, MEG, ERG, EMG, respiratory signals, blood sound, and pressure signals.

ITCS 6224. Biomedical Image Processing. (3) Prerequisites: CCI graduate standing and undergraduate course in linear algebra, or permission of instructor. Topics include: review of image processing and pattern recognition (2-D Fourier transforms, 2-D Wavelet transform, denoising of medical images); origin and processing of X-ray images; CT images; MRI images; ultrasonic images; PET images; thermal images; electrical impedance images; cross-registration between images of different source; stereotactic neurosurgery; stereotactic radiosurgery/radiotherapy; robot-assisted surgery.

ITCS 6226. Bioinformatics. (3) Prerequisite: CCI graduate standing. Topics include: brief review of molecular biology, proteins, and their classifications, DNA, RNA, and using microarrays and gene chips for sequencing; review of computational techniques for bioinformatics, expectation maximization, Bayesian classifiers, dynamic programming, information theory and entropy analysis, Markov chain models, and neural networks; computational techniques for local and multiple sequence alignment; application of Markov chains in finding genes; using information theory to estimate binding sites, start Codon prediction; RNA secondary structure prediction;

computational techniques for protein function prediction; advanced signal processing techniques in feature extraction from protein sequences.

ITCS 6228. Medical Informatics. (3) Cross-listed as HCIP 6228. Prerequisite: CCI graduate standing or permission of instructor. Focuses on methods and techniques used in storage, communication, processing, analysis, integration, management, and distribution of medical information. Emphasizes the applications of telemedicine and intelligent computer-aided decision making systems in different medical and surgical systems. Discusses the computational methods to accept or reject a new drug or a new treatment for a given disease.

ITCS 6265. Advanced Topics in Knowledge Discovery in Databases. (3) Prerequisite: ITCS 6162 or permission of instructor. Continuation and extension of ITCS 6162. Information visualization in data mining and knowledge discovery, predictive data mining, mining of multimedia sources, mining of unstructured data, distributed data mining, mining of Web data/information, mining complex types of data, mining of biotechnology data, applications, and trends in data mining.

ITCS 6267. Intelligent Information Retrieval. (3) Prerequisite: ITCS 6114 or permission of instructor. Topics include: definition of the information retrieval problem, modeling the information retrieval problem, evaluation of information retrieval, query languages and operations, text processing, indexing and searching, parallel and distributed information retrieval, user interface and visualization, multimedia information retrieval, and information retrieval applications.

ITCS 6490. Industrial Internship. (0-6) Cross-listed as HCIP 6490. Prerequisite: Completion of six hours of graduate coursework. Full- or part-time academic year internship in computer science areas complementary to the concentration area of studies and designed to allow theoretical and course-based practical learning to be applied in a supervised industrial experience. Each student's internship program must be approved by the supervising faculty, the academic advisor, and the graduate program director. A mid-term report and a final report to be evaluated by the supervising faculty are required. *Grading is on a Pass/Unsatisfactory basis* by the supervising faculty in consultation with off-campus supervisor at the internship organization. The credit hours may not be part of the minimum 30 credit hours for graduation. *May be repeated for credit.*

ITCS 6500. Complex Adaptive Systems. (3) Cross-listed as DSBA 6500, HCIP 6500, ITCS 8500, ITIS 6500, and ITIS 8500. Prerequisite: CCI graduate

standing or permission of instructor. Complex adaptive systems (CAS) are networked (agents/part interact with their neighbors and, occasionally, distant agents), nonlinear (the whole is greater than the sum of its parts), adaptive (the system learns to change with its environment), open (new resources are being introduced into the environment), dynamic (the change is a norm), emergent (new, unplanned features of the system get introduced through the interaction of its parts/agents), and self-organizing (the parts organize themselves into a hierarchy of subsystems of various complexity). Ant colonies, networks of neurons, the immune system, the Internet, social institutions, organization of cities, and the global economy are a few examples where the behavior of the whole is much more complex than the behavior of the parts. Examples of current research efforts are provided. Topics include: Self-organization; emergent properties; learning; agents; localization affect; adaptive systems; nonlinear behavior; chaos; complexity.

ITCS 6690. Computer Science Seminar. (3) Prerequisite: at least 9 graduate ITCS/ITIS hours and permission of department. Experience for the advanced M.S. student on current problems of computer design and application. (May be used by a student or small group of students to work with a professor on a topic of mutual interest. May be used to give a course on a topic announced in advance.)

ITCS 6880. Individual Study. (1-3) Prerequisite: At least 9 graduate ITCS/ITIS hours and permission of department. With the direction of a faculty member, students plan and implement appropriate objectives and learning activities to develop specific areas of expertise through research, reading, and individual projects. *May be repeated for credit.*

ITCS 6991. Computer Science Thesis. (1-3) Prerequisite: Permission of department. Graduate thesis research. Detailed exploration of an area of computer science chosen for thesis research. *May be repeated for credit but no more than six hours may be applied to M.S. degree requirements.*

Computing and Information Systems

• Ph.D. in Computing and Information Systems

College of Computing and Informatics
cci.uncc.edu

Ph.D. Program Director

Dr. Manuel A. Pérez Quiñones

Ph.D. Concentration Coordinators

TBD, Bioinformatics

Dr. Cem Saydam, Business Information Systems and
Operation Management

Dr. Yu Wang, Computer Science

Dr. Weichao Wang, Software and Information
Systems

Graduate Faculty

Dr. Srinivas Akella, Professor
Dr. Ehab Al-Shaer, Professor
Dr. Cory Brouwer, Associate Professor
Dr. Keh-Hsun Chen, Professor
Dr. Bei-Tseng Chu, Professor
Dr. W. Douglas Cooper, Professor
Dr. Bojan Cukic, Professor
Dr. Yi Deng, Professor
Dr. Wenwen Dou, Research Professor
Dr. Didier Dreau, Associate Professor
Dr. Xiuxia Du, Associate Professor
Dr. Jianping Fan, Professor
Dr. Anthony Fodor, Associate Professor
Dr. Yaorong Ge, Associate Professor
Dr. Yong Ge, Assistant Professor
Dr. John Gero, Research Professor
Dr. Cynthia Gibas, Professor
Dr. Jun-Tao Guo, Associate Professor
Dr. Mirsad Hadzikadic, Professor
Dr. Xiuli He, Associate Professor
Dr. Thomas J. Holt, Assistant Professor
Dr. Donald Jacobs, Professor
Dr. Daniel Janies, Carol Grotnes Belk Distinguished
Professor of Bioinformatics and Genomics
Dr. Monica Johar, Associate Professor
Dr. Moutaz Khouja, Professor
Dr. Ram Kumar, Professor
Dr. Celine Latulipe, Associate Professor
Dr. Heather Lipford, Associate Professor
Dr. Ann Loraine, Associate Professor
Dr. Aidong Lu, Associate Professor
Dr. Mary Lou Maher, Professor
Dr. Ian Marriott, Professor

Dr. Lawrence Mays, Professor
Dr. Roslyn Mickelson, Professor
Dr. Taghi Mostafavi, Associate Professor
Dr. Yuri Nesmelov, Assistant Professor
Dr. Irina Nesmelova, Assistant Professor
Dr. James Oliver, Professor
Dr. Sungjune Park, Associate Professor
Dr. Jamie Payton, Associate Professor
Dr. Zbigniew Ras, Professor
Dr. William Ribarsky, Professor, and Bank of America
Endowed Chair in Information Technology
Dr. Erik Saule, Assistant Professor
Dr. Cem Saydam, Professor
Dr. Jessica Schlueter, Associate Professor
Dr. Mohamed Shehab, Associate Professor
Dr. Mindy Shi, Assistant Professor
Dr. Min Shin, Associate Professor
Dr. Richard Souvenir, Associate Professor
Dr. Antonis Stylianou, Professor
Dr. ZhengChang Su, Associate Professor
Dr. Chandrasekar Subramaniam, Associate Professor
Dr. Kalpathi Subramanian, Associate Professor
Dr. William J. Tolone, Professor
Dr. Khai Truong, Associate Professor
Dr. Shen-Guo Wang, Professor
Dr. Weichao Wang, Associate Professor
Dr. Xiaoyu Wang, Research Professor
Dr. Yongge Wang, Associate Professor
Dr. Yu Wang, Professor
Dr. Zachary Wartell, Associate Professor
Dr. Jennifer Weller, Associate Professor
Dr. Dale-Marie Wilson, Assistant Professor
Dr. David Wilson, Professor
Dr. Wensheng Wu, Assistant Professor
Dr. Xintao Wu, Professor
Dr. Wei-Ning Xiang, Professor
Dr. Jing Xiao, Professor
Dr. Jing Yang, Professor
Dr. Lixia Yao, Assistant Professor
Dr. Wlodek Zadrozny, Associate Professor
Dr. Kexin Zhao, Assistant Professor
Dr. Shaoting Zhang, Assistant Professor
Dr. Yuliang Zheng, Professor
Dr. Jing Zhou, Associate Professor

PH.D. IN COMPUTING AND INFORMATION SYSTEMS

The Ph.D. in Computing and Information Systems (CIS) program has five concentrations:

- 1) Bioinformatics (BINF)
- 2) Business Information Systems and Operations Management (BISOM)
- 3) Computer Science (CS)
- 4) Software and Information Systems (SIS)
- 5) Interdisciplinary (INT)

The program is staffed with a multidisciplinary faculty and offers opportunities for students to develop advanced competencies in a number of CIS-related fields. Faculty from the Departments of Computer Science, Software and Information Systems, Bioinformatics and Genomics, and Business Information Systems and Operations Management form its core. Students, in cooperation with faculty advisors, design flexible programs of study tailored to address individual career goals.

Students who aspire to academic research and teaching can benefit from a strong research faculty of international stature and exposure to practical applications of their specialties. Others seeking employment in industry, commerce, or government are afforded the opportunity to participate in high-quality applied research.

General Admission Requirements

Admission is competitive. Preference is given to applicants with strong credentials and appropriate undergraduate and/or professional preparation. Specific admission requirements for the program include:

- 1) A baccalaureate degree from a recognized institution. Students must show evidence of preparation in their chosen field sufficient to ensure profitable graduate study.
- 2) A satisfactory past academic performance as usually reflected by a grade point average of (or equivalent to) at least 3.0 (on a 4.0 scale) on courses related to the chosen field of Ph.D. study.
- 3) Excellent GRE or GMAT scores.
- 4) Applicants whose native language is not English must score at least 83 on the Internet-based version, 220 on the computer-based version, or 557 on the paper-based version of the Test of English as a Foreign Language (TOEFL). In addition, they will be required to take an English Proficiency Examination prior to the beginning of the first semester of study. Students who do not pass this examination must pass ENGL 1100 (English as a Foreign Language) with a grade of B or higher.
- 5) A one-page essay that addresses the following:
 - a) The applicant's motivation
 - b) Area(s) of research interest
- 6) Three letters of reference from professionals working in the applicant's field of interest that address the applicant's previous experience and potential to do research.

Further documentation that will support the application may include: evidence of scholarly and creative activity, including publication list; awards; results in national or international contests related to computing and information systems and the like.

Highly qualified individuals who may not meet all the required prerequisites may be admitted with a clear agreement to make up the prerequisites.

Concentration Specific Additional Admission Requirements

Business Information Systems and Operations Management Concentration and Software and Information Systems Concentrations

Additional admission requirements for the Business Information Systems and Operations Management concentration and Software and Information Systems concentration include:

- 1) Adequate understanding of software/information systems analysis, design, and implementation
- 2) Evidence of college-level skills in mathematical logic and data analysis (e.g., statistics, differential and integral calculus, discrete math, linear algebra)

Computer Science Concentration

Additional admission requirements for the Computer Science concentration include:

Coursework

Incoming students should possess a Master's or at least a Bachelor's degree in Computer Science, Computer Engineering, or a closely related discipline. Specifically, students should have demonstrable knowledge in at least four of the following areas:

- 1) Algorithms and Data Structures
- 2) Theory of Computation
- 3) Programming Language Concepts
- 4) Computer Architecture
- 5) Operating Systems
- 6) Software Engineering and Design

Course requirements may be satisfied through prior undergraduate or graduate work, or by a satisfactory score on the Computer Science Subject GRE examination. Admission into the Computer Science concentration is highly competitive. Thus, satisfying the requirements listed above does not guarantee admission.

Exceptionally strong students from other disciplines will be considered and may be allowed to make up the deficiencies at the discretion of the CS Ph.D. Admissions Committee.

Research

Prior research experience and strong recommendation letters (preferably from university faculty or researchers at corporate labs) will be a significant consideration in evaluating the applicant's research

potential. Research experience may be demonstrated via publications, Bachelor's or Master's theses. A good match with faculty research interests as well as faculty input to the Admissions Committee will play a significant role in the final decision. Potential applicants are encouraged to communicate with research faculty regarding their interests.

Application Deadlines

Application deadlines are in accordance with UNC Charlotte Graduate School deadlines. However, to ensure full consideration for financial support, applications must be received by September 1 for Spring admission and February 1 for Fall admission.

Degree Requirements

The Ph.D. in Computing and Information Systems program prepares students to be well-rounded professionals in the broad discipline of Computing and Information Systems (CIS). The degree of Doctor of Philosophy is granted for performance of original research resulting in significant contributions to the discipline's body of knowledge. Students are admitted into a concentration within the program by one of the participating units:

- 1) Department of Computer Science
- 2) Department of Software and Information Systems
- 3) Department of Bioinformatics and Genomics
- 4) Department of Business Information Systems and Operations Management

The Ph.D. in Computing and Information Systems program also has an interdisciplinary concentration in which CIS is applied to different disciplines. Students in the interdisciplinary concentration are admitted into one unit but are expected to complete some coursework in a complementary discipline in addition to the minimum core requirements of their chosen unit. Students in the interdisciplinary concentration must have co-advisors from their chosen unit and the complementary discipline. The detailed requirements are provided below. Failure to satisfy the requirements may result in the student's termination from the program.

To earn a Ph.D. degree, students in all concentrations must complete at least 72 post-baccalaureate credit hours. This includes at least 18 credit hours of dissertation research and at least 9 credit hours of coursework completed at UNC Charlotte. A limited amount of transfer credit is allowed (see below for details). Students are expected to acquire a sufficiently broad body of technical knowledge in the discipline as well as a deep understanding of a specialized area. Such courses will be defined by the student's advisor(s). Students are expected to excel in all coursework. Graduation requirements mandate

that students must achieve a minimum grade point average of 3.0 to graduate. Receiving more than two C grades or a grade of U in any course will result in a suspension from the program.

Introductory Course (3 credit hours)

ITSC 8110 Introduction to Computing and Information Systems Research (3)

First-year students must take this introductory course in the first Fall semester. It is jointly taught by CIS Ph.D. faculty for all concentrations, providing new students an overview of the CIS research areas and opportunities at UNC Charlotte.

Only when there is an unavoidable schedule conflict between ITSC 8110 and another Ph.D. level course that a student has to take, can the student make a request to take ITSC 8110 in the second Fall semester. Such a request must be justified and signed by the student's initial Ph.D. advisor and endorsed by the Ph.D. Program Director.

Graduate Research Seminar (minimum 3 credit hours)

ITSC 8699 Graduate Research Seminar (1)

Students must sign up for and receive credit for ITSC 8699 every semester that they are in the Ph.D. program until the semester after they pass the proposal defense, unless they are enrolled in ITSC 8110.

If there is a legitimate reason that a student has to do part of their Ph.D. research in a different site during a regular semester, then they must first make a request to be exempted from taking ITSC 8699 for the period that he/she is visiting the other site. Such a request must be well justified and signed by the student's Ph.D. advisor and endorsed by the Concentration Coordinator. The period of exemption should not exceed one semester. Exceptions must be approved by the Ph.D. Steering Committee.

Concentration Requirements

Bioinformatics Concentration

Required Courses (25 credit hours)

Students must take the following courses prior to the qualifying exam:

- BINF 8100 Biological Basis of Bioinformatics (3)
- BINF 8101 Energy and Information in Biological Modeling (3)
- BINF 8111 Bioinformatics Programming I (3)
- BINF 8111L Bioinformatics Programming I Lab (0)
- BINF 8112 Bioinformatics Programming II (3)
- BINF 8112L Bioinformatics Programming II Lab (0)
- BINF 8200 Statistics for Bioinformatics (3)
- BINF 8200L Statistics for Bioinformatics Lab (0)

BINF 8201 Molecular Sequence Analysis (3)
 BINF 8201L Molecular Sequence Analysis Lab (0)
 BINF 8202 Computational Structural Biology (3)
 BINF 8202L Computational Structural Biology Lab (0)
 BINF 8911 Bioinformatics Research Rotation I (2)
 BINF 8912 Bioinformatics Research Rotation II (2)

Elective Courses (24 credit hours)

Select from the following:

BINF 8000-8999
 ITCS 8000-8999
 ITIS 8000-8999
 ITSC 8000-8999

Note: Students with exceptionally strong backgrounds in specific disciplines may be excused from one or more of the required didactic classes (except ITSC 8110) at the discretion of the Bioinformatics Concentration Coordinator.

Business Information Systems and Operations Management Concentration

In addition to the general CIS Ph.D. program requirements, students must also take:

Required Coursework (minimum 36 credit hours)

Take at least 36 credit hours of coursework approved by the student's Research Advisor(s). At least 9 credit hours of graduate coursework must be taken at UNC Charlotte. (Exceptions to minimum credit hour requirements may be granted by the Department's Graduate Affairs Committee upon the recommendation of the student's advisor. Such a request should only be granted based on overwhelming evidence that the student has excellent background knowledge to conduct high quality research in Computing and Information Systems.)

Dissertation Research (minimum 18 credit hours)

ITSC 8991 Doctoral Dissertation Research (1-9)

Computer Science Concentration

Core Courses (12 credit hours)

The GPA of these four core courses must be 3.5 or above. Core course requirements must be met within the first 30 credit hours of entering the program.

Group A (6 credit hours)

Select two of the following:

ITCS 8107 Formal Languages and Automata (3)
 ITCS 8114 Algorithms and Data Structures (3)
 ITCS 8132 Modeling and Analysis of Communication Networks (3)
 ITCS 8156 Machine Learning (3)
 ITCS 8165 Coding and Information Theory (3)

Group B (6 credit hours)

Select two of the following:

ITCS 8120 Computer Graphics (3)
 ITCS 8150 Intelligent Systems (3)
 ITCS 8160 Database Systems (3)
 ITCS 8166 Computer Communications and Networks (3)
 ITCS 8182 Computer System Architecture (3)

Elective Courses (15 credit hours)

With advisor approval, select from the following:

ITCS 8000-8999
 ITIS 8000-8999
 ITSC 8000-8999

Additional Elective Courses (15 credit hours)

Take additional elective courses, research credit, or a combination of the two from the following:

ITCS 8000-8999
 ITIS 8000-8999
 ITSC 8000-8999

Pre-Dissertation Research (minimum 6 credit hours)

Students take during their first four semesters under the direction of one or more CIS Ph.D. Graduate Faculty members.

ITSC 8990 Pre-Dissertation Research (1-6)

Dissertation Research (minimum 18 credit hours)

Take under the direction of one or more CIS Ph.D. Graduate Faculty members.

ITSC 8991 Doctoral Dissertation Research (1-9)

Software and Information Systems Concentration

Core Courses (9 credit hours)

A GPA of 3.6 or above is required for these courses. Advanced versions of the core courses can be used as substitutes upon permission from both the student's academic advisor and the program coordinator. Core course requirements must be met during the first 30 credit hours within the program.

Select three of the following:

ITIS 8180 Foundations of Health Informatics (3)
 ITIS 8200 Principles of Information Security and Privacy (3)
 ITIS 8400 Principles of Human-Computer Interaction (3)
 ITIS 8520 Network Science (3)

Elective Courses (15 credit hours)

With advisor approval, select from the following:

ITCS 8000-8999
 ITIS 8000-8999
 ITSC 8000-8999

Additional Elective Courses (15 credit hours)

Take additional elective courses, research credit, or a combination of the two from the following:

ITCS 8000-8999
ITIS 8000-8999
ITSC 8000-8999

Pre-Dissertation Research (minimum 6 credit hours)

Students take during their first four semesters under the direction of one or more CIS Ph.D. Graduate Faculty members.

ITSC 8990 Pre-Dissertation Research (1-6)

Dissertation Research (minimum 18 credit hours)

Take under the direction of one or more CIS Ph.D. Graduate Faculty members.

ITSC 8991 Doctoral Dissertation Research (1-9)

Interdisciplinary Concentration

The coursework requirements of this concentration depend on the chosen unit and complementary discipline. Students in this concentration must select Computer Science (CS) or Software and Information Systems (SIS) as their home unit. The core courses of that unit applies to them.

Computer Science Core Courses (12 credit hours)

Group A (6 credit hours)

Select two of the following:

ITCS 8107 Formal Languages and Automata (3)
ITCS 8114 Algorithms and Data Structures (3)
ITCS 8132 Modeling and Analysis of Communication Networks (3)
ITCS 8156 Machine Learning (3)
ITCS 8165 Coding and Information Theory (3)

Group B (6 credit hours)

Select two of the following:

ITCS 8120 Computer Graphics (3)
ITCS 8150 Intelligent Systems (3)
ITCS 8160 Database Systems (3)
ITCS 8166 Computer Communications and Networks (3)
ITCS 8182 Computer System Architecture (3)

Software and Information Systems Core Courses (9 credit hours)

Select three of the following:

ITIS 8180 Foundations of Health Informatics (3)
ITIS 8200 Principles of Information Security and Privacy (3)
ITIS 8400 Principles of Human-Computer Interaction (3)
ITIS 8520 Network Science (3)

Elective Discipline Courses

Beyond the core requirements of the chosen unit, students must select a minimum of two graduate courses from a complementary discipline with the approval of their advisors.

Research Advisor(s) and Qualifying Exam Committee

Each Ph.D. student is assigned a temporary academic advisor(s) within a concentration when admitted to the program. Before the end of their fourth semester in the program, students should select a Research Advisor(s) and, in consultation with their Research Advisor(s), form a Qualifying Exam Committee. The Qualifying Exam Committee should include at least three CIS Doctoral Faculty members, plus the student's the Research Advisor who is a non-voting member of the Qualifying Exam Committee. The Qualifying Exam Committee must be approved by the Concentration Coordinator.

Qualifying Exam

Each student must pass a qualifying exam, given and evaluated by the student's Qualifying Exam Committee. The purpose of the Qualifying Exam is to ensure that the student will have sufficient capability for doing dissertation-level research leading to a Ph.D. degree.

Each student must prepare a written research survey that describes the research area the student is expected to do his/her dissertation research in. Copies of the research survey must be provided to the committee at the time of filing the Qualifying Examination application, which must be at least two weeks prior to the exam. The student must present the research survey and defend it in a manner accepted by the Qualifying Exam Committee. Prior to the oral defense of the research survey, the student's advisor is required to submit a written evaluation of the student's research and academic progress to the Qualifying Exam Committee, with a copy also provided to the Concentration Coordinator. The Qualifying Exam will be graded on a Pass/Unsatisfactory basis, based on the corresponding rubrics by the Qualifying Exam Committee. A pass decision must be unanimous.

The student must pass the Qualifying Examination in at most two attempts within three years of the date of first enrollment into Ph.D. study at UNC Charlotte. A student who fails the Qualifying Exam twice will be terminated from the Ph.D. in Computing and Information Systems program.

Dissertation Committee

After passing the qualifying exam, the student should

set up a Dissertation Committee of at least four graduate faculty members, which include at least three Ph.D. in Computing and Information Systems faculty members. This Committee may, but is not required to, consist of the same faculty members as the Qualifying Exam Committee. Ordinarily, the chair of this committee will be the student's advisor(s), who must be a member of the CIS Ph.D. program faculty and will ensure that the composition of the committee is appropriate. Committee members from outside the University must be appointed Associate Graduate Faculty members at UNC Charlotte. The Dissertation Committee must be approved by the Concentration Coordinator. After identifying and obtaining the signatures of the CIS faculty who will be serving on the Committee, the Dissertation Committee Form must be sent to the Graduate School for the appointment of the Graduate Faculty Representative. This appointment may take as long as four weeks. If there is need to change committee members later, a formal written request must be first submitted to the CIS Ph.D. Steering Committee with a clear explanation of the rationale for change. Upon approval by the CIS Ph.D. Steering Committee, a revised Committee form (above) must be submitted.

Proposal Defense

Each student must present and defend a Ph.D. dissertation proposal after passing the qualifying exam and within ten semesters since entering the Ph.D. program. The proposal defense will be conducted by the student's Dissertation Committee and will be open to the CIS Ph.D. faculty and students. The student shall provide copies of the written proposal to the Committee members at least two weeks before the scheduled defense. At the discretion of the Dissertation Committee, the defense may include questions that cover the student's program of study and background knowledge in the area of the proposal. The proposal defense will be graded on a Pass/Unsatisfactory basis, according to the corresponding rubrics by the Committee. A pass must be a unanimous decision by the Committee members; otherwise, the proposal defense fails. A student may retake the proposal defense if he/she cannot pass it the first time, and should consult the Concentration Coordinator before the second attempt. The second failed defense of a dissertation proposal will result in the termination of the student's enrollment in the Ph.D. program. It is expected that the student first take the proposal defense by the ninth semester after they are enrolled, in order to provide time for a second attempt should the first one fail.

Ph.D. Candidacy

A doctoral student advances to Ph.D. candidacy after the dissertation proposal has been successfully defended.

Dissertation

Each student must complete a research program approved by the student's Dissertation Advisor(s) that yields a high quality, original, and substantial piece of research. The Ph.D. dissertation describes this research and its results. The dissertation defense is a public presentation. A written copy of the dissertation must be made available to each member of the student Ph.D. Dissertation Committee, to the Ph.D. Steering Committee, and to the UNC Charlotte Library, at least three weeks before the public defense. The date of the defense must be publicly announced at least three weeks prior to the defense. The student must present the dissertation and defend it in a manner accepted by the Dissertation Committee. The dissertation will be graded on a Pass/Unsatisfactory basis, based on the corresponding rubrics by the Dissertation Committee. A pass decision must be unanimous and must be approved by the Dean of the Graduate School. A student who fails the defense of a dissertation twice will be terminated from the Ph.D. in Computing and Information Systems program.

Progress Report and Evaluation

By every January, each student is required to submit a written progress report for the previous year, and the advisor(s) is required to submit a written evaluation of the student to the Concentration Coordinator, with a copy to the Program Director. A rubric is used for evaluation of progress. Failure to make satisfactory progress may result in discontinuation of the student's graduate assistantship and suspension from the program.

Residency Requirements

Each student must satisfy the residency requirement of one continuous full-time year (i.e., two consecutive semesters with the student being enrolled for at least nine graduate credit hours in each semester) after being admitted to the Ph.D. degree program.

Transfer Credit

In accordance with rules of the UNC Charlotte Graduate School, students are allowed to transfer up to 30 credit hours of graduate credit earned at UNC Charlotte or other recognized graduate programs. In cases of applicants with records of exceptionally high quality, the CIS Ph.D. Steering Committee, at its discretion, may request that the Graduate School approve transfer credit beyond the limit set by the Graduate School. To receive transfer credit, students must file a written request and submit all necessary documents to the Concentration Coordinator.

DOCTORAL COURSES IN COMPUTING AND INFORMATION SYSTEMS

Bioinformatics (BINF)

See descriptions of BINF courses under "Bioinformatics and Genomics" earlier in this section of this *Catalog*.

Computer Science (ITCS)

ITCS 8010. Topics in Computer Science. (3)

Prerequisite: Ph.D. student standing or permission of instructor. Topics in computer science selected to supplement the regular course offerings. A student may register for multiple sections of the course with different topics in the same semester or in different semesters.

ITCS 8050. Topics in Intelligent Systems. (3)

Prerequisite: Ph.D. student standing or permission of instructor. Topics in intelligent systems selected to supplement the regular course offerings. *May be repeated for credit with change of topic.*

ITCS 8080. Topics in Computer Engineering. (3)

Prerequisite: Ph.D. student standing or permission of instructor. Topics in computer engineering selected to supplement the regular course offerings. *May be repeated for credit with change of topic.*

ITCS 8107. Formal Languages and Automata. (3)

Prerequisite: Ph.D. student standing or permission of instructor. Detailed study of abstract models for the syntax of programming languages and information processing devices. Languages and their representation; grammars; finite automata and regular sets; context-free grammars and pushdown automata; Chomsky Hierarchy; closure properties of families of languages; syntax analysis.

ITCS 8110. Topics in Programming Languages and Compilers. (3)

Prerequisite: ITCS 5128. A continuation of material in ITCS 5128 with emphasis on advanced aspects of optimization, data flow analysis, and error discovery.

ITCS 8111. Evolutionary Computation. (3)

Prerequisite: ITCS 8114 or permission of instructor. General introduction to optimization problems. Optimization techniques: hill climbing, simulated annealing, evolution strategies, genetic algorithms. Evolution programming techniques.

ITCS 8112. Software Systems Design and Implementation. (3)

Cross-listed as ITIS 8112. Prerequisite: Ph.D. student standing or permission of

instructor. Introduction to the techniques involved in the planning and implementation of large software systems. Emphasis on human interface aspects of systems. Planning software projects; software design process; top-down design; modular and structured design; management of software projects; testing of software; software documentation; choosing a language for software system.

ITCS 8114. Algorithms and Data Structures. (3)

Cross-listed as ITCS 6114. Prerequisite: Ph.D. student standing or permission of instructor. Analyzing algorithms and problems; data abstraction and data structures; recursion and induction; time and space complexities; searching and sorting; search trees and tries; hashing; heaps; dynamic programming; graph algorithms; string matching; NP-complete problems.

ITCS 8115. Advanced Topics in Algorithms and Data Structures. (3)

Cross-listed as ITCS 6115. Prerequisite: ITCS 8114 or equivalent. Advanced study on selected topics such as NP-complete and NP-hard problems, approximation algorithms, computational geometry, multithreaded algorithms and parallel algorithms, string processing, number-theoretic algorithms, cryptology.

ITCS 8120. Computer Graphics. (3)

Cross-listed as ITCS 6120. Prerequisite: Ph.D. student standing or permission of instructor. Introduction to the design and implementation of interactive graphics systems. Raster and vector display systems, I/O devices; graphics primitives and their attributes; raster algorithms and clipping; 2D/3D geometric transformations; 3D viewing and projections; hierarchical and procedural models; surface representation; color and lighting models; rendering algorithms; global illumination and texture mapping.

ITCS 8124. Illustrative Visualization. (3) Cross-listed as ITCS 6124. Prerequisite: Graduate standing or permission of the instructor. The state-of-the-art of illustrative visualization techniques, which transform large-scale, complex datasets to succinct, non-photorealistic visualization styles and at the same time preserve important data features. Topics include: 2D/3D stippling, interactive line drawings, animated visualization, non-photorealistic rendering, design, and evaluation of illustrative visualization approaches.

ITCS 8125. Virtual Environments. (3)

Cross-listed as ITCS 6125. Prerequisite: Ph.D. student standing or permission of instructor. Covers the current state-of-the-art in the design and implementation of Virtual Environments. Topics include: position tracking, design of head-tracked and head-mounted displays, stereoscopic display, presence in virtual environments, 3D user interface design, and

applications of VEs. Previous experience in computer graphics or 3D game design is helpful but not required.

ITCS 8126. Large Scale Information Visualization.(3)

Cross-listed as ITCS 6126. Prerequisite: ITCS 4121 or ITCS 5121. Concept, theory, design principles, data processing techniques, and visual metaphors and interaction techniques for massive, multi-dimensional, multi-source, time-varying information exploration.

ITCS 8127. Real-Time Rendering Engines. (3) Cross-listed as ITCS 6127. Prerequisite: ITCS 5120 or ITCS 6120. Focuses on advanced concepts and techniques employed in building real-time rendering systems that support a high level of realism as well as handle large geometric models. Topics include: modern graphics hardware, programmable shaders, shadow and environment mapping, image-based modeling and rendering, large data models (simplification, level of detail), high quality interactive rendering.

ITCS 8128. 3D Display and Advanced Interfaces. (3) Cross-listed as ITCS 6128. Prerequisite: ITCS 4120 or ITCS 6120. The fundamentals of 3D display hardware and software technology. Topics include: human visual spatial perception of natural and synthetic 3D images, 3D display hardware, human computer interface algorithms for effective stereoscopic display, 3D display rendering techniques.

ITCS 8130. Advanced Computer Graphics. (3) Cross-listed as ITCS 6130. Prerequisite: ITCS 8120 or permission of instructor. Implicit and parametric representation; cubic surfaces; advanced reflection models; global illumination models - ray tracing, radiosity; shadow algorithms, texture mapping; volumetric modeling and rendering techniques; animation; advanced modeling techniques; particle systems, fractals.

ITCS 8132. Modeling and Analysis of Communication Networks. (3) Prerequisite: A course in communication networks or permission of instructor. Students develop an understanding of modeling and analysis techniques for communication systems and networks. Comparatively analyze the cost and performance impact of network architecture and protocol design decisions. Modeling techniques for analytical analysis, simulation based analysis, and measurement based analysis. Topics include: validation/verification of models, workload characterization, metric selection, presentation and interpretation of results. A semester long analysis project is undertaken.

ITCS 8134. Digital Image Processing. (3) Cross-listed as ECGR 6118. Prerequisite: Ph.D. student standing or permission of instructor. Image perception; image

types/applications; image restoration and enhancement; edge/boundary detection; image transformation; image segmentation; statistical and syntactical pattern recognition; image information measures and compression.

ITCS 8140. Data Visualization. (3) Prerequisite: Ph.D. student standing or permission of instructor. Emphasis on the methodology and application of data visualization to scientific and engineering data; data types and models; visualization methods; volume visualization; scalar, vector and tensor fields; multi-variate visualization; visualization systems and model; visualization applications; visualization software and hardware; research issues and future trends.

ITCS 8144. Operating Systems Design. (3)

Prerequisite: ITCS 8114 or permission of instructor. Introduction to features of a large-scale operating system with emphasis on resource-sharing environments. Computer system organization; resource management; multiprogramming; multi-processing; file systems; virtual machine concepts; protection and efficiency.

ITCS 8148. Advanced Object-Oriented Systems. (3)

Prerequisite: ITCS 8112 or permission of instructor. Focuses on issues related to the design, implementation, integration, and management of large object-oriented systems. Topics include: object models, object modeling, frameworks, persistent and distributed objects, and object-oriented databases.

ITCS 8150. Intelligent Systems. (3) Prerequisite: Ph.D. student standing or permission of instructor. Introduction to core ideas in AI. Heuristic versus algorithmic methods; problem solving; game playing and decision making; automatic theorem proving; pattern recognition; adaptive learning; projects to illustrate theoretical concepts.

ITCS 8151. Intelligent Robotics. (3) Prerequisites: Ph.D. student standing and an undergraduate course in linear algebra, or permission of instructor. General introduction to spatial descriptions and transformations, and manipulator position and motion. More study on robot planning, programming, sensing, vision, and CAD/CAM.

ITCS 8152. Robot Motion Planning. (3) Prerequisite: ITCS 8114 or permission of instructor. Introduction to algorithmic techniques for robot motion planning. Topics include: configuration space representations, roadmap methods, cell decomposition methods, potential field techniques, randomized path planning, collision detection, nonholonomic motion planning, multiple robot coordination, and manipulation planning. These techniques are motivated by applications of motion planning to mobile robots and

robot manipulators, assembly planning, computer aided design, computer graphics, and bioinformatics.

ITCS 8153. Neural Networks. (3) Prerequisite: ITCS 8114. Topics include: Basic notions and models of artificial neural nets; single layer neural classifiers; multilayer one-way neural nets; single layer feedback networks; neural models of associative memory; self-organizing neural nets; translation between neural networks and knowledge bases; applications of neural networks.

ITCS 8154. Heuristic Search. (3) Prerequisite: ITCS 8150. Heuristics and problem representation; heuristic-search procedures; formal properties and performance analysis of heuristic methods; game-searching strategies and heuristic programming; search with probabilities; knowledge-guided search.

ITCS 8155. Knowledge-Based Systems. (3) Prerequisite: ITCS 8162 or permission of instructor. Knowledge systems; knowledge discovery; association rules; action rules, hierarchical classifiers, cascade classifiers, query languages and their semantics; cooperative and collaborative systems; ontology and metadata; flexible query answering; chase algorithms and data sanitization methods; decision support systems in medicine; and automatic indexing of music.

ITCS 8156. Machine Learning. (3) Prerequisite: ITCS 8150 or permission of instructor. Machine learning methods and techniques including: acquisition of declarative knowledge; organization of knowledge into new, more effective representations; development of new skills through instruction and practice; and discovery of new facts and theories through observation and experimentation.

ITCS 8157. Visual Databases. (3) Prerequisite: ITCS 8160 or permission of instructor. Topics include: Representation of visual content, querying visual databases, content-based interactive browsing and navigation, system architecture, similarity models, indexing visual databases, data models and knowledge structures, image retrieval by similarity, and video retrieval by content.

ITCS 8158. Natural Language Processing. (3) Prerequisite: ITCS 8150. Principles, methodologies, and programming methods of natural language processing including foundations of natural language understanding, namely: lexical, syntactic, and semantic analysis, discourse integration, and pragmatic and morphological analysis.

ITCS 8159. Intelligent Tutoring Systems. (3) Prerequisite: Ph.D. student standing or permission of instructor. Introduces the issues relevant to creating

adaptive learning systems using artificial intelligence and includes a project to build a small Intelligent Tutoring System (ITS). Topics include: representation of knowledge and cognition, ITS design, adaptive user interfaces, design and evaluation of feedback, experimental methods, educational data mining, history of intelligent tutoring, tutor authoring, and issues for implementation.

ITCS 8160. Database Systems. (3) Prerequisite: Ph.D. student standing or permission of instructor. The modeling, programming, and implementation of database systems. Focuses on relational database systems, but may also address non-relational databases or other advanced topics. Topics include: (1) modeling: conceptual data modeling, ER diagram, relational data model, schema design and refinement; (2) programming: relational algebra and calculus, SQL, constraints, triggers, views; (3) implementation: data storage, indexing, query execution, query optimization, and transaction management; and (4) advanced: semi-structured data model, XML, and other emerging topics.

ITCS 8161. Advanced Topics in Database Systems. (3) Prerequisite: ITCS 8160 or permission of instructor. Continuation of ITCS 8160. Topics include: deductive databases; semantic query processing; intelligent and cooperative query languages; distributed databases; active databases; heterogeneous databases, multimedia databases; data and knowledge interchange; multidatabase systems; very large databases.

ITCS 8162. Knowledge Discovery in Databases. (3) Prerequisite: ITCS 8160 or permission of instructor. The entire knowledge discovery process is covered. Topics include: setting up a problem, data preprocessing and warehousing, data mining in search for knowledge, knowledge evaluation, visualization and application in decision making. A broad range of systems, such as OLAP, LERS, DatalogicR+, C4.5, AQ15, Forty-Niner, CN2, QRAS, and discretization algorithms are covered.

ITCS 8163. Data Warehousing. (3) Prerequisite: ITCS 8160 or permission of instructor. Topics include: use of data in discovery of knowledge and decision making; the limitations of relational databases and SQL queries; the warehouse data models: multidimensional, star, snowflake; architecture of data warehouse and the process of warehouse construction; data consolidation from various sources; optimization; techniques for data transformation and knowledge extraction; relations with enterprise modeling.

ITCS 8164. Design and Implementation of Online Management Information Systems. (3) Prerequisite:

ITCS 8114 or permission of instructor. The fundamental concepts and philosophy of planning and implementing an online computer system. Characteristics of online systems; hardware requirements; modeling of online systems; performance measurement; language choice for online systems; organization techniques, security requirements; resource allocation.

ITCS 8165. Coding and Information Theory. (3)

Prerequisite: knowledge of probability theory or permission of instructor. Information theory; coding theory; Shannon's theorem; Markov process; channel capacity; data transmission codes; error correcting codes; data compression; data encryption.

ITCS 8166. Computer Communications and Networks. (3)

Prerequisite: Ph.D. student standing or permission of instructor. Introduction to the concepts of communication networks; types of networks; wired and wireless media; communication architectures; network protocols; coding and modulation; multiplexing and multiple access; error and flow control; routing; Internet Protocols; transport protocols. Assignments include implementation and analysis of network protocols.

ITCS 8167. Advanced Networking Protocols. (3)

Prerequisite: ITCS 8166 or ITCS 8168. Focuses on advanced networking concepts and protocols related to the design, implementation, integration, and management of networking and communication systems. Topics include: topology control protocols, ad hoc routing protocols, power management protocols, distributed data processing protocols for various networking systems (Internet, wireless mesh networks, ad hoc networks, sensor networks, peer-to-peer networks).

ITCS 8168. Wireless Communication Networks. (3)

Prerequisites: Ph.D. student standing in CS, SIS, ECE, or Optics and a prior course in networking, or permission of instructor. An overview of mobile systems and wireless networking technologies. Emphasis on resource management, routing and quality of service at the MAC and networking layers for mobile systems. Students undertake a semester long research project to survey the research literature and identify specific challenges for cellular telecommunications, wireless LANS, ad hoc networks, mesh networks or sensor networks.

ITCS 8170. Logic for Artificial Intelligence. (3)

Prerequisite: ITCS 8150 or permission of instructor. Introduction to basic concepts of logic for artificial intelligence, including declarative knowledge, inference, resolution, nonmonotonic reasoning, induction, reasoning with uncertain beliefs, distributed information systems, intelligent

information systems, planning and intelligent- agent architecture.

ITCS 8171. Logic Programming. (3)

Prerequisite: ITCS 8150 or permission of instructor. Prolog programming language; programming techniques in Prolog; foundations of logic programming including computability of Horn clause logic, completeness of resolution principle, complexity of unification algorithms, and verification of logic programs; principles of implementing logic programming systems; selected topics from applications of logic programming to expert systems, intelligent database systems, and/or natural language processing.

ITCS 8175. Computability and Complexity. (3)

Prerequisite: ITCS 8114. Study of computability, unsolvability, computational complexity. Concept of effective computability; recursive functions; mathematical models of computation; universal Turing machines; unsolvable problems; time and space complexity of computations; NP-completeness problems; subrecursive hierarchies.

ITCS 8181. Switching and Automata Theory. (3)

Prerequisite: permission of instructor. Topics include: sets, relations, lattices, Boolean algebras; functional decomposition and symmetric functions; threshold logic; multiple-valued logic; fault detection and fault tolerant design; finite state machines, incompletely specified machines, minimization; state identification and fault detection experiments; finite state recognizers.

ITCS 8182. Computer System Architecture. (3)

Prerequisite: Ph.D. student standing or permission of instructor. Survey of existing and proposed architectures; pipelined, dataflow, multi-bus and parallel system architecture, and interconnection network architectures. Project-based and requires written and verbal presentation of projects.

ITCS 8183. Computer Arithmetic. (3)

Prerequisite: Ph.D. student standing or permission of instructor. Principles, architecture, and design of fast two operand adders; multioperand adders, standard multipliers, and dividers. Cellular array multipliers and dividers. Floating point processes, BCD, and excess three adders, multipliers, and dividers.

ITCS 8186. Application Specifics System Design and Simulation. (3)

Prerequisites: Ph.D. student standing and undergraduate computer architecture course, or permission of instructor. Project-oriented course on techniques and methodology in design and development of special purpose systems valuable for business, healthcare, and industrial community; course content include system specifications, interface structure and data communication, interconnection

architecture, and techniques for testing and debugging.

ITCS 8190. Cloud Computing for Data Analysis. (3)

Cross-listed as DSBA 6190 and ITCS 6190.

Prerequisites: ITCS 8114 or permission of instructor; familiarity with Java, Unix, Data Structures and Algorithms, Linear Algebra, and Probability and Statistics; good programming skills and a solid mathematical background. Introduction to the basic principles of cloud computing for data-intensive applications. Focuses on parallel computing using Google's MapReduce paradigm on Linux clusters, and algorithms for large-scale data analysis applications in web search, information retrieval, computational advertising, and business and scientific data analysis. Students read and present research papers on these topics, and implement programming projects using Hadoop, an open source implementation of Google's MapReduce technology, and related NoSQL technologies for analyzing unstructured data.

ITCS 8220. Pattern Recognition. (3)

Prerequisite: Ph.D. student standing or permission of instructor. Topics include: Pattern pre-processing and feature extraction (entropy minimization, orthogonal expansion, Fourier expansion, Karhunen-Loeve expansion, PCA); linear decision functions; orthogonal and non-orthogonal systems of functions; pattern classification by distance functions (Nearest Neighbor, K-means, ISODATA); pattern classification by likelihood functions (Bayesian classifiers, estimation of probability density function); trainable classifiers (LMSE, Perceptron, multi-layer perceptrons, fuzzy classifiers); stochastic processes; classification on categorical attributes.

ITCS 8222. Biomedical Signal Processing. (3)

Prerequisite: Ph.D. student standing. Topics include: Fundamental techniques in processing, analysis, feature extraction, and classification of complex signals; origin and processing techniques for biomedical signals, including ECG, ENG, EEG, MEG, ERG, EMG, respiratory signals, blood sound, and pressure signals.

ITCS 8224. Biomedical Image Processing. (3)

Prerequisites: Ph.D. student standing and undergraduate course in linear algebra, or permission of instructor. Topics include: Review of image processing and pattern recognition (2-D Fourier transforms, 2-D Wavelet transform, denoising of medical images); origin and processing of X-ray images; CT images; MRI images; ultrasonic images; PET images; thermal images; electrical impedance images; cross-registration between images of different source; stereotactic neurosurgery; stereotactic radiosurgery/radiotherapy; robot-assisted surgery.

ITCS 8226. Bioinformatics. (3) Prerequisite: Ph.D. student standing. Topics include: Brief Review of molecular biology, proteins and their classifications, DNA, RNA, and using microarrays and gene chips for sequencing; review of computational techniques for bioinformatics, expectation maximization, Bayesian classifiers, dynamic programming, information theory and entropy analysis, Markov chain models, and neural networks; computational techniques for local and multiple sequence alignment; application of Markov chains in finding genes; using information theory to estimate binding sites, start Codon prediction; RNA secondary structure prediction; computational techniques for protein function prediction; Advanced signal processing techniques in feature extraction from protein sequences.

ITCS 8228. Medical Informatics. (3) Prerequisite: Ph.D. student standing. Focuses on methods and techniques used in storage, communication, processing, analysis, integration, management, and distribution of medical information. Emphasizes the applications of telemedicine and intelligent computer-aided decision making systems in different medical and surgical systems. Discusses the computational methods to accept or reject a new drug or a new treatment for a given disease.

ITCS 8265. Advanced Topics in Knowledge Discovery in Databases. (3)

Prerequisite: ITCS 8162 or permission of instructor. Continuation and extension of ITCS 8162. Information visualization in data mining and knowledge discovery, predictive data mining, mining of multimedia sources, mining of unstructured data, distributed data mining, mining of Web data/information, mining complex types of data, mining of biotechnology data, applications and trends in data mining.

ITCS 8267. Intelligent Information Retrieval. (3)

Prerequisite: ITCS 8114 or permission of instructor. Topics include: definition of the information retrieval problem, modeling the information retrieval problem, evaluation of information retrieval, query languages and operations, text processing, indexing and searching, parallel and distributed information retrieval, user interface and visualization, multimedia information retrieval, and information retrieval applications.

ITCS 8500. Complex Adaptive Systems. (3)

Cross-listed as DSBA 6500, HCIP 6500, ITCS 6500, ITIS 6500, and ITIS 8500. Prerequisite: Permission of instructor. Complex adaptive systems (CAS) are networked (agents/part interact with their neighbors and, occasionally, distant agents), nonlinear (the whole is greater than the sum of its parts), adaptive (the system learns to change with its environment), open (new resources are being introduced into the

environment), dynamic (the change is a norm), emergent (new, unplanned features of the system get introduced through the interaction of its parts/agents), and self-organizing (the parts organize themselves into a hierarchy of subsystems of various complexity). Ant colonies, networks of neurons, the immune system, the Internet, social institutions, organization of cities, and the global economy are a few examples where the behavior of the whole is much more complex than the behavior of the parts. Covers these and similar topics in an interactive manner. Examples of our current research effort are provided. Topics include: Self-organization; emergent properties; learning; agents; localization affect; adaptive systems; nonlinear behavior; chaos; complexity.

ITCS 8690. Computer Science Seminar. (3)

Prerequisites: at least 9 graduate ITCS/ITIS hours and permission of department. Experience for the advanced Ph.D. student on current problems of computer design and application. (May be used by a student or small group of students to work with a professor on a topic of mutual interest. May be used to give a course on a topic announced in advance.)

Software and Information Systems (ITIS)

ITIS 8010. Topics in Software and Information Systems. (3) Prerequisite: permission of department. Topics in software and information systems selected to supplement the regular course offerings. *May be repeated for credit with change of topic.*

ITIS 8011. Interaction Design Studio. (4)

Prerequisite: Graduate standing and permission of department. A studio approach to teaching topics in interaction design. Aspects of interaction design taught in the studio include: gesture-based interaction, tangible interaction, large public display interaction, tabletop interaction, multi-touch tablet interaction, and human-robot interaction. Students learn to apply a theoretical understanding of some aspect of interaction design to the study of existing designs and the development of a new design. Outcomes include writing a literature review about interaction design, executing users studies and critiques of existing designs, and developing and implementing a new interaction design for a specific purpose. *May be repeated for credit.*

ITIS 8112. Software System Design and Implementation. (3) Cross-listed as ITCS 8112.

Prerequisite: Ph.D. student standing or permission of instructor. Introduction to the techniques involved in the planning and implementation of large software systems. Emphasis on human interface aspects of systems. Planning software projects; software design process; top-down design; modular and structured design; management of software projects; testing of

software; software documentation; choosing a language for software system.

ITIS 8120. Applied Databases. (3) Cross-listed as HCIP 5160 and ITIS 6120. Prerequisite: Full graduate standing or permission of department. Identification of business database needs; requirements specification; relational database model; SQL; E-R modeling; database design, implementation, and verification; distributed databases; databases replication; object-oriented databases; data warehouses; OLAP; data mining; security of databases; vendor selection; DBMS product comparison; database project management; tools for database development, integration, and transaction control.

ITIS 8130. Software Requirements Engineering for Information Systems. (3) Prerequisite: Full graduate standing, or permission of department. Introduction to requirement engineering methodologies. Topics include: requirements elicitation, specification, and validation; structural, informational, behavioral, security, privacy, and computer user interface requirements; scenario analysis; application of object-oriented methodologies in requirements gathering; spiral development models; risk management models; software engineering maturity model.

ITIS 8140. Software Testing and Quality Assurance. (3)

Prerequisite: ITIS 6112 or permission of department. Methods for evaluating software for correctness, and reliability including code inspections, program proofs and testing methodologies. Formal and informal proofs of correctness. Code inspections and their role in software verification. Unit and system testing techniques, testing tools and limitations of testing. Statistical testing, reliability models. Software engineering maturity model.

ITIS 8148. Advanced Object-Oriented Systems. (3)

Cross-listed as ITCS 8112. Prerequisite: ITIS 8112 or equivalent. Issues related to the design, implementation, integration, and management of large object-oriented systems. Topics include: object models, object modeling, frameworks, persistent and distributed objects, and object-oriented databases.

ITIS 8150. Software Assurance. (3) Cross-listed as ITIS 6150. Prerequisite: ITCS 6112, ITCS 8112, ITIS 5221, ITIS 6112, ITIS 8112, or permission of department. An introduction to software assurance education and research. Topics include: the security of software across the development life cycle that addresses trustworthiness, predictable execution and conformance. Various aspects of secure software requirements, design, construction, verification, and validation, process and engineering management are

focused on as they relate to secure software development. Students gain hands-on experience in various techniques and tools as part of a semester-long project in addition to other assignments.

ITIS 8156. Computer-Aided Instruction. (3)

Prerequisite: permission of department. History of CAI; study of current CAI systems; development of man-machine dialogue; programming tools for CAI; information structures for computer-oriented learning. Advantages/disadvantages/costs of CAI.

ITIS 8163. Data Warehousing. (3) Cross-listed as ITCS 8163. Prerequisite: ITCS 8160 or equivalent. Topics include: use of data in discovery of knowledge and decision making; the limitations of relational databases and SQL queries; the warehouse data models: multidimensional, star, snowflake; architecture of data warehouse and the process of warehouse construction; data consolidation from various sources; optimization; techniques for data transformation and knowledge extraction; relations with enterprise modeling.

ITIS 8164. Online-Info Systems. (3) Prerequisites: ITCS 6114 or permission of department. The fundamental concepts and philosophy of planning and implementing an online computer system. Characteristics of online systems; hardware requirements; modeling of online systems; performance measurement; language choice for online systems; organization techniques, security requirements; resource allocation.

ITIS 8167. Network and Information Security. (3) Prerequisite: ITCS 6166 or equivalent. Examines the issues related network and information security. Topics include: concepts, security attacks and risks, security architectures, security policy management, security mechanisms, cryptographic algorithms, security standards, security system interoperation and case studies of the current major security systems.

ITIS 8177. System Integration. (3) Prerequisite: Ph.D. student standing, or permission of the department. Examines the issues related to system integration. Topics include: data integration, business process integration, integration architecture, middleware, system security, and system management.

ITIS 8180. Foundations of Health Informatics. (3) Cross-listed as ITIS 6180. Prerequisite: Graduate standing in computer science, information technology, health informatics, or related discipline. An overview of foundational concepts and methods in healthcare systems, technologies, and policies that are critical for successful research in health informatics. Students explore recurring themes, issues, and applications most frequently encountered in the field.

The course is both technical and rigorous, and will involve both theoretical analysis and substantial projects. Topic include: an overview of issues, systems and technologies in health informatics and in-depth discussion of data standards, data integration, data analytics, and evaluation methods. Students who take this course gain the skills and knowledge necessary to conduct research in health informatics.

ITIS 8200. Principles of Information Security and Privacy. (3) Cross-listed as ITIS 6200 and HCIP 6200.

Prerequisite: permission of department. Topics include: security concepts and mechanisms; security technologies; authentication mechanisms; mandatory and discretionary controls; basic cryptography and its applications; intrusion detection and prevention; information systems assurance; anonymity and privacy issues for information systems.

ITIS 8210. Access Control and Security Architecture. (3)

Prerequisite: ITIS 8200. Discusses objectives, formal models, and mechanisms for access control; and access control on commercial off-the-shelf (COTS) systems. Examines the issues related to security architectures and technologies for authorization. Topics include: cryptographic infrastructure, distributed systems security architectures, Internet security architectures, network security architectures and e-commerce security architectures.

ITIS 8220. Data Privacy. (3) Pre- or corequisites: ITIS 6200, full graduate standing, or permission of department. Topics include: privacy concepts, policies, and mechanisms; identity, anonymity, and confidentiality; private data analysis and database sanitization; privacy-preserving data mining techniques including k-anonymity, randomization, and secure function evaluation; privacy issues in social networks, RFID, and healthcare applications.

ITIS 8230. Information Infrastructure Protection. (3)

Cross-listed as HCIP 6230 and ITIS 6230. Prerequisite: ITIS 8200. Methodologies, tools, and technologies that are important for protecting information systems and information infrastructures. Topics include: techniques, processes and methodologies for information security risk assessment and management, systems modeling and analysis using logic programming and formal methods, tools and technologies for critical infrastructure protection, methodologies for continuous operation and recovery from disasters.

ITIS 8240. Applied Cryptography. (3) Prerequisite: Graduate standing or permission of department. Provides students with an understanding of modern cryptographic techniques, algorithms and protocols that are of fundamental importance to the design and

implementation of security critical applications. The course not only covers standard cryptographic techniques, but also exposes students to the latest advances in applied cryptography. Topics include: secret and public key ciphers, stream ciphers, one-way hashing algorithms, authentication and identification, digital signatures, key establishment and management, secret sharing and data recovery, public key infrastructures, and efficient implementation.

ITIS 8250. Open Source Security Systems. (3) Cross-listed as ITIS 6250. Prerequisite: Ph.D. student standing or permission of the department. An introduction to the design, implementation, evaluation and maintenance of secure software systems and applications using open source technologies, with an emphasis on hands-on experience. Topics include: open source ecosystems, open source security methodologies and models, notable open source software systems and projects, quality and security assurance through open source, open source supply chain security, major open source cryptographic packages; designing, implementing and maintaining security systems using open source technologies; assessment and regulatory compliance using open source tools, and open source hardware.

ITIS 8320. Cloud Data Storage. (3) Cross-listed as ITIS 6320. Prerequisite: Full graduate standing or permission of department. The design and implementation of cloud storage and big data systems and the architecture and characteristics of components on which cloud storage systems are built. Topics include: storage device hardware, file systems, mirroring and RAID, array coding techniques, storage area networks (SAN), network-attached storage (NAS), cloud storage and big data, DB in clouds, relational storage models, key value stores and other No-SQL mechanisms, data consistency and availability in the cloud, cloud data privacy and security.

ITIS 8342. Information Technology Project Management. (3) Prerequisite: permission of department. Introduces the student to problems associated with managing information technology projects involving, particularly, integration of systems, development of client-specific solutions, and project justification. The course will move beyond the classic techniques of project management and integrate communication software/systems, multi-site, multi-client facilities projects, cultural issues involved with managing interdisciplinary teams, and the effect of rapid technological obsolescence on project justification, funding and continuance.

ITIS 8350. Rapid Prototyping Design Patterns. (3) Cross-listed as ITIS 6350. Prerequisite: Ph.D. standing. Designed to teach the Rapid Prototyping

Design Patterns process. An active learning course designed to expose students to the many forms of rapid prototyping software and devices. The focus is on the use of common design patterns and how to represent them quickly and inexpensively for the purpose of allowing many rapid design iterations prior to the coding of solutions. This course can be considered a communication course where communication between designers and developers occurs through prototyped artifacts and accompanying documentation. Design patterns can be considered the vocabulary of interaction and interface design, and so learning this vocabulary is an important aspect of the course. Prototyping in this course spans all types of devices and platforms: desktop, mobile, web, tabletop, tablet, etc. The theory of rapid prototyping is covered in video lectures that are consumed as part of the student's preparation outside of class. Class time is devoted to hands-on practice of the various rapid prototyping methods. Assignments involve applying the techniques learned in class to a variety of problem spaces and platforms, and the peer-critique of other student's designs. Evaluation is based on both understanding of the theory and on the methodological skills gained, as demonstrated through the individual or paired assignments. Students are also expected to write a scholarly article that examines some aspect of prototyping as a part of the design process.

ITIS 8360. User-Centered Design and Evaluation. (3) Cross-listed as ITIS 6360. Prerequisite: ITIS 6400 or ITIS 8400. Designed to teach the user-centered design and evaluation process. In particular, students gain hands-on experience with the process of interface design, methods of design, and ways to evaluate and improve the design of interactive software applications in a course-long project. Students learn how to employ techniques which ensure that end-users are fully considered at all stages of the design process, from inception to implementation. Assignments involve planning, designing, and conducting studies to learn about user needs; developing the protocols and instruments for data collection; brainstorming, prototyping, and refining interactive solutions for a user problem; and designing and executing user evaluations of interactive software interfaces.

ITIS 8362. Information Technology Ethics, Policy, and Security. (3) Prerequisite: HADM 6152, MBAD 6121, or MPAD 6120. Management of information technology involves understanding the broader issues of ethics, Policy and Security. The growth in Internet usage and E-commerce require IT professionals to consider issues pertaining to data protection, regulation, and appropriate use and dissemination of information. The course is designed to be team-taught

by professionals in the field.

ITIS 8400. Principles of Human Computer

Interaction. (3) Prerequisite: Full graduate standing or permission of department. Introduction to Human-computer Interaction practice and research. The course will include topics on the perceptual, cognitive, and social characteristics of people, as well as methods for learning more about people and their use of computing systems. We will cover the process of interface design, methods of design, and ways to evaluate and improve a design. The course will also highlight a number of current and cutting-edge research topics in Human- Computer Interaction. The course will be a balance of design, sociological/psychological, and information systems elements.

ITIS 8410. Personalization and Recommender

Systems. (3) Cross-listed as HCIP 6410 and ITIS 6410. Prerequisite: Full graduate standing or permission of department. Introduction to the application of personalization and recommender systems techniques in information systems. Topics include: historical, individual and commercial perspectives; underlying approaches to content-based and collaborative recommendation techniques for building user models; acceptance issues; and case-studies drawn from research prototypes and commercially deployed systems.

ITIS 8420. Usable Security and Privacy. (3) Cross-listed as ITIS 6420. Prerequisite: ITIS 8200. Much of the work into security and privacy solutions ignore a critical element: the human who must interact with those solutions. In this course, we investigate privacy and security from a user-centered point of view. How do people think about privacy and security? How do they interact with current applications and solutions? What should be considered in designing user-friendly security systems? This course introduces students to a variety of usability and user interface issues related to privacy and security as well as examine potential designs and solutions.

ITIS 8500. Complex Adaptive Systems. (3) Cross-listed as DSBA 6500, HCIP 6500, ITCS 6500, ITCS 8500, and ITIS 6500. Prerequisite: Permission of instructor. Complex adaptive systems (CAS) are networked (agents/part interact with their neighbors and, occasionally, distant agents), nonlinear (the whole is greater than the sum of its parts), adaptive (the system learns to change with its environment), open (new resources are being introduced into the environment), dynamic (the change is a norm), emergent (new, unplanned features of the system get introduced through the interaction of its parts/agents), and self-organizing (the parts organize themselves into a hierarchy of subsystems of various complexity). Ant

colonies, networks of neurons, the immune system, the Internet, social institutions, organization of cities, and the global economy are a few examples where the behavior of the whole is much more complex than the behavior of the parts. Covers these and similar topics in an interactive manner. Examples of our current research effort will be provided. Topics include: Self-organization; emergent properties; learning; agents; localization affect; adaptive systems; nonlinear behavior; chaos; complexity.

ITIS 8510. Software Agent Systems. (3) Cross-listed as ITIS 6510. Prerequisite: Full graduate standing or permission of department. Introduction to centralized and distributed software agent systems. Topics include: agent cooperation in cooperative and competitive environments, agent architectures, game theoretical models, market mechanisms, multi-agent learning, mixed-initiative computing and single and multi-agent applications. The students will gain hands-on experience by building a multi-agent system as part of a semester-long project in addition to shorter assignments.

ITIS 8520. Network Science. (3) Cross-listed as DSBA 6520, HCIP 6520, and ITIS 6520. Prerequisite: Full graduate standing or permission of department. Network Science helps students design faster, more resilient communication networks; revise infrastructure systems such as electrical power grids, telecommunications networks, and airline routes; model market dynamics; understand synchronization in biological systems; and analyze social interactions among people. It examines the various kinds of networks (regular, random, small-world, influence, scale-free, and social) and applies network processes and behaviors to emergence, epidemics, synchrony, and risk. This course integrates concepts across computer science, biology, physics, social network analysis, economics, and marketing.

ITIS 8530. Systems Dynamics. (3) Cross-listed as ITIS 6530. Prerequisite: CCI graduate standing or department approval. Introduction to systems thinking and the systems dynamics world view, tools for eliciting and mapping the structure and dynamics of complex systems, tools for modeling and simulation of complex systems, and procedures for testing and improving models. Helps students outline and evaluate dynamic relationships and factors that influence organizations' performance, market position, decision-making, and policy evaluations. Integrates concepts across information systems, computer science, business, engineering, economics, and social sciences. Based on 3-hour weekly lectures and hands-on project assignment.

Computing and Informatics (ITSC)

ITSC 8110. Introduction to Computing and Information Systems Research. (3) Prerequisite: Good standing in the Ph.D. in Computing and Information Systems Program. Computing and Information Systems has a wide range of research areas encompassing the fields of Business Information Systems, Bioinformatics, Computer Science, and Software and Information Systems. This seminar is intended to give Ph.D. in Computing and Information Systems students a sound understanding of the different research areas in Information Technology. The seminar is to be taken during the first year of studies and is intended to be the gateway to the fields within Information Technology and will enable students to select the fields matching their interests early in their studies. Through attending weekly in-depth research presentations from faculty in all participating units in the Ph.D. in Computing and Information Systems program and conducting literature surveys in areas of interest, students are expected to gain the knowledge they need to identify the areas of interest for themselves.

ITSC 8123. Applied Management Science. (3) Prerequisite: MBAD 6122. Mathematical model building aimed at integrating methods and applications. Overview of mathematical programming in practice and a series of projects implementing models in business and the public sector.

ITSC 8141. Operations Management. (3) Prerequisite: MBAD 5141 and MBAD 5142 or equivalents. Design, operation, and control of service and manufacturing systems. Emphasis on using analytical tools for problem solving in process analysis and re-engineering, work-force management, materials and inventory management, aggregate planning, total quality management, and others

ITSC 8142. Quality and Manufacturing Management. (3) Prerequisite: MBAD 6141. Current issues and advances in operations management including just-in-time inventory management, total quality management, continuous improvement, flexible manufacturing systems, computer integrated manufacturing systems, technology evaluation and selection, and operations strategy.

ITSC 8699. Graduate Research Seminar. (1) Prerequisites: Good standing in the Ph.D. in Computing and Information Systems Program. This seminar is intended to expose Ph.D. in Computing and Information Systems students to current research in Computing and Information Systems through attending weekly research presentations by other students, CIS faculty, and invited speakers. Each student is expected to give one or more presentations

for the Graduate Research Seminar before graduation. Students must sign up for and receive credit for the Graduate Research Seminar every semester that they are in the Ph.D. in Computing and Information Systems Program until they are admitted to Ph.D. candidacy. *Graded on Pass/Unsatisfactory basis.* Students taking ITSC 8110 should not register for ITSC 8699 for the same semester.

ITSC 8880. Individual Study. (3) Prerequisites: permission of department. With the direction of a faculty member, students plan and implement appropriate objectives and learning activities to develop specific areas of expertise through research, reading, and individual projects. *May be repeated for credit.*

ITSC 8990 Pre-Dissertation Research. (1-6) Prerequisites: Good standing in the Ph.D. in Computing and Information Systems Program. Students conduct research in information technology under the direction of one or more CIS faculty. A major goal of this course is to prepare the student for the Qualifying Examination. *May be repeated for credit.*

ITSC 8991. Doctoral Dissertation Research. (1-9) Individual investigation culminating in the preparation and presentation of a doctoral dissertation.

Business Information Systems (INFO)

INFO 8100. Information Systems Research Methodologies. (3) Prerequisites: Graduate standing or permission of the instructor. A study of statistical and research methods used in information systems research.

INFO 8120. Advanced Research Methodologies. (3) Prerequisites: INFO 8100 or permission of department. A study of advanced research methods used in business administration and management information systems research.

INFO 8201. Data and Knowledge Management in Business. (3) Prerequisite: MBAD 5121 or permission of department and admission to the Ph.D. in Computing and Information Systems Program. An overview of the business approach to identifying, modeling, retrieving, sharing, and evaluating an enterprise's data and knowledge assets. Covers the organizational, technological and management perspectives.

INFO 8202. Business Information Systems: Analysis, Design, and Management. (3) Prerequisite: MBAD 5121 or permission of department. Examination of managerial issues associated with the study of business processes and the development of supporting

information systems. Emphasis on the application of appropriate methodologies, techniques, and tools to analyze, design, and implement business information systems. Study of relevant IS project management and quality assurance techniques.

INFO 8203. Information Systems Economics, Strategy and Policy. (3) Prerequisite: MBAD 5121 or permission of department and admission to the Ph.D. in Computing and Information Systems Program. Examines a collection of topics that deal with the strategic use of information systems (IS). These topics include Business Value of IS, Network Economics, use of IS for competitive advantage, IS Planning and policy setting, IS evaluation, selection and sourcing.

INFO 8204. Business Data Communications. (3) Prerequisite: MBAD 5121 or permission of department. Examination of the information communication requirements of business environments, the fundamentals of communication technology, and the application of the technology for solving business problems. Emphasis on understanding communication technologies to assess needs, plan for the introduction of hardware and software, and manage these communication systems.

INFO 8700. Advanced Topics in MIS. (3) Prerequisite: Permission of department. Topics in MIS selected to supplement the regular course offerings. *May be repeated for credit with change of topic.*

INFO 8800. Information Systems Research Seminar. (3) Prerequisite: INFO 8100 or permission of department. A study of current research areas in MIS.

INFO 8900. Directed Individual Study in Business Information Systems. (3) Prerequisites: Permission of department and member of the doctoral faculty who would direct the study. Directed individual study and in-depth analysis of a special area of MIS. The course may be used to satisfy up to six credit hours of graduate credit requirements in the Ph.D. in Computing and Information Systems degree program. *May be repeated for credit with different area of study.*

Operations Management (OPER)

OPER 8122. Technology Enhanced Decision Making. (3) Prerequisites: MBAD 5141 and MBAD 5142 or equivalents. An analytical approach to the management process. Generalized models for decision making with major emphasis on application of the scientific method to management problems.

OPER 8208. Supply Chain Management. (3) Prerequisite: MBAD 6141. Pre- or corequisite: MBAD 6122 or permission of department. Supply chain

management is concerned with all of the activities performed from the initial raw materials to the ultimate consumption of the finished product. From a broad perspective, the course is designed to examine the major aspects of the supply chain: the product flows; the information flows; and the relationships among supply chain participants. The course content is interdisciplinary in nature and will cover a variety of topics such as supply chain information technologies, supply chain design, strategic alliances between supply chain participants and supply chain initiatives.

Health Informatics

- **M.S. in Health Informatics**
- **MHA/M.S. in Health Informatics Dual Degree** (see under *Health Administration in the “College of Health and Human Services”* section)
- **MSPH/M.S. in Health Informatics Dual Degree** (see under *Public Health in the “College of Health and Human Services”* section)
- **Graduate Certificate in Health Informatics**

Health Informatics

hi.uncc.edu

Graduate Program Directors

Dr. William Saunders, College of Health and Human Services

Mr. Joshua Hertel, Graduate School

The program in Health Informatics is a joint venture between the College of Computing and Informatics, the College of Health and Human Services, and the Graduate School. The program offers both a Graduate Certificate and a Master of Science degree designed to prepare students for the complex and rapidly changing healthcare and technology sectors.

MASTER OF SCIENCE IN HEALTH INFORMATICS

The Professional Science Master's (PSM) in Health Informatics is an interdisciplinary program focused on the complex issues surrounding the management and analysis of electronic medical information. The program is designed to develop future leaders in the areas of health data science and healthcare analytics.

Admission Requirements

Applicants must meet the general Graduate School requirements for admission to Master's Degree programs. Applications must include all of the materials listed by the Graduate School as typical for Master's Degree application submissions. In addition to the general requirements for admission to the Graduate School, an earned baccalaureate degree from an accredited college or university in computer sciences, health sciences, information systems, or life sciences or in an informatics discipline or a closely related field is required for study toward the M.S. in Health Informatics. Acceptable scores on the verbal, quantitative, and analytical sections of the GRE are

also required; applicants holding a terminal degree (e.g., J.D., M.D., D.D.S., Ph.D.) may request a waiver from this requirement.

Applicants to the PSM in Health Informatics program may also request the score waiver provided they:

- Were accepted into the Graduate Certificate in Health Informatics program
- Successfully complete a minimum of two of the required courses with a GPA of 3.5 or above and with no more than one grade of B
- Secure a letter of recommendation from at least one of the instructors teaching those courses supporting their admission into the master's program

Degree Requirements

The PSM in Health Informatics program requires 35-38 graduate credit hours, including 3-6 credit hours of Foundation courses, 11 credit hours of Core courses, 3 credit hours of Core elective courses, 15 credit hours of concentration focus courses, and 3 credit hours of Internship/Practicum.

A minimum of 24 credit hours contributing to the M.S. in Health Informatics must be from courses numbered 6000 or higher. A maximum of 6 hours of graduate credit may be transferred. Students may apply all of the credits earned in the Graduate Certificate in Health Informatics towards the M.S. in Health Informatics.

Foundation Courses (3-6 credit hours)

Students lacking an adequate healthcare background take the “Foundations in Health” course sequence. Similarly, students lacking an adequate informatics background will take the “Foundations in Informatics” course sequence. In all cases, a minimum of 3 credit hours of Foundations courses are required.

Foundations in Health

HCIP 5370 Health Vocabularies and Classification Systems (3)

Foundations in Informatics

HCIP 5375 Computer Vocabularies and Programming Systems (3)

The adequacy of a student's background is determined by the Graduate Program Director. Students who are determined by the Graduate Program Director to lack an adequate background in both healthcare and informatics will be required to take courses from both Foundation sequences (Foundation General) for a maximum of up to 6 hours.

Note: A course cannot be used to satisfy both a

Foundation and a Concentration requirement toward the degree.

Core Courses (11 credit hours)

All students complete four required Core courses that provide a strong general background in health informatics.

HCIP 6102 Healthcare Data Analysis (3)
 HCIP 6108 Decision Analysis in Healthcare (3)
 HCIP 6380 Introduction to Health Informatics (3)
 GRAD 6002 Responsible Conduct of Research (2)

Core Elective Course (3 credit hours)

Students must take 3 credit hours of Core elective coursework from the following set, complementary to their base Foundation coursework.

HCIP 5376 Introduction to Programming for Health Informatics (3)
 HCIP 6100 Introduction to the U.S. Healthcare System (3)

One of these two equivalent courses:

HCIP 6201 Computer Security, Privacy, and Legal Issues (3)
 HCIP 6200 Principles of Information Security and Privacy (3)

Concentration Requirements (15 credit hours)

Each student must also complete an approved concentration area consisting of fifteen (15) credit hours. Concentration coursework balances depth and breadth across the following coursework categories with a breadth requirement. Students must take at least 3 of the 15 hours in a separate category from the majority of the Concentration coursework. Concentration category areas and applicable courses include:

Data Science and Analytics

Students with a focus in this concentration category create and manipulate data as part of advanced health information systems to meet the unique needs and exacting standards of the healthcare industry.

HCIP 5121 Information Visualization (3)
 HCIP 5122 Visual Analytics (3)
 HCIP 5123 Applied Statistics (3)
 HCIP 5160 Database Systems (3)
 HCIP 5166 Network-Based Application Development (3)
 HCIP 5220 Vulnerability Assessment and System Assurance (3)
 HCIP 5250 Computer Forensics (3)
 HCIP 61030 Big Data Analytics for Competitive Advantage (3)
 HCIP 6112 Software System Design and Implementation (3)

HCIP 6156 Machine Learning (3)
 HCIP 6162 Knowledge Discovery in Databases (3)
 HCIP 6163 Data Warehousing (3)
 HCIP 6167 Network Security (3)
 HCIP 6200 Principles of Information Security and Privacy (3)
 HCIP 6201 Computer Security, Privacy, and Legal Issues (3)
 HCIP 6210 Access Control & Security Architecture (3)
 HCIP 6230 Information Infrastructure Protection (3)
 HCIP 6342 Information Technology Project Management (3)
 HCIP 6350 Principles of Human-Computer Interaction (3)
 HCIP 6391 Architecting Health Information Systems (3)
 HCIP 6392 Enterprise Health Information Systems (3)
 HCIP 6393 Advanced Health Data Integration (3)
 HCIP 6500 Complex Adaptive Systems (3)
 HCIP 6520 Network Science

Business of Healthcare

Students with a focus in this concentration category develop skills in analyzing health data to identify risk and to adopt best practices in the healthcare industry.

HCIP 6070 Current Issues in Health Informatics (3)
 HCIP 6100 Introduction to the U.S. Healthcare System (3)
 HCIP 6104 Health and Disease (3)
 HCIP 6134 Quality and Outcomes Management in Healthcare (3)
 HCIP 6146 Information Resources Management (3)
 HCIP 6150 Health Law and Ethics (3)
 HCIP 6260 Analytic Epidemiology (3)
 HCIP 6330 Medical Practice Management (3)
 HCIP 6385 Health Communication and Leadership (3)

Note: A course cannot be used to satisfy any two requirements toward the degree.

Other focus areas may be possible with the approval of the Graduate Program Director. In addition, the Graduate Program Director may approve substitution of courses within approved concentration areas. Students may submit a Special Request to the Program or Faculty Director to substitute relevant DSBA, HADM, HLTH, ITCS, or ITIS courses in a given concentration.

Capstone Project/Internship (3 hours)

In line with the practice-based nature of the program, all students must complete an approved Capstone Project/Internship experience from one of the following:

HCIP 6198 IT Internship Project (3)

HCIP 6400 Health Internship Project (3)

GRADUATE CERTIFICATE IN HEALTH INFORMATICS

The Graduate Certificate in Health Informatics (HI) is designed to introduce individuals to the core concepts of data management and analysis in healthcare. The certificate requires 15 credit hours of coursework. The certificate may be pursued concurrently with a related graduate degree program at UNC Charlotte. Students may apply all of the credits earned in the HI Certificate towards the Health Informatics PSM.

Admission Requirements

Applicants must meet the general Graduate School requirements for admission to Graduate Certificate programs. Applications must include all of the materials listed by the Graduate School as typical for Graduate Certificate application submissions. In addition to the general requirements for admission to the Graduate School, the following are required for study toward the Graduate Certificate in Health Informatics.

- 1) A bachelor's degree in a related field, including, but not limited to, a life science, health science, health administration, business administration, or computing discipline
- 2) Knowledge of applications of information technology, including an understanding of computers, database management, and basic programming skills (*the adequacy of a student's background is determined by the Graduate Program Director*)

Program Requirements

Foundation Courses (3-6 credit hours)

Students with an adequate informatics background will take the "Foundations in Health" course sequence. Similarly, students with an adequate healthcare background will take the "Foundations in Informatics" course sequence. In all cases, a minimum of 3 credit hours of Foundations courses are required.

Foundation in Health

HCIP 5370 Health Vocabularies and Classification Systems (3)

Foundation in Informatics

HCIP 5375 Computer Vocabularies and Programming Systems (3)

The adequacy of a student's background is determined by the Graduate Program Director. Students who are determined by the Graduate

Program Director to lack an adequate background in both healthcare and informatics will be required to take courses from both Foundation sequences (Foundation General) for a maximum of up to 6 hours.

Core Courses (9 credit hours)

All students complete three required Core courses that provide a strong general background in health informatics.

HCIP 6102 Healthcare Data Analysis (3)

HCIP 6108 Decision Analysis in Healthcare (3)

HCIP 6380 Introduction to Health Informatics (3)

Core Elective Course (3 credit hours)

Students must take 3 credit hours of Core elective coursework from the following set, complementary to the student's base Foundation coursework.

HCIP 5376 Introduction to Programming for Health Informatics (3)

HCIP 6100 Introduction to the U.S. Healthcare System (3)

One of these two equivalent courses:

HCIP 6201 Computer Security, Privacy, and Legal Issues (3)

HCIP 6200 Principles of Information Security and Privacy (3)

This Graduate Certificate represents the first part of the Health Informatics PSM (HIPSM) program, thus allowing students who want to continue their studies a smooth transition into HIPSM.

Transfer credits cannot be applied to this certificate program.

COURSES IN HEALTH INFORMATICS (HCIP)

HCIP 5121. Information Visualization. (3) Cross-listed as DSBA 5121 and ITCS 5121. Prerequisite: Full graduate standing and enrollment in the PSM or Graduate Certificate in Health Informatics. Information visualization concepts, theories, design principles, popular techniques, evaluation methods, and information visualization applications.

HCIP 5122. Visual Analytics. (3) Cross-listed as DSBA 5122 and ITCS 5122. Prerequisites: STAT 1220, STAT 1221, STAT 1222, STAT 2122, STAT 2223, or permission of instructor; full graduate standing; and enrollment in the PSM or Graduate Certificate in Health Informatics. Introduces the new field of visual analytics, which integrates interactive analytical methods and visualization. Topics include: critical thinking, visual reasoning,

perception/cognition, statistical and other analysis techniques, principles of interaction, and applications.

HCIP 5123. Applied Statistics I. (3) Cross-listed as STAT 5123. Prerequisites: MATH 2164 with a grade of C or above and Junior standing, or permission of department; and enrollment in the PSM or Graduate Certificate in Health Informatics. Review of stochastic variables and probability distributions, methods of estimating a parameter, hypothesis testing, confidence intervals, contingency tables. Linear and multiple regression, time series analysis.

HCIP 5160. Applied Databases. (3) Cross-listed as ITIS 6120 and ITIS 8120. Prerequisites: Enrollment in the PSM or Graduate Certificate in Health Informatics and full graduate standing required. Identification of business database needs; requirements specification; relational database model; SQL; E-R modeling; database design, implementation, and verification; distributed databases; databases replication; object-oriented databases; data warehouses; OLAP; data mining; security of databases; vendor selection; DBMS product comparison; database project management; tools for database development, integration, and transaction control.

HCIP 5166. Network-Based Application Development. (3) Cross-listed as ITIS 5166. Prerequisite: Enrollment in the PSM or Graduate Certificate in Health Informatics and full graduate standing. Examines the issues related to network based application development. Topics include: introduction to computer networks, web technologies and standards, network based programming methodologies, languages, tools, and standards.

HCIP 5220. Vulnerability Assessment and System Assurance. (3) Cross-listed as ITIS 5220. Prerequisite: Enrollment in the PSM or Graduate Certificate in Health Informatics. Discusses methodologies, tools, and technologies that are important for vulnerability assessment and systems assurance. Topics include: ethical hacking techniques, vulnerability assessment, risk assessment/management, finding new exploits, discovering vulnerabilities, penetrating network perimeters, bypassing auditing systems, and assured administration of systems, as well as evaluating systems assurance levels. Focus will be placed on: 1) understanding current penetration techniques for networks, operating systems, services and applications; 2) investigating mitigation and defense strategies; and 3) studying legal and ethical considerations. Based on case studies with a strong lab component.

HCIP 5250. Computer Forensics. (3) Cross-listed as ITIS 5250. Prerequisite: Enrollment in the PSM or Graduate Certificate in Health Informatics. The identification, extraction, documentation, interpretation, and preservation of computer media for evidentiary purposes and/or root cause analysis. Topics include: techniques for discovering digital evidence; responding to electronic incidents; tracking communications through networks; understanding electronic media, crypto-literacy, data hiding, hostile code, and Windows™ and UNIX™ system forensics; and the role of forensics in the digital environment.

HCIP 5370. Health Vocabularies and Classification Systems. (3) Prerequisite: Enrollment in the PSM or Graduate Certificate in Health Informatics. Development of fundamental medical terminology, consisting of basic word structure (including word analysis, combining forms, suffixes, prefixes, and pronunciation) of descriptive medical terms pertaining to the body as a whole and to each body system. Clinical vocabularies, terminologies and coding systems, along with definitions are described in the context of caring and treating patients. Terms covered include: diseases, diagnoses, findings, operations, treatments, drugs, and administrative items as utilized to support recording and reporting a patient's care at varying levels of detail via an electronic medical record. Identifying appropriate representation elements, uses, and sources in order to apply them in the context of health information systems and communication.

HCIP 5375. Computer Vocabularies and Programming Systems. (3) Prerequisite: Enrollment in the PSM or Graduate Certificate in Health Informatics. Study of the terminology and concepts used in Information Technology, Computer Science, and Information Systems. Topics include: computers and their components, system and application software, programming paradigms, databases and data warehouses, networks, Internet, Web, security, personal digital assistants, communications, data formats and media, data representations, computer games, and technology. Explores technological constraints introduced by the intricacies of varying application domains.

HCIP 5376. Introduction to Programming for Health Informatics. (3) Prerequisite: Enrollment in the PSM or Graduate Certificate in Health Informatics. Foundational use of object-oriented programming and scripting techniques to solve common problems in health informatics. Topics include: data structures for electronic health records; developing basic electronic health record applications; relational database connectivity; and interfacing with industry standard health information systems.

HCIP 6070. Current Issues in Health Informatics. (3)

Prerequisite: Enrollment in the PSM or Graduate Certificate in Health Informatics. Current topics and issues related to Health Informatics, including health policy analysis and development, ethical issues, structure of health administrative and delivery systems, assessment of population health, models of healthcare delivery, access and quality of care issues.

HCIP 6100. Introduction to the U.S. Healthcare System. (3) Cross-listed as HADM 6100.

Prerequisite: Enrollment in the PSM or Graduate Certificate in Health Informatics. Overview of healthcare delivery in the United States, including organizational structures, financing mechanisms and delivery systems, with particular attention to program formation.

HCIP 6102. Healthcare Data Analysis. (3)

Prerequisite: Enrollment in the PSM or Graduate Certificate in Health Informatics. Develops skills in the management, analysis, and reporting of health data using SAS, including introductory applied statistical analysis. Students use SAS in exercises to control costs, improve quality, adjust for risk, quantify access, target marketing, measure population health, and evaluate policies and programs. Focuses on using base SAS and SAS STAT, and introduces SAS Maps, Enterprise Miner, and Visual Analytics to generate reports, develop clinical, financial, and operational recommendations for managerial action, and communicate with stakeholders. Also introduces SPSS, Stata, SQL, IML/R, qualitative methods, and managerial, legal, and ethical concepts in healthcare data analysis.

HCIP 6103. Big Data Analytics for Competitive Advantage. (3) Cross-listed as DSBA 6100 and ITCS 6100.

Prerequisite: Enrollment in the PSM or Graduate Certificate in Health Informatics. An introduction to the use of big data as a strategic resource. A focus is placed on integrating the knowledge of analytics tools with an understanding of how companies leverage data analytics to gain strategic advantage. A case approach is used to emphasize hands-on learning and a real-world view of big data analytics.

HCIP 6104. Health and Disease. (3) Cross-listed as HADM 6104. Prerequisite: Enrollment in the PSM or Graduate Certificate in Health Informatics. Principles and methods of epidemiology, including definitions and models of health, illness, and disease; modes of transmission of clinically important infectious agents; risk factors and chronic diseases; and insights into existing studies and paradigms of health promotion and disease prevention.

HCIP 6108. Decision Analysis in Healthcare. (3)

Cross-listed as HADM 6108. Prerequisite: Enrollment in the PSM or Graduate Certificate in Health Informatics. Study of selected quantitative management tools useful in the analysis of managerial decisions, a review of basic descriptive and inferential statistics, applied probability distributions, forecasting methods, statistical process control, queuing, transportation and assignment modeling, and linear programming. Emphasis on applying quantitative decision making methods to the operational problems facing healthcare organizations. Familiarity with computers and computer software will be important for success in this course.

HCIP 6112. Software System Design and Implementation. (3) Cross-listed as ITCS 6112 and ITIS 6112.

Prerequisite: Enrollment in the PSM or Graduate Certificate in Health Informatics. Introduction to the techniques involved in the planning and implementation of large software systems. Emphasis on applying quantitative decision making methods to the operational problems facing healthcare organizations. Familiarity with computers and computer software will be important for success in this course.

HCIP 6134. Quality and Outcomes Management in Healthcare. (3) Cross-listed as HADM 6134.

Prerequisites: HCIP 5370, HCIP 6100, and Enrollment in the PSM or Graduate Certificate in Health Informatics. Examination of the concepts and practices of quality management, performance improvement, and assessment of outcomes in healthcare delivery settings. Designed to provide an in-depth understanding of basic concepts and frameworks and of their applicability and relevance in specific situations. Topics include: process reengineering, service improvement, continuous quality improvement, accreditation standards, patient satisfaction, outcome measurement, teamwork, and case management.

HCIP 6146. Information Resources Management. (3)

Cross-listed as HADM 6146. Prerequisite: Enrollment in the PSM or Graduate Certificate in Health Informatics. A study of the use of information management to improve the delivery of healthcare. Information resource management includes methods and practices to acquire, disseminate, store, interpret and use information to provide healthcare in a more efficient, effective and economical manner. Emphasis is placed upon information as central to the ongoing operations and strategic decisions of healthcare organizations.

HCIP 6150. Health Law and Ethics. (3) Cross-listed as HADM 6150. Prerequisite: Enrollment in the PSM or Graduate Certificate in Health Informatics.

Analysis of ethical and bioethical problems confronting healthcare delivery systems. Selected legal principles and their application to the healthcare field, including corporate liability, malpractice, informed consent and governmental regulation of health personnel and health facilities.

HCIP 6156. Applied Machine Learning. (3) Cross-listed as DSBA 6156. Prerequisites: Full graduate standing and enrollment in the PSM or Graduate Certificate in Health Informatics. Practical perspectives and applications of machine learning methods and techniques including: acquisition of declarative knowledge; organization of knowledge into new, more effective representations; development of new skills through instruction and practice; and discovery of new facts and theories through observation and experimentation.

HCIP 6160. Database Systems. (3) Cross-listed as DSBA 6160 and ITCS 6160. Prerequisite: Enrollment in the PSM or Graduate Certificate in Health Informatics. The modeling, programming, and implementation of database systems. Focuses on relational database systems, but may also address non-relational databases or other advanced topics. Topics include: (1) modeling: conceptual data modeling, ER diagram, relational data model, schema design and refinement; (2) programming: relational algebra and calculus, SQL, constraints, triggers, views; (3) implementation: data storage, indexing, query execution, query optimization, and transaction management; and (4) advanced: semi-structured data model, XML, and other emerging topics.

HCIP 6162. Knowledge Discovery in Databases. (3) Cross-listed as DSBA 6162, ITCS 6162, and ITIS 6162. Prerequisites: ITCS 6160 and Enrollment in the PSM or Graduate Certificate in Health Informatics. The entire knowledge discovery process is covered. Topics include: setting up a problem, data preprocessing and warehousing, data mining in search for knowledge, knowledge evaluation, visualization and application in decision making. A broad range of systems, such as OLAP, LERS, DatalogicR+, C4.5, AQ15, Forty-Niner, CN2, QRAS, and discretization algorithms are covered.

HCIP 6163. Data Warehousing. (3) Cross-listed as ITCS 6163 and ITIS 6163. Prerequisites: ITCS 6160 or equivalent and Enrollment in the PSM or Graduate Certificate in Health Informatics. Topics include: use of data in discovery of knowledge and decision making; the limitations of relational databases and SQL queries; the warehouse data models: multidimensional, star, snowflake; architecture of a data warehouse and the process of warehouse construction; data consolidation from various sources; optimization; techniques for data transformation and

knowledge extraction; relations with enterprise modeling.

HCIP 6167. Network Security. (3) Cross-listed as ITIS 6167. Prerequisites: ITIS 6200 or equivalent and Enrollment in the PSM or Graduate Certificate in Health Informatics. Examines the issues related to network security. Topics include: network security background and motivation, network centric threats, network authentication and identification, network security protocols, firewall, IDS, security in wireless environments, email security, instant message security, network application security, and network based storage security. There are heavy lab based components in this course.

HCIP 6198. IT Internship Project. (3) Cross-listed as ITIS 6198. Prerequisite: Enrollment in the PSM or Graduate Certificate in Health Informatics. Complete a team-based project that is originated from an IT organization and approved by the department.

HCIP 6199. Principles of Computer Networks and Databases. (3) Prerequisite: Enrollment in the PSM or Graduate Certificate in Health Informatics. Computer concepts (hardware components, systems architectures, operating systems and languages, and software packages and tools); Communications technologies (networks—LANs, WANs, VPNs; data interchange standards—NIST, HL-7); Internet technologies (Intranet, web-based systems, standards – SGML, XML); Data, information and file structures (data administration, data definitions, data dictionary, data modeling, data structures, data warehousing, database management systems); Data storage and retrieval (storage media, query tools/applications, data mining, report design, search engines); Data security (protection methods—physical, technical, managerial, risk assessment, audit and control program, contingency planning, data recovery, Internet, web-based, and eHealth security).

HCIP 6200. Principles of Information Security and Privacy. (3) Cross-listed as ITIS 6200 and ITIS 8200. Prerequisite: Permission of department. Topics include: security concepts and mechanisms; security technologies; authentication mechanisms; mandatory and discretionary controls; basic cryptography and its applications; database security, intrusion detection and prevention; assurance requirement, assurance class, evaluation methods and assurance maintenance; anonymity and privacy issues for information systems.

HCIP 6201. Computer Security, Privacy, and Legal Issues. (3) Cross-listed as ITIS 6201. Prerequisite: Enrollment in the PSM or Graduate Certificate in Health Informatics. Topics include: security concepts and mechanisms; security technologies;

authentication mechanisms; mandatory and discretionary controls; basic cryptography and its applications; database security, intrusion detection and prevention; assurance requirement, assurance class, evaluation methods and assurance maintenance; anonymity and privacy issues for information systems. Students gain hands-on experience through lab exercises and case studies.

HCIP 6210. Access Control and Security

Architecture. (3) Cross-listed as ITIS 6210.

Prerequisites: ITIS 6200 and Enrollment in the PSM or Graduate Certificate in Health Informatics. Discusses objectives, formal models, and mechanisms for access control; and access control on commercial off-the-shelf (COTS) systems. Examines the issues related to security architectures and technologies for authorization. Topics include: cryptographic infrastructure, distributed systems security architectures, database systems security architectures, Internet security architectures, network security architectures, and e-commerce security architectures.

HCIP 6213. Applied Healthcare Business Analytics.

(3) Cross-listed as DSBA 6213 and MBAD 6213. Prerequisites: Demonstrated proficiency with Microsoft Excel; and either HCIP 5123, STAT 5123, HADM 6108 (for students with background in healthcare administration), HCIP 6108 (for students with background in healthcare informatics), or equivalent. Focuses on applying business analytics within the healthcare setting. Students learn analytical tools used to synthesize big data into meaningful management information that is used in making key business decisions that impact the delivery of healthcare services. Case studies are utilized to prepare students for delivering boardroom level presentations of their findings.

HCIP 6228. Medical Informatics. (3) Cross-listed as ITCS 6228. Prerequisite: Enrollment in the PSM or Graduate Certificate in Health Informatics and graduate standing. Focuses on methods and techniques used in storage, communication, processing, analysis, integration, management, and distribution of medical information. Emphasizes the applications of telemedicine and intelligent computer-aided decision making systems in different medical and surgical systems. Discusses the computational methods to accept or reject a new drug or a new treatment for a given disease.

HCIP 6230. Information Infrastructure Protection.

(3) Cross-listed as ITIS 6230 and ITIS 8230. Prerequisite: ITIS 6200 and Enrollment in the PSM or Graduate Certificate in Health Informatics. Methodologies, tools, and technologies that are important for protecting information systems and information infrastructures. Topics include:

techniques, processes and methodologies for information security risk assessment and management, systems modeling and analysis using logic programming and formal methods, tools and technologies for critical infrastructure protection, methodologies for continuous operation and recovery from disasters.

HCIP 6240. Applied Cryptography. (3) Cross-listed as ITIS 6240. Prerequisite: Enrollment in the PSM or Graduate Certificate in Health Informatics and full graduate standing. Provides students with an understanding of modern cryptographic techniques, algorithms and protocols that are of fundamental importance to the design and implementation of security critical applications. Covers not only standard cryptographic techniques, but also exposes students to the latest advances in applied cryptography. Topics include: secret and public key ciphers, stream ciphers, one-way hashing algorithms, authentication and identification, digital signatures, key establishment and management, secret sharing and data recovery, public key infrastructures, and efficient implementation.

HCIP 6260. Analytic Epidemiology. (3) Cross-listed as HLTH 6260, HLTH 8260, HSRD 8003, and PPOL 8665. Prerequisites: HLTH 6202 with a grade of B or above, and Enrollment in the PSM or Graduate Certificate in Health Informatics. Principles and methods of studying advanced epidemiology, with emphasis on the analytic approach. Advanced techniques in the establishment of disease causation in groups and communities. Topics include: risk assessment, environmental exposures, stratification and adjustment, and multivariate analysis in epidemiology. Emphasis also placed on quality assurance and control and communicating results of epidemiological studies in professional publications and settings.

HCIP 6330. Medical Practice Management. (3)

Cross-listed as HADM 6210. Prerequisite: Enrollment in the PSM or Graduate Certificate in Health Informatics. A comprehensive study of medical practice management and the issues, tools, and techniques to resolve those issues. Provides the student with an understanding of the financial and regulatory issues that influence today's medical practice with an insight into the cultural, human resource, and governance issues that make physician practices unique among healthcare organizations.

HCIP 6342. Health Information Technology Project Management. (3) Cross-listed as ITIS 6342.

Prerequisite: Enrollment in the PSM or Graduate Certificate in Health Informatics. Introduces students to problems associated with managing information technology projects involving, particularly, integration

of systems, development of client-specific solutions, and project justification. Moves beyond the classic techniques of project management and integrates communication software/systems, multi-site, multi-client facilities projects, cultural issues involved with managing interdisciplinary teams, and the effect of rapid technological obsolescence on project justification, funding and continuance.

HCIP 6350. Principles of Human-Computer Interaction. (3) Cross-listed as ITIS 6400.

Prerequisite: Enrollment in the PSM or Graduate Certificate in Health Informatics and full graduate standing. Introduction to Human-Computer Interaction practice and research. Topics include: the perceptual, cognitive, and social characteristics of people, as well as methods for learning more about people and their use of computing systems. The process of interface design, methods of design, and ways to evaluate and improve a design. Also highlights a number of current and cutting-edge research topics in Human-Computer Interaction with a balance of design, sociological/psychological, and information systems elements.

HCIP 6380. Introduction to Health Informatics. (3)

Prerequisite: Enrollment in the PSM or Graduate Certificate in Health Informatics. Introduces the fundamental concepts and techniques in application data management for Health Informatics and in understanding reference terminologies, data mapping and conversion, and supporting data storage and formats. Topics include: internal and external policy issues governing data collection, storage, exchange, and compliance. Includes a detailed look at the Electronic Health Record and digitized Personal Health Record as used in current healthcare environments. Primarily covers AHIMA HIM competency I.A.

HCIP 6385. Healthcare Communication and Leadership. (3) Prerequisite: Enrollment in the PSM or Graduate Certificate in Health Informatics.

Principles and useful techniques for effective oral presentations, poster presentations, scientific writing. Students critique and help revise each other's presentations and learn how to enhance communications. Students learn how to properly organize and run a meeting. Also covers negotiation, conflict management, and influence. Students use several approaches to evaluate their individual leadership style. Completes a management style assessment, and analyzes leadership styles of prominent leaders in the eHealth environment, using contemporary leadership theory and principles. Primarily covers AHIMA HIM competency III.A.

HCIP 6390. Advanced Programming for Health Informatics. (3) Prerequisite: Enrollment in the PSM

or Graduate Certificate in Health Informatics.

Examines advanced use of object-oriented programming and scripting techniques applied to case studies in health informatics development.

Emphasizes programming techniques beyond the fundamentals, with emphasis on efficiency in speed, data structures and file size. Students learn how to optimize code and databases so that the demands of large-scale health information systems can be performed in acceptable amounts of time while minimizing hardware requirements. Topics include: algorithm optimization, optimization of database queries and development for software as a service.

HCIP 6391. Architecting Health Information Systems. (3) Prerequisite: Enrollment in the PSM or Graduate Certificate in Health Informatics.

Introduces planning, implementation, and maintenance of Health Information Systems for organizations. Students learn about the development of hardware and software requirements for system deployment, including: cost/benefit analysis, assessment of work-flow, interface, human resource factors, as well as capability assessment of regulatory requirements. Topics include: policy and procedure development for capability evaluation, regulatory compliance, system use, and data exchange.

HCIP 6392. Enterprise Health Information Systems. (3) Prerequisites: Enrollment in the PSM or Graduate Certificate in Health Informatics or Graduate Certificate; and HCIP 5375 or HCIP 5370.

Provides graduate students with a comprehensive overview of information technology systems and applications commonly found in healthcare organizations. Topics include: (a) the history, evolution, state-of-art and issues of healthcare information systems; (b) the regulations, laws and standards applied to healthcare information systems; (c) the design and development principles (e.g., security and privacy) of health information systems; and (d) evaluation and adoption of clinical, administrative, and specialty information technology applications for health organizations of all sizes.

HCIP 6393. Advanced Health Data Integration. (3) Prerequisite: Enrollment in the PSM or Graduate Certificate in Health Informatics.

Secondary data sources (registries and indexes; databases – such as MEDPAR, NPDB, HCUP); Healthcare data sets (such as OASIS, HEDIS, DEEDS, UHDDS, UACDS, NEDSS, NMMFS); National Healthcare Information Infrastructure (NHII); Standards and regulations for documentation (such as JCAHO, CARF, COP, AAAHC, AOA); Health information standards (such as HIPAA, ANSI, ASTM, LOINC, UMLS, MESH, Arden Syntax, HL-7); Healthcare taxonomies, clinical vocabularies, terminologies/nomenclatures (such as ICD-9-CM, ICD-10, CPT, SNOMED-CT, DSM-IV);

Severity of illness systems ; Vital statistics ; Epidemiology ; Reimbursement Methodologies; Clinical data and reimbursement management; Compliance strategies and reporting (e.g. National Correct Coding Initiative); Charge-master management; Casemix management; Audit process such as compliance and reimbursement; Payment systems (such as PPS, DRGs, APCs, RBRVS, RUGs); Commercial, managed care, and federal insurance plans.

HCIP 6396. Business Intelligence in Healthcare. (3)

Prerequisites: HCIP 6102, HCIP 6108, and HCIP 6380. Business Intelligence is a collection of computer-based techniques used to extract, identify and analyze data. Analytics is key in the transformation of the healthcare industry. Healthcare business intelligence can provide organizations with the ability to improve quality of care, increase financial efficiency and operational effectiveness, conduct innovative research, and satisfy regulatory requirements. Business Intelligence provides better access to information. It provides current and predictive views across the enterprise. Common functions of BI are reporting, data mining, analytical processing, knowledge management, and data visualization. Topics include: elements of business intelligence, business analytics, data visualization, data mining, data warehousing, and business performance management.

HCIP 6400. Health Internship Project. (3) Cross-listed as HADM 6400. Prerequisites: HADM 6100; enrollment limited to students already holding or concurrently pursuing a MHA degree; instructor permission required. Offers administrative experience in a healthcare setting for students. The initial assumption is made that students participating in the internship experience have had limited hands-on exposure to healthcare administration. *Graded on a Pass/Unsatisfactory basis.*

HCIP 6410. Personalization and Recommender Systems. (3) Cross-listed as ITIS 6410 and ITIS 8410. Prerequisites: Enrollment in the PSM or Graduate Certificate in Health Informatics and full graduate standing. An introduction to the application of personalization and recommender systems techniques in information systems. Topics include: historical, individual and commercial perspectives; underlying approaches to content-based and collaborative recommendation techniques for building user models; acceptance issues; and case-studies drawn from research prototypes and commercially deployed systems.

HCIP 6500. Complex Adaptive Systems. (3) Cross-listed as DSBA 6500, ITCS 6500, ITCS 8500, ITIS 6500, and ITIS 8500. Prerequisite: Permission of

instructor, and enrollment in the PSM or Graduate Certificate in Health Informatics. Complex adaptive systems (CAS) are networked (agents/part interact with their neighbors and, occasionally, distant agents), nonlinear (the whole is greater than the sum of its parts), adaptive (the system learns to change with its environment), open (new resources are being introduced into the environment), dynamic (the change is a norm), emergent (new, unplanned features of the system get introduced through the interaction of its parts/agents), and self-organizing (the parts organize themselves into a hierarchy of subsystems of various complexity). Ant colonies, networks of neurons, the immune system, the Internet, social institutions, organization of cities, and the global economy are a few examples where the behavior of the whole is much more complex than the behavior of the parts. Covers the above and similar topics in an interactive manner. Examples of our current research effort are provided. Topics include: Self-organization; emergent properties; learning; agents; localization affect; adaptive systems; nonlinear behavior; chaos; complexity.

HCIP 6520. Network Science. (3) Cross-listed as DSBA 6520, ITIS 6520, and ITIS 8520. Prerequisite: Full graduate standing or permission of department. Network Science helps students design faster, more resilient communication networks; revise infrastructure systems such as electrical power grids, telecommunications networks, and airline routes; model market dynamics; understand synchronization in biological systems; and analyze social interactions among people. It examines the various kinds of networks (regular, random, small-world, influence, scale-free, and social) and applies network processes and behaviors to emergence, epidemics, synchrony, and risk. Integrates concepts across computer science, biology, physics, social network analysis, economics, and marketing.

Other Health Administration Courses (HADM)

See descriptions of HADM courses under "Health Administration" in the College of Health and Human Services section of this *Catalog*.

Other Public Health Courses (HLTH)

See descriptions of HLTH courses under "Public Health" in the College of Health and Human Services section of this *Catalog*.

Other Computer Science Courses (ITCS)

See descriptions of ITCS courses under "Computer Science" in the College of Computing and Informatics section of this *Catalog*.

Other Information Technology Courses (ITIS)

See descriptions of ITIS courses under "Information Technology" in the College of Computing and

Informatics section of this *Catalog*.

Information Technology

- **M.S. in Information Technology**
- **Master of Architecture and M.S. in Computer Science or Information Technology Dual Degree** (see under *Architecture in the "College of Arts + Architecture" section*)
- **Graduate Certificate in Health Informatics** (see under *Health Informatics*)
- **Graduate Certificate in Information Security and Privacy**
- **Graduate Certificate in Management of Information Technology**
- **Graduate Certificate in Network Security**
- **Graduate Certificate in Secure Software Development**

Department of Software and Information Systems

sis.uncc.edu

Graduate Program Director

Dr. Yuliang Zheng

MASTER OF SCIENCE IN INFORMATION TECHNOLOGY

The Master of Science in Information Technology (MSIT) at UNC Charlotte, is designed to equip students with advanced skills and knowledge in the planning, design, implementation, testing and evaluation, deployment, maintenance, and management of applications and systems, that embody information and communication technologies for their proper functioning. These skills form necessary foundations for solving practical problems that arise in business, industrial, governmental, and other organizations, as well as for pursuing doctoral studies in information technologies.

The current areas of concentration include: Advanced Data and Knowledge Discovery, Design, Emerging Technologies, Human-Computer Interaction, Information Security and Privacy, Information Technology Management, Software

Systems Design and Engineering, and Web Development.

Students entering the MSIT program are required to have completed a baccalaureate degree from an accredited institution of higher learning and have acquired substantial experience in studying, applying, or developing information and computing technology. Such experience may be developed by completing an undergraduate major in a discipline related to information technology, including but not limited to, business information systems, computer engineering, computer science, data communication, information management, information technology, mathematical and physical sciences, and software engineering. For applicants who have an undergraduate major not directly related to computing, the experience may be acquired through work, professional training, or further education such as post baccalaureate studies.

Admission Requirements

Admission requirements specific to the MSIT program include:

- 1) Applicants must have completed undergraduate or equivalent coursework in (a) data structures and (b) object-oriented programming in C++, C#, or Java, both with a minimum GPAs of 3.0 on a 4.0 scale. Applicants who have substantial work experience in applying or developing computing and information technology may be able to substitute their work experience for the specific requirements for object-oriented programming and/or data structures, subject to review by the MSIT Program Coordinator.
- 2) All applicants must have an undergraduate GPA or equivalent of at least 3.0 on a scale of 1.0 to 4.0, and a Junior/Senior GPA of at least 3.0.
- 3) Applicants are required to demonstrate a satisfactory score on the aptitude portion of the Graduate Record Examination (GRE) or the Graduate Management Admission Test (GMAT).

Degree Requirements

The Master of Science in Information Technology degree requires a total of 30 graduate credit hours with a minimum GPA of 3.0, together with a capstone or culminating experience. Additionally, the following requirements must be met:

- No more than 12 credit hours of coursework may be taken from outside of the courses offered by the Department of Software and Information Systems
- At least 15 credit hours must be taken from 6000 level or above courses
- No more than 3 credit hours may be taken for Individual Study

- A maximum of 6 graduate credit hours may be transferred from other institutions

The 30 credit hours of coursework comprise the following three parts:

Core Courses (15 credit hours)

Advanced Programming Courses

Select one of the following:

ITIS 5166 Network-Based Application Development (3)

ITIS 5180 Mobile Application Development (3)

Software Systems Courses

Select one of the following:

ITIS 6112 Software System Design and Implementation (3)

ITIS 6177 System Integration (3)

ITIS 6342 Information Technology Project Management (3)

Databases and Data Science Courses

Select one of the following:

ITIS 6120 Applied Databases (3)

ITIS 6162 Knowledge Discovery in Databases (3)

Principles Courses

ITIS 6200 Principles of Information Security and Privacy (3)

ITIS 6400 Principles of Human-Computer Interaction (3)

Concentration Courses (9 credit hours)

The MSIT program offers the following concentrations:

- 1) Advanced Data and Knowledge Discovery
- 2) Design
- 3) Emerging Technologies
- 4) Human-Computer Interaction
- 5) Information Security and Privacy
- 6) Information Technology Management
- 7) Software Systems Design and Engineering
- 8) Web Development

Each student is required to select one concentration and complete 3 courses selected from the list of approved courses for the specific concentration. Among the 9 credit hours for a concentration, 6 may be substituted with a master's research thesis. The topic for the research thesis must fall within the area of concentration. A core course cannot be double-counted toward a concentration. Subject to the approval of the MSIT Program Director, a course from outside of the approved list for a concentration may be taken as a substitute for a course for the concentration.

Advanced Data and Knowledge Discovery Concentration

Select three of the following:

- ITIS 5510 Web Mining (3)
- ITIS 6010 Topics in Software and Information Systems (3) *(only if topic applicable and approved by program director)*
or ITCS 6010 Topics in Computer Science (3) *(only if topic applicable and approved by program director)*
- ITIS 6150 Software Assurance (3)
- ITIS 6162 Knowledge Discovery in Databases (3)
- ITIS 6163 Data Warehousing (3)
or ITCS 6163 Data Warehousing (3)
- ITIS 6220 Data Privacy (3)
- ITIS 6320 Cloud Data Storage (3)
- ITIS 6410 Personalization and Recommender Systems (3)
- ITIS 6520 Network Science (3)
- ITCS 6155 Knowledge-Based Systems (3)
- ITCS 6156 Machine Learning (3)
- ITCS 6157 Visual Databases (3)
- ITCS 6161 Advanced Topics in Database Systems (3)
- ITCS 6265 Advanced Topics in Knowledge Discovery in Databases (3)
- ITCS 6267 Intelligent Information Retrieval (3)
- DSBA 6100 Big Data Analytics for Competitive Advantage (3)
- MBAD 6201 Business Intelligence and Analytics (3)
- MBAD 6202 Managing IT-Enabled Business Processes and Systems (3)

Design Concentration

Select three of the following:

- ITIS 5180 Mobile Application Development (3)
- ITIS 6011 Interaction Design Studio (4)
- ITIS 6350 Rapid Prototyping Design Patterns (3)
- ITIS 6360 User-Centered Design and Evaluation (3)
- ITIS 6420 Usable Security and Privacy (3)
- ITIS 6500 Complex Adaptive Systems (3)
- ITIS 6880 Individual Study (1-3)
- ITCS 5122 Visual Analytics (3)
- ITCS 5230 Introduction to Game Design and Development (3)
- ITIS 6010 Topics in Software and Information Systems (3) *(only if topic applicable and approved by program director)*
or ITCS 6010 Topics in Computer Science (3) *(only if topic applicable and approved by program director)*
- ITIS 6211 Studio Lab I (3)
or ITCS 6211 Studio Lab I (4)
or ARCH 7211 Studio Lab I (4)
- ITIS 6212 Studio Lab II (3)
or ITCS 6212 Studio Lab II (4)
or ARCH 7212 - Studio Lab II (4)

Emerging Technologies Concentration

Select three courses from the aggregated list of courses for all the other concentrations. Students are recommended to select each course from a different concentration to maximize their exposure to the broadest range of latest knowledge in computing and information technology.

Human-Computer Interaction Concentration

Select three of the following:

- ITCS 5121 Information Visualization (3)
- ITCS 5122 Visual Analytics (3)
- ITCS 5123 Visualization and Visual Communication (3)
- ITCS 6010 Topics in Computer Science (3) *(only if topic applicable and approved by program director)*
or ITIS 6010 Topics in Software and Information Systems (3) *(only if topic applicable and approved by program director)*
- ITCS 6124 Illustrative Visualization (3)
- ITCS 6125 Virtual Environments (3)
- ITCS 6128 3D Display and Advanced Interfaces (3)
- ITCS 6140 Data Visualization (3)
- ITCS 6216 Introduction to Cognitive Science (3)
or PSYC 6216 Introduction to Cognitive Science (3)
- ITIS 6011 Interaction Design Studio (4)
- ITIS 6350 Rapid Prototyping Design Patterns (3)
- ITIS 6360 User-Centered Design and Evaluation (3)
- ITIS 6410 Personalization and Recommender Systems (3)
- ITIS 6420 Usable Security and Privacy (3)
- PHIL 6340 Philosophy of Mind (3)
- PSYC 6102 Organizational Research Methods (3)
- PSYC 6116 Cognition (3)

Information Security and Privacy Concentration

Select three of the following:

- ITIS 5221 Secure Programming and Penetration Testing (3)
- ITIS 5250 Computer Forensics (3)
- ITIS 6010 Topics in Software and Information Systems (3) *(only if topic applicable and approved by program director)*
or ITCS 6010 Topics in Computer Science (3) *(only if topic applicable and approved by program director)*
- ITIS 6140 Software Testing and Quality Assurance (3)
- ITIS 6150 Software Assurance (3)
- ITIS 6167 Network Security (3)
- ITIS 6210 Access Control and Security Architecture (3)
- ITIS 6220 Data Privacy (3)
- ITIS 6230 Information Infrastructure Protection (3)
- ITIS 6240 Applied Cryptography (3)
- ITIS 6250 Open Source Security Systems (3)
- ITIS 6320 Cloud Data Storage (3)

ITIS 6362 Information Technology Ethics, Policy, and Security (3)

ITIS 6420 Usable Security and Privacy (3)

Information Technology Management Concentration

ITIS 6342 Information Technology Project Management (3) *(if not already taken as a Core Course)*

ITIS 6362 Information Technology Ethics, Policy, and Security (3)

Plus 1-2 of the following, to result in 3 courses for this concentration:

ITIS 6010 Topics in Software and Information Systems (3) *(only if topic applicable and approved by program director)*

or ITCS 6010 Topics in Computer Science (3) *(only if topic applicable and approved by program director)*

ITIS 6177 System Integration (3)

ITIS 6130 Software Requirements Engineering for Information Systems (3)

ITIS 6230 Information Infrastructure Protection (3)

ITIS 6320 Cloud Data Storage (3)

ITCS 5161 Intellectual Property Aspects of Computing (3)

MBAD 6122 Decision Modeling and Analysis via Spreadsheets (3)

MBAD 6141 Operations Management (3)

MBAD 6161 Human Behavior in Organizations (3)

MBAD 6164 Executive Communication (3)

MBAD 6165 Negotiation and Conflict Management (3)

MBAD 6192 Business Ethics and Corporate Responsibility (3)

MBAD 6201 Business Intelligence and Analytics (3)

MBAD 6202 Managing IT-Enabled Business Processes and Systems (3)

MBAD 6203 Information Systems Economics, Strategy and Policy (3)

MBAD 6204 Management of Information Security and Privacy (3)

MBAD 6207 Business Project Management (3)

MBAD 6209 Management of Service Operations (3)

MBAD 6191 Entrepreneurship (3) *(requires significant business background)*

MBAD 6193 Global Business Environment (3) *(requires significant business background)*

MBAD 6197 Managing the Multinational Enterprise (3) *(requires significant business background)*

Software Systems Design and Engineering Concentration

ITIS 6112 Software System Design and Implementation (3) *(if not already taken as a Core Course)*

Plus 2-3 of the following, to result in 3 courses for this concentration:

ITIS 5166 Network-Based Application Development (3)

ITIS 5180 Mobile Application Development (3)

ITIS 5221 Secure Programming and Penetration Testing (3)

ITIS 6010 Topics in Software and Information Systems (3) *(only if topic applicable and approved by program director)*

or ITCS 6010 Topics in Computer Science (3) *(only if topic applicable and approved by program director)*

ITIS 6011 Interaction Design Studio (4)

ITIS 6140 Software Testing and Quality Assurance (3)

ITIS 6150 Software Assurance (3)

ITIS 6177 System Integration (3)

ITIS 6210 Access Control and Security Architecture (3)

ITIS 6250 Open Source Security Systems (3)

ITIS 6362 Information Technology Ethics, Policy, and Security (3)

MBAD 6202 Managing IT-Enabled Business Processes and Systems (3)

Web Development Concentration

Select three of the following:

Select three of the following:

ITIS 5166 Network-Based Application Development (3)

ITIS 5180 Mobile Application Development (3)

ITIS 5221 Secure Programming and Penetration Testing (3)

ITIS 5510 Web Mining (3)

ITIS 6010 Topics in Software and Information Systems (3) *(only if topic applicable and approved by program director)*

or ITCS 6010 Topics in Computer Science (3) *(only if topic applicable and approved by program director)*

ITIS 6011 Interaction Design Studio (4)

ITIS 6177 System Integration (3)

ITIS 6350 Rapid Prototyping Design Patterns (3)

ITIS 6360 User-Centered Design and Evaluation (3)

ITIS 6362 Information Technology Ethics, Policy, and Security (3)

ITIS 6410 Personalization and Recommender Systems (3)

ITIS 6520 Network Science (3)

Elective Courses (6 credit hours)

Students fulfill the remaining requirements for coursework by completing two approved elective courses from the College of Computing and Informatics.

Part of the elective requirements may also be met by taking the following internship:

ITIS 6198 IT Internship Project (3)

Culminating Experience

All students must successfully complete a culminating experience. This requirement is satisfied by completing any one of the following three:

- **IT Project:** a 15-page written report on knowledge related to one or more courses or a programming experience (*0 credit hours*)
- **IT Internship:** ITIS 6198 IT Internship Project (3)
- **IT Master's Thesis:** ITIS 6991 Information Technology Thesis (*6 credit hours; taken for 2 semesters*)

GRADUATE CERTIFICATE IN INFORMATION SECURITY AND PRIVACY

The Graduate Certificate in Information Security and Privacy provides professionals with an opportunity to advance their level of competence in the understanding, management, and applications of cyber security and privacy technology. Coursework towards this graduate certificate can be used for credit towards the M.S. in Information Technology. However, its primary objective is to provide a well-defined target for students who want to advance their knowledge and skills in understanding and applying cyber security technology, but do not necessarily wish to complete all the requirements for the M.S. in Information Technology. The certificate may be pursued concurrently with any of the graduate degree programs at UNC Charlotte.

Admission Requirements

This graduate certificate program is open to all applicants who hold a bachelor's degree from an accredited institution in a computing, mathematical, engineering or business discipline, with a minimum overall GPA of 2.8 and Junior/Senior GPA of 3.0, on a 4.0 scale. In addition, applicants are required to have substantial knowledge of data structures and object-oriented programming in C++, C# or Java.

The requirements on GPA may be waived if an applicant is currently enrolled and in good standing in a graduate degree program at UNC Charlotte.

Admission Procedure

As part of an application for the graduate certificate program, applicants are required to submit a brief (one-to-two page) statement of educational and work experience in applying information technology. All applications are handled centrally through the Office of Graduate Admissions. *Note: the admission process*

for the graduate certificate is separate from the admission process for a M.S. degree.

Certificate Requirements

The Certificate requires 12 credit hours of coursework. All requirements must be completed within four years of studies, starting from the time when the first course for the certificate is taken. Coursework taken for one graduate certificate may not be counted towards a second graduate certificate.

Core Course (3 credit hours)

ITIS 6200 Principles of Information Security and Privacy (3)

Elective Courses (9 credit hours)

Select three of the following:

ITIS 5220 Vulnerability Assessment and System Assurance (3)

ITIS 5221 Secure Programming and Penetration Testing (3)

ITIS 5250 Computer Forensics (3)

ITIS 6150 Software Assurance (3)

ITIS 6167 Network Security (3)

ITIS 6198 IT Internship Project (3)

ITIS 6210 Access Control and Security Architecture (3)

ITIS 6220 Data Privacy (3)

ITIS 6230 Information Infrastructure Protection (3)

ITIS 6240 Applied Cryptography (3)

ITIS 6362 Information Technology Ethics, Policy, and Security (3)

ITIS 6420 Usable Security and Privacy (3)

GRADUATE CERTIFICATE IN MANAGEMENT OF INFORMATION TECHNOLOGY

The Graduate Certificate in Management of Information Technology provides professionals with an opportunity to advance their level of competence in the management and applications of computing and information technology through formal training. Coursework towards this graduate certificate can be used for credit towards the M.S. in Information Technology. However, its primary objective is to provide a well-defined target for students who want to advance their knowledge and skills in applying and managing information technology, but do not necessarily wish to complete all the requirements for the M.S. in Information Technology. The certificate may be pursued concurrently with any of the graduate degree programs at UNC Charlotte.

Admission Requirements

This graduate certificate program is open to all applicants who hold a Bachelor's degree from an accredited institution with a minimum overall GPA of 2.8 and Junior/Senior GPA of 3.0, on a 4.0 scale. In addition, applicants are expected to have substantial working knowledge of applications of information technology.

The requirements on GPA may be waived if an applicant is currently enrolled and in good standing in a graduate degree program at UNC Charlotte.

Admission Procedure

As part of an application for the graduate certificate program, applicants are required to submit a brief (one-to-two page) statement of educational and work experience in applying information technology. All applications are handled centrally through the Office of Graduate Admissions. *Note: the admission process for the graduate certificate is separate from the admission process for a M.S. degree.*

Certificate Requirements

The Certificate requires 15 credit hours of coursework. All requirements must be completed within four years of studies, starting from the time when the first course for the certificate is taken. Coursework taken for one graduate certificate may not be counted towards a second graduate certificate.

Core Courses (6 credit hours)

ITIS 6342 Information Technology Project Management (3)
ITIS 6362 Information Technology: Ethics, Policy, and Security (3)

Elective Courses (9 credit hours)

Select three of the following:

ITIS 6200 Principles of Information Security and Privacy (3)
ITIS 6230 Information Infrastructure Protection (3)
ITIS 6112 Software System Design and Implementation (3)*
ITIS 6120 Applied Databases (3)*
ITIS 5166 Network Based Application Development (3)*
GEOG 6400 Advanced Seminar in Spatial Decision Support Systems (4)
MBAD 5121 Business Information Systems (3)
MBAD 6122 Decision Modeling and Analysis via Spreadsheets (3)
MBAD 6202 Managing IT-Enabled Business Processes and Systems (3)
MPAD 6160 Information Systems in Public Administration (3)

**Requires knowledge of data structures and object-oriented programming in C++, C#, or Java.*

GRADUATE CERTIFICATE IN NETWORK SECURITY

The Graduate Certificate in Network Security provides professionals with an opportunity to advance their knowledge and skills in cyber security for networked systems. The certificate requires fifteen (15) graduate credit hours of coursework. The certificate may be pursued concurrently with a related graduate degree program at UNC Charlotte.

Admission Requirements

This graduate certificate program is open to all applicants who hold a bachelor's degree from an accredited institution in a computing, mathematical, engineering or business discipline, with a minimum overall GPA of 2.8 and Junior/Senior GPA of 3.0, on a 4.0 scale. In addition, applicants are required to have substantial knowledge of data structures and object-oriented programming in C++, C# or Java.

The requirements on GPA may be waived if an applicant is currently enrolled and in good standing in a graduate degree program at UNC Charlotte.

Certificate Requirements

The graduate certificate must meet both the University-wide graduate certificate requirements as specified in the *Graduate Catalog* and the certificate specific requirements of 15 credit hours of coursework. All requirements must be completed within four years of studies, starting from the time when the first course for the certificate is taken. Coursework taken for one graduate certificate may not be counted towards a second graduate certificate.

Core Courses (12 credit hours)

ITIS 5250 Computer Forensics (3)
ITIS 6167 Network Security (3)
ITIS 6230 Information Infrastructure Protection (3)
ITCS 6166 Computer Communications and Networks (3)

Elective Course (3 credit hours)

Select one of the following:

ITIS 5221 Secure Programming and Penetration Testing (3)
ITIS 6150 Software Assurance (3)
ITIS 6200 Information Security and Privacy (3)
ITIS 6210 Access Control and Security Architecture (3)
ITIS 6220 Data Privacy (3)
ITIS 6240 Applied Cryptography (3)
ITIS 6250 Open Source Security Systems (3)

ITIS 6320 Cloud Data Storage (3)
 ITIS 6362 Information Technology Ethics, Policy, and Security (3)
 ITIS 6420 Usable Security and Privacy (3)

GRADUATE CERTIFICATE IN SECURE SOFTWARE DEVELOPMENT

The Graduate Certificate in Secure Software Development provides professionals with an opportunity to advance their knowledge and skills in developing software applications that are secure. The certificate requires 15 graduate credit-hours of coursework. The certificate may be pursued concurrently with a related graduate degree program at UNC Charlotte.

Admission Requirements

This graduate certificate program is open to all applicants who hold a bachelor's degree from an accredited institution in a computing, mathematical, engineering or business discipline, with a minimum overall GPA of 2.8 and Junior/Senior GPA of 3.0, on a 4.0 scale. In addition, applicants are required to have substantial knowledge of data structures and object-oriented programming in C++, C# or Java.

The requirements on GPA may be waived if an applicant is currently enrolled and in good standing in a graduate degree program at UNC Charlotte.

Certificate Requirements

The graduate certificate must meet both the University-wide graduate certificate requirements as specified in the *Graduate Catalog* and the certificate specific requirements of 15 credit hours of coursework. All requirements must be completed within four years of studies, starting from the time when the first course for the certificate is taken. Coursework taken for one graduate certificate may not be counted towards a second graduate certificate.

Core Courses (9 credit hours)

ITIS 5221 Secure Programming and Penetration Testing (3)
 ITIS 6150 Software Assurance (3)
 ITIS 6420 Usable Security and Privacy (3)

Elective Courses (6 credit hours)

Select two of the following:

ITIS 5166 Network Based Application Development (3)
 ITIS 5180 Mobile Application Development (3)
 ITIS 5250 Computer Forensics (3)
 ITIS 6112 Software System Design and Implementation (3)
 ITIS 6167 Network Security (3)

ITIS 6200 Information Security and Privacy (3)
 ITIS 6210 Access Control and Security Architecture (3)
 ITIS 6220 Data Privacy (3)
 ITIS 6230 Information Infrastructure Protection (3)
 ITIS 6240 Applied Cryptography (3)
 ITIS 6250 Open Source Security Systems (3)
 ITIS 6320 Cloud Data Storage (3)
 ITIS 6342 Information Technology Project Management (3)
 ITIS 6362 Information Technology Ethics, Policy, and Security
 ITCS 6114 Algorithm and Data Structures (3)

MASTER'S AND POST-GRADUATE COURSES IN INFORMATION TECHNOLOGY (ITIS)

ITIS 5156. Computer-Aided Instruction. (3)

Prerequisite: CCI graduate standing or permission of department. History of Computer-Aided Instruction (CAI); study of current CAI systems; development of man-machine dialogue; programming tools for CAI; information structures for computer-oriented learning. Advantages, disadvantages, and costs of CAI.

ITIS 5166. Network-Based Application Development. (3)

Cross-listed as HCIP 5166. Prerequisite: CCI graduate standing or permission of department. Examines the issues related to network based application development. Topics include: introduction to computer networks, web technologies and standards, network based programming methodologies, languages, tools and standards

ITIS 5180. Mobile Application Development. (3)

Cross-listed as ITCS 5180. Prerequisite: CCI graduate standing or permission of department. Mobile platforms are at the center of attention of users and organizations nowadays. Most organizations and businesses are rapidly migrating toward the cloud and need to provide a fast and easy mechanism for users to stay connected to their services. Mobile applications are the top trend nowadays given the high variety of new mobile devices and platforms such as Apple's iOS and Google's Android. In this course, students are introduced to the foundations of mobile development and its unique requirements and constraints. Students design and build a variety of mobile applications with a hands-on and project-based approach.

ITIS 5220. Vulnerability Assessment and System Assurance. (3)

Cross-listed as HCIP 5220. Prerequisite: CCI graduate standing or permission of department. Discusses methodologies, tools, and technologies that are important for vulnerability

assessment and systems assurance. Topics covered include: ethical hacking techniques, vulnerability assessment, risk assessment/management, finding new exploits, discovering vulnerabilities, penetrating network perimeters, bypassing auditing systems, and assured administration of systems as well as evaluating systems assurance levels. Focus will be placed on 1) understanding current penetration techniques for networks, operating systems, services and applications; 2) investigating mitigation and defense strategies; and 3) studying legal and ethical considerations. The course is based on case studies with a strong lab component.

ITIS 5221. Secure Programming and Penetration Testing. (3) Prerequisite: ITIS 4166 or ITIS 5166, or permission of department. Techniques for web application penetration testing, secure software development techniques for network based applications. Automated approaches such as static code analysis and application scanning are also discussed.

ITIS 5250. Computer Forensics. (3) Cross-listed as HCIP 5250. Prerequisite: CCI graduate standing or permission of department. The identification, extraction, documentation, interpretation, and preservation of computer media for evidentiary purposes and/or root cause analysis. Topics include: techniques for discovering digital evidence; responding to electronic incidents; tracking communications through networks; understanding electronic media, crypto-literacy, data hiding, hostile code, and Windows™ and UNIX™ system forensics; and the role of forensics in the digital environment.

ITIS 5510. Web Mining. (3) Cross-listed as DSBA 5510. Pre- or corequisite: ITIS 6120 or permission of department. Topics include: measuring and modeling the Web; crawling, Web search and information retrieval; unsupervised learning, supervised learning, semi-supervised learning in Web context; social network analysis and hyperlink analysis; text parsing and knowledge representation.

ITIS 6010. Topics in Software and Information Systems. (3) Prerequisite: CCI graduate standing or permission of department. Topics in software and information systems selected to supplement the regular course offerings. *May be repeated for credit with change of topic.*

ITIS 6011. Interaction Design Studio. (4) Prerequisite: CCI graduate standing or permission of department. A studio approach to teaching topics in interaction design. Aspects of interaction design taught in the studio include: gesture-based interaction, tangible interaction, large public display interaction, tabletop interaction, multi-touch tablet interaction,

and human-robot interaction. Students learn to apply a theoretical understanding of some aspect of interaction design to the study of existing designs and the development of a new design. Outcomes include writing a literature review about interaction design, executing users studies and critiques of existing designs, and developing and implementing a new interaction design for a specific purpose. *May be repeated for credit.*

ITIS 6112. Software System Design and Implementation. (3) Cross-listed as HCIP 6112 and ITCS 6112. Prerequisite: CCI graduate standing or permission of department. Introduction to the techniques involved in the planning and implementation of large software systems. Emphasis on human interface aspects of systems. Planning software projects; software design process; top-down design; modular and structured design; management of software projects; testing of software; software documentation; choosing a language for software system.

ITIS 6120. Applied Databases. (3) Cross-listed as HCIP 5160 and ITIS 8120. Prerequisite: CCI graduate standing or permission of department. Identification of business database needs; requirements specification; relational database model; SQL; E-R modeling; database design, implementation, and verification; distributed databases; databases replication; object-oriented databases; data warehouses; OLAP; data mining; security of databases; vendor selection; DBMS product comparison; database project management; tools for database development, integration, and transaction control.

ITIS 6130. Software Requirements Engineering for Information Systems. (3) Prerequisite: CCI graduate standing or permission of department. Introduction to requirement engineering methodologies. Topics include: requirements elicitation, specification, and validation; structural, informational, behavioral, security, privacy, and computer user interface requirements; scenario analysis; application of object-oriented methodologies in requirements gathering; spiral development models; risk management models; software engineering maturity model.

ITIS 6140. Software Testing and Quality Assurance. (3) Prerequisite: CCI graduate standing or permission of department. Methods for evaluating software for correctness and reliability including code inspections, program proofs and testing methodologies. Formal and informal proofs of correctness. Code inspections and their role in software verification. Unit and system testing techniques, testing tools and limitations of testing. Statistical testing, reliability models. Software engineering maturity model.

ITIS 6148. Advanced Object-Oriented Design and Implementation. (3) Cross-listed as ITCS 6148.

Prerequisite: CCI graduate standing or permission of department. Focuses on issues related to the design, implementation, integration, and management of large object-oriented systems. Topics include: object models, object modeling, frameworks, persistent and distributed objects, and object-oriented databases.

ITIS 6150. Software Assurance. (3) Cross-listed as ITIS 8150. Prerequisite: CCI graduate standing or permission of department. An introduction to software assurance education and research. Topics include: the security of software across the development life cycle that addresses trustworthiness, predictable execution and conformance. Various aspects of secure software requirements, design, construction, verification, and validation, process and engineering management are focused on as they relate to secure software development. Students gain hands-on experience in various techniques and tools as part of a semester-long project in addition to other assignments.

ITIS 6162. Knowledge Discovery in Databases. (3) Cross-listed as DSBA 6162, HCIP 6162, and ITCS 6162. Prerequisite: ITCS 6160 or permission of instructor. The entire knowledge discovery process is covered in this course. Topics include: setting up a problem, data preprocessing and warehousing, data mining in search for knowledge, knowledge evaluation, visualization and application in decision making. A broad range of systems, such as OLAP, LERS, DatalogicR+, C4.5, AQ15, Forty-Niner, CN2, QRAS, and discretization algorithms will be covered.

ITIS 6163. Data Warehousing. (3) Cross-listed as HCIP 6163 and ITCS 6163. Prerequisite: ITCS 6160 or permission of instructor. Topics include: use of data in discovery of knowledge and decision making; the limitations of relational databases and SQL queries; the warehouse data models: multidimensional, star, snowflake; architecture of data warehouse and the process of warehouse construction; data consolidation from various sources; optimization; techniques for data transformation and knowledge extraction; relations with enterprise modeling.

ITIS 6164. Online-Info Systems. (3) Prerequisites: ITCS 6114 or permission of department. The fundamental concepts and philosophy of planning and implementing an online computer system. Characteristics of online systems; hardware requirements; modeling of online systems; performance measurement; language choice for online systems; organization techniques, security requirements; resource allocation.

ITIS 6167. Network Security. (3) Cross-listed as HCIP 6167. Prerequisite: CCI graduate standing or permission of department. Examines the issues related to network security. Topics include: network security background and motivation, network centric threats, network authentication and identification, network security protocols, firewall, IDS, security in wireless environments, email security, instant message security, network application security, and network based storage security. There are heavy lab based components in this course.

ITIS 6177. System Integration. (3) Pre- or corequisite: ITIS 5166 or equivalent, or permission of department. Examines the issues related to system integration. Topics include: data integration, business process integration, integration architecture, middleware, system security, and system management.

ITIS 6180. Foundations of Health Informatics. (3) Cross-listed as ITIS 8180. Prerequisite: Graduate standing in computer science, information technology, health informatics, or related discipline. An overview of foundational concepts and methods in healthcare systems, technologies, and policies that are critical for successful research in health informatics. Students explore recurring themes, issues, and applications most frequently encountered in the field. The course is both technical and rigorous, and will involve both theoretical analysis and substantial projects. Topic include: an overview of issues, systems and technologies in health informatics and in-depth discussion of data standards, data integration, data analytics, and evaluation methods. Students who take this course gain the skills and knowledge necessary to conduct research in health informatics.

ITIS 6198. IT Internship Project. (3) Cross-listed as HCIP 6198. Prerequisite: permission of department. Complete a team-based project that is originated from an IT organization and approved by the department.

ITIS 6200. Principles of Information Security and Privacy. (3) Cross-listed as HCIP 6200 and ITIS 8200. Prerequisite: CCI graduate standing or permission of department. Topics include: security concepts and mechanisms; security technologies; authentication mechanisms; mandatory and discretionary controls; basic cryptography and its applications; database security, intrusion detection and prevention; assurance requirement, assurance class, evaluation methods and assurance maintenance; anonymity and privacy issues for information systems.

ITIS 6201. Computer Security and Privacy. (3) Crosslisted as HCIP 6201. Prerequisite: full graduate standing or permission of department. Topics

include: threats to computer and communication systems and privacy concepts; basic security defense techniques; web and network security issues; portable device security; operating systems security issues; email security; and security issues in major business applications.

ITIS 6210. Access Control and Security Architecture.

(3) Cross-listed as HCIP 6210. Prerequisite: ITIS 6200 or permission of department. Discusses objectives, formal models, and mechanisms for access control; and access control on commercial off-the-shelf (COTS) systems. Examines the issues related to security architectures and technologies for authorization. Topics include: cryptographic infrastructure, distributed systems security architectures, database systems security architectures, Internet security architectures, network security architectures and e-commerce security architectures.

ITIS 6211. Studio Lab I. (3) Cross-listed as ARCH 7211 and ITCS 6211. Prerequisite: CCI graduate standing or permission of department. The Studio/Lab sequence situates students with varying backgrounds in an educational environment that allows them to develop and test innovative computational design tools, applications and settings. Each semester is jointly taught by faculty from the School of Architecture and the College of Computing and Informatics, and is organized around a topic chosen by the participating faculty. Each focused topic requires expertise both in spatial design and computational design, and results in prototypes and evaluation.

ITIS 6212. Studio Lab II. (3) Cross-listed as ARCH 7212 and ITCS 6212. Prerequisite: CCI graduate standing or permission of department. The Studio/Lab sequence situates students with varying backgrounds in an educational environment that allows them to develop and test innovative computational design tools, applications and settings. Each semester is jointly taught by faculty from School of Architecture and the College of Computing and Informatics, and is organized around a topic chosen by the participating faculty. Each focused topic requires expertise both in spatial design and computational design, and results in prototypes and evaluation.

ITIS 6216. Introduction to Cognitive Science. (3)

Cross-listed as PSYC 6216 and ITCS 6216. Multiple perspectives on the study of intelligent systems. Broad coverage of such topics as philosophy of mind; human memory processes; reasoning and problem solving; artificial intelligence; language processing (human and machine); neural structures and processes; and vision. Also included is participation in the cognitive science seminar.

ITIS 6220. Data Privacy. (3) Pre- or corequisite: ITIS 6200, full graduate standing, or permission of department. Topics include: privacy concepts, policies, and mechanisms; identity, anonymity, and confidentiality; private data analysis and database sanitization; privacy-preserving data mining techniques including k-anonymity, randomization, and secure function evaluation; privacy issues in social networks, RFID, and healthcare applications.

ITIS 6230. Information Infrastructure Protection. (3)

Cross-listed as HCIP 6230 and ITIS 8230. Prerequisite: ITIS 6200 or permission of department. Methodologies, tools, and technologies that are important for protecting information systems and information infrastructures. Topics include: techniques, processes and methodologies for information security risk assessment and management, systems modeling and analysis using logic programming and formal methods, tools and technologies for critical infrastructure protection, methodologies for continuous operation and recovery from disasters.

ITIS 6240. Applied Cryptography. (3) Cross-listed as HCIP 6240. Prerequisite: CCI graduate standing or permission of department. Provides students with an understanding of modern cryptographic techniques, algorithms and protocols that are of fundamental importance to the design and implementation of security critical applications. Covers not only standard cryptographic techniques, but also exposes students to the latest advances in applied cryptography. Topics include: secret and public key ciphers, stream ciphers, one-way hashing algorithms, authentication and identification, digital signatures, key establishment and management, secret sharing and data recovery, public key infrastructures, and efficient implementation.

ITIS 6250. Open Source Security Systems. (3) Cross-listed as ITIS 8250. Pre- or corequisite: ITIS 6200 or equivalent, or permission of the department. An introduction to the design, implementation, evaluation and maintenance of secure software systems and applications using open source technologies, with an emphasis on hands-on experience. Topics include: open source ecosystems, open source security methodologies and models, notable open source software systems and projects, quality and security assurance through open source, open source supply chain security, major open source cryptographic packages; designing, implementing and maintaining security systems using open source technologies; assessment and regulatory compliance using open source tools, and open source hardware.

ITIS 6320. Cloud Data Storage. (3) Cross-listed as ITIS 8320. Prerequisite: CCI graduate standing or

permission of department. The design and implementation of cloud storage and big data systems and the architecture and characteristics of components on which cloud storage systems are built. Topics include: storage device hardware, file systems, mirroring and RAID, array coding techniques, storage area networks (SAN), network-attached storage (NAS), cloud storage and big data, DB in clouds, relational storage models, key value stores and other No-SQL mechanisms, data consistency and availability in the cloud, cloud data privacy and security.

ITIS 6342. Information Technology Project Management. (3) Cross-listed as HCIP 6342.

Prerequisite: CCI graduate standing or permission of department. Introduction to problems associated with managing information technology projects involving, particularly, integration of systems, development of client-specific solutions, and project justification. Moves beyond the classic techniques of project management and integrate communication software/systems, multi-site, multi-client facilities projects, cultural issues involved with managing interdisciplinary teams, and the effect of rapid technological obsolescence on project justification, funding and continuance.

ITIS 6350. Rapid Prototyping Design Patterns. (3)

Cross-listed as ITIS 8350. Prerequisite: Permission of department. Designed to teach the Rapid Prototyping Design Patterns process. An active learning course designed to expose students to the many forms of rapid prototyping software and devices. The focus is on the use of common design patterns and how to represent them quickly and inexpensively for the purpose of allowing many rapid design iterations prior to the coding of solutions. This course can be considered a communication course where communication between designers and developers occurs through prototyped artifacts and accompanying documentation. Design patterns can be considered the vocabulary of interaction and interface design, and so learning this vocabulary is an important aspect of the course. Prototyping in this course spans all types of devices and platforms: desktop, mobile, web, tabletop, tablet, etc. The theory of rapid prototyping is covered in video lectures that are consumed as part of the student's preparation outside of class. Class time is devoted to hands-on practice of the various rapid prototyping methods. Assignments involve applying the techniques learned in class to a variety of problem spaces and platforms, and the peer-critique of other student's designs. Evaluation is based on both understanding of the theory and on the methodological skills gained, as demonstrated through the individual or paired assignments. Students are also expected to write a scholarly article that examines some aspect of prototyping as a

part of the design process.

ITIS 6360. User-Centered Design and Evaluation. (3)

Cross-listed as ITIS 8360. Prerequisite: ITIS 6400. Designed to teach the user-centered design and evaluation process. In particular, students gain hands-on experience with the process of interface design, methods of design, and ways to evaluate and improve the design of interactive software applications in a course-long project. Students learn how to employ techniques which ensure that end-users are fully considered at all stages of the design process, from inception to implementation. Assignments involve planning, designing, and conducting studies to learn about user needs; developing the protocols and instruments for data collection; brainstorming, prototyping, and refining interactive solutions for a user problem; and designing and executing user evaluations of interactive software interfaces.

ITIS 6362. Information Technology Ethics, Policy, and Security. (3) Prerequisite: CCI graduate standing or permission of department.

Management of Information technology involves understanding the broader issues of ethics, policy and security. The growth in Internet usage and E-commerce require IT professionals to consider issues pertaining to data protection, regulation, and appropriate use and dissemination of information. The course is designed to be team-taught by professionals in the field.

ITIS 6400. Principles of Human-Computer Interaction. (3) Cross-listed as HCIP 6350.

Prerequisite: CCI graduate standing or permission of department. An introduction to Human-Computer Interaction practice and research. Topics include: the perceptual, cognitive, and social characteristics of people, as well as methods for learning more about people and their use of computing systems. The process of interface design, methods of design, and ways to evaluate and improve a design. Also highlights a number of current and cutting-edge research topics in Human-Computer Interaction. A balance of design, sociological/psychological, and information systems elements.

ITIS 6410. Personalization and Recommender Systems. (3) Cross-listed as HCIP 6410 and ITIS 8410.

Prerequisite: CCI graduate standing or permission of department. An introduction to the application of personalization and recommender systems techniques in information systems. Topics include: historical, individual and commercial perspectives; underlying approaches to content-based and collaborative recommendation techniques for building user models; acceptance issues; and case-studies drawn from research prototypes and commercially deployed systems.

ITIS 6420. Usable Security and Privacy. (3) Cross-listed as ITIS 8420. Prerequisite: ITIS 6200 or permission of department. Much of the work into security and privacy solutions ignore a critical element: the human who must interact with those solutions. In this course, we investigate privacy and security from a user-centered point of view. How do people think about privacy and security? How do they interact with current applications and solutions? What should be considered in designing user-friendly security systems? This course introduces students to a variety of usability and user interface issues related to privacy and security as well as examine potential designs and solutions.

ITIS 6500. Complex Adaptive Systems. (3) Cross-listed as DSBA 6500, HCIP 6500, ITCS 6500, ITCS 8500, and ITIS 8500. Prerequisite: CCI graduate standing or permission of department. Complex adaptive systems (CAS) are networked (agents/part interact with their neighbors and, occasionally, distant agents), nonlinear (the whole is greater than the sum of its parts), adaptive (the system learns to change with its environment), open (new resources are being introduced into the environment), dynamic (the change is a norm), emergent (new, unplanned features of the system get introduced through the interaction of its parts/agents), and self-organizing (the parts organize themselves into a hierarchy of subsystems of various complexity). Ant colonies, networks of neurons, the immune system, the Internet, social institutions, organization of cities, and the global economy are a few examples where the behavior of the whole is much more complex than the behavior of the parts. This course covers those and similar topics in an interactive manner. Examples of current research efforts are provided. Topics include: Self-organization; emergent properties; learning; agents; localization affect; adaptive systems; nonlinear behavior; chaos; and complexity.

ITIS 6510. Software Agent Systems. (3) Cross-listed as ITIS 8510. Prerequisite: CCI graduate standing or permission of department. An introduction to centralized and distributed software agent systems. Topics include: agent cooperation in cooperative and competitive environments, agent architectures, game theoretical models, market mechanisms, multi-agent learning, mixed-initiative computing and single and multi-agent applications. Students gain hands-on experience by building a multi-agent system as part of a semester-long project in addition to shorter assignments.

ITIS 6520. Network Science. (3) Cross-listed as DSBA 6520, HCIP 6520, and ITIS 8520. Prerequisite: CCI graduate standing or permission of department. Network Science helps students design faster, more resilient communication networks; revise

infrastructure systems such as electrical power grids, telecommunications networks, and airline routes; model market dynamics; understand synchronization in biological systems; and analyze social interactions among people. It examines the various kinds of networks (regular, random, small-world, influence, scale-free, and social) and applies network processes and behaviors to emergence, epidemics, synchrony, and risk. This course integrates concepts across computer science, biology, physics, social network analysis, economics, and marketing.

ITIS 6530. Systems Dynamics. (3) Cross-listed as ITIS 8530. Prerequisite: CCI graduate standing or permission of department. Introduction to systems thinking and the systems dynamics world view, tools for eliciting and mapping the structure and dynamics of complex systems, tools for modeling and simulation of complex systems, and procedures for testing and improving models. Helps students outline and evaluate dynamic relationships and factors that influence organizations' performance, market position, decision-making, and policy evaluations. Integrates concepts across information systems, computer science, business, engineering, economics, and social sciences. Based on 3-hour weekly lectures and hands-on project assignment.

ITIS 6880. Individual Study. (1-3) Prerequisites: At least 9 graduate ITCS/ITCS hours and permission of department. With the direction of a faculty member, students plan and implement appropriate objectives and learning activities to develop specific areas of expertise through research, reading, and individual projects. *May be repeated for credit.*

ITIS 6991. Information Technology Thesis. (1-6) Prerequisite: Full standing in the M.S. in Information Technology program and permission of department. Graduate thesis research. A detailed exploration of an area of information technology chosen for thesis research. *May be repeated for credit; no more than six hours may be applied to the M.S. degree requirements.*



College of Education

education.uncc.edu

Dean: Dr. Ellen McIntyre

Associate Dean for Research and Graduate Studies: Dr. Dawson Hancock

Interim Associate Dean: Dr. Teresa Petty

At the University of North Carolina at Charlotte, graduate students in the College of Education have many different opportunities to expand their knowledge and skills in preparation for new educational roles and increased leadership responsibilities. While many professional education programs lead to advanced NC licensure, other programs lead to both initial and advanced licensure, and still others are not associated with licensure. The College of Education is accredited by the National Council for Accreditation of Teacher Education (NCATE), and the Counseling programs are accredited by the Council on Accreditation of Counseling and Related Programs (CACREP). All licensure programs are approved by the North Carolina State Board of Education. Program graduates positively influence their peers, clients, and students; contribute to the development of effective schools and agencies for all children; and work to alleviate and prevent many of today's educational and social obstacles. The curricula of most of the College of Education's teacher education program align with the core propositions, skill sets, academic language, and concepts from the National Board of Professional Teaching Standards (NBPTS). Activities are designed to provide information and support to potential and current candidates for NBPTS certification.

One of the college's most important functions is to serve as a regional resource in education, research, and service to help address the challenges of urban schools. The college has a strong partnership with the 12 school districts in the Southwest Education

Alliance and is located within the bounds of Charlotte-Mecklenburg Schools (CMS), a large urban district.

Doctoral Programs

- **Doctor of Education (Ed.D.)**
 - o Educational Leadership: Superintendent or Curriculum/Supervision Concentration and Higher Education Concentration
- **Doctor of Philosophy (Ph.D.)**
 - o Counseling
 - o Curriculum and Instruction: Urban Education, Elementary Education, Literacy Education, or Mathematics Education
 - o Educational Research, Measurement, and Evaluation
 - o Special Education

Master's Degree Programs

- **Master of Arts (M.A.)**
 - o Counseling
 - Addiction Counseling Specialization
 - Clinical Mental Health Counseling Specialization
 - School Counseling Specialization (*Licensure program*)

- English with Concentration in English Education (*Advanced licensure; see under English in the College of Liberal Arts & Sciences section*)
- Mathematics Education (*Advanced licensure – see under Mathematics and Statistics in the College of Liberal Arts & Sciences section*)

- **Master of Arts in Teacher Education (M.A.T.)**

(*Combines Initial and Advanced licensure*)

- Child and Family Studies: Early Childhood Education (Birth through Kindergarten)
- Elementary Education
- Foreign Language Education: French, German, or Spanish
- Middle Grades Education: English/Language Arts, Mathematics, Science, or Social Studies
- Secondary Education: English, Mathematics, Comprehensive Social Studies, or Comprehensive Science
- Special Education: General Curriculum or Adapted Curriculum
- Teaching English as a Second Language

- **Master of Education (M.Ed.)**

(*Advanced licensure*)

- Child and Family Studies (B-K)
- Curriculum and Supervision
- Elementary Education
- Instructional Systems Technology (*Also offers a non-licensure track*)
- Middle/Secondary Education
 - a) Middle Grades Concentration: English/Language Arts, Mathematics, Science, or Social Studies
 - b) Secondary Education Concentration: English/Language Arts, Mathematics, Comprehensive Social Studies, or Comprehensive Science
- Reading Education
- Special Education
 - a) Academically Gifted
 - b) Adapted Curriculum
 - c) General Curriculum
- Teaching English as a Second Language

- **Master of School Administration (M.S.A.)** (*Advanced licensure*)

- School Administration

- **Master of Science (M.S.)**

- Mathematics with Concentration in Mathematics Education (*Advanced licensure; see under Mathematics and*

Statistics in the College of Liberal Arts & Sciences section)

Graduate Non-Degree Programs

- **Graduate Certificate in Teacher Education**

- Child and Family Development
- Elementary Education
- Fine and Performing Arts Education: Art
- Foreign Language Education: French, German, or Spanish
- Middle Grades Education: English/Language Arts, Mathematics, Science, or Social Studies
- Secondary Education: English, Mathematics, Comprehensive Social Studies, or Comprehensive Science
- Special Education: Academic or Intellectually Gifted
- Special Education: General Curriculum or Adapted Curriculum
- Teaching English as a Second Language

- **Other Graduate Certificate Programs**

- Addiction Counseling
- Autism Spectrum Disorders
- Curriculum and Supervision
- Early Childhood Mental Health
- Elementary School Mathematics
- Instructional Systems Technology
- Play Therapy
- School Administration
- School Counseling

GENERAL GRADUATE COURSES IN EDUCATION (EDUC)

EDUC 5000. Topics in Education. (1-6) May include classroom and/or clinical experiences in the content area. *May be repeated for credit with permission of department.*

EDUC 5100. Diverse Learners. (3) Strategies for adapting instruction to meet the learning needs of K-12 students, including students at risk for school failure, individuals from culturally and linguistically diverse backgrounds, gifted learners, and special needs populations. Extensive clinical experience required.

EDUC 6000. Topics in Education. (1-6) May include classroom and/or clinical experiences in the content area. *May be repeated for credit with permission of department.*

EDUC 6100. Theories of Human Development and Learning. (3) Concepts of development; philosophical antecedents of developmental and learning theories; role of theory in explaining human nature; components of theoretical explanations; evaluating theories.

EDUC 6102. The Person and School in Urban Society. (3) The basic philosophical theories and sociocultural forces that influence the objectives, structure and programs of schools, agencies and institutions in urban society.

EDUC 6144. Introduction to National Board Certification. (3) Provides a deeper understanding of the National Board for Professional Teaching Standards Certification Process. Emphasis on broadening an understanding of foundational components, including the National Board as a certifying entity, history of the certification process, National Board Standards for each content area, Core Propositions, what every teacher should know and be able to do, learning to be a reflective practitioner, and the steps in the certification process.

EDUC 6254. Individualizing Instruction for Diverse Learners. (3) Prerequisite: Enrollment in M.Ed. in Elementary Education with Concentration in Special Education, M.Ed. in Special Education, or M.Ed. in Reading Education; or permission of instructor. Instructional modifications/adaptations related to meeting the individual learning needs of students. Emphasis on teaming, collaboration, and creating a classroom environment in which all learners can be successful. Differences among learners that are

influenced by development, exceptionalities, and diversity are explored using case study methodology.

EDUC 6274. Contexts and Issues in the Teaching of English. (4) Cross-listed as ENGL 6274. Prerequisite: Admission to the M.A. in English with Concentration in English Education or the M.Ed. in Middle/Secondary Education. Examine the key concepts of the discipline. Consider own identities as readers, writers, teachers, researchers, makers of meaning. Emphasis upon critical approaches and pedagogical issues, with special attention to technology in the teaching of language, composition, and literature, as well as cultural contexts for the study of English.

EDUC 6651. Piagetian Theory. (3) Prerequisite: Permission of the instructor. Advanced seminar for investigation of Piagetian theory with emphasis on genetic epistemology, research and neo-Piagetian concepts.

EDUC 6674. Applied Research Methods in the Teaching of English. (4) Prerequisites: EDUC 6274 or ENGL 6274; and 12 credit hours toward the M.A. in English with Concentration in English Education. Building on the research basis established in ENGL 6274/EDUC 6274, this course provides the opportunity to apply research methods in classrooms. Examine identities as readers, writers, teachers, and especially as classroom researchers.

EDUC 6974. Thesis/Project in the Teaching of English. (6) Research integrating the fields of English and Education in a theoretical or application-oriented study. If the thesis/project is the outgrowth of previous coursework rather than a new topic, then considerable additional research and exposition must be done.

EDUC 7126. Comparative Education. (3) Analysis of sociocultural forces affecting educational planning and comparison of contemporary educational systems of selected countries and the United States.

Arts Education

• Graduate Certificate in Teaching: K-12 Art

Department of Middle, Secondary, and K-12 Education

mnsk.uncc.edu

Department of Art and Art History

art.uncc.edu

Graduate Program Director/Coordinator

Dr. David Gall, Coordinator for Art Education
Tesh Ramey, Arts Education Specialist

Graduate Faculty

Dr. Jane Dalton, Assistant Professor
Dr. David Gall, Associate Professor
Dr. Delane Vanada, Assistant Professor

GRADUATE CERTIFICATE IN TEACHING: K-12 ART

The Graduate Certificate in Teaching for Art Education is an 18 credit hour program designed for candidates who hold a bachelor's degree and a major in Visual Arts. It is offered by the College of Education in collaboration with the College of Arts + Architecture. The Colleges collaborate to provide arts professionals an alternative pathway to a teaching certificate. Upon successful completion of the Graduate Certificate, students are eligible for the North Carolina initial Standard Professional I teaching license.

All courses for the Graduate Certificate in Teaching must be completed within four years.

General Requirements for Admission to the Graduate School

Please refer to general information provided in The Graduate School section of this Catalog.

Additional Admission Requirements

- 1) An undergraduate degree from a regionally accredited four-year institution
- 2) A cumulative undergraduate GPA of 3.0. (For alternative ways to demonstrate academic competence, contact the Office of Teacher Education Advising, Licensure, and Recruitment.)
- 3) Three recommendations from persons knowledgeable of your interaction with children or youth

- 4) Statement of purpose
- 5) Clear criminal background check
- 6) Apply online at gradadmissions.uncc.edu
- 7) Submission of digital portfolio

Certificate Requirements

Required Courses (18 credit hours)

ARTE 5121 Art Education Methods I (K-12) (3)
ARTE 5122 Art Education Methods II (K-12) (3)
EDUC 5100 Diverse Learners (3)
MDSK 6162 Planning for K-12 Instruction (3)
MDSK 6470 Graduate Student Teaching and Internship (3)
READ 5255 Integrating Reading and Writing in the Content Areas (3)

Content Background Requirements

The applicant's undergraduate coursework (and professional experiences) will be reviewed to determine if the applicant's background is sufficient to meet current standards for art teachers. If deficiencies are identified, a plan of study for additional coursework will be provided.

Clinical Field Experiences

Most courses require candidates to develop their knowledge, skills, and dispositions in public school settings. These experiences broaden their ability to help all children learn, including children with exceptionalities and students from diverse ethnic/racial, linguistic, gender, and socioeconomic groups. During clinical experiences, candidates apply theories and understandings gained in coursework, analyze P-12 student learning, and develop the ability to positively impact all learners. All candidates are expected to complete clinical experiences in at least three significantly different school settings (the graduate student teaching placement may serve as one of the settings).

Candidates who are lateral entry teachers or teacher assistants must move beyond their own classrooms and schools for at least two clinical experiences. Alternative settings must be approved by the instructor and may include schools on different schedules, after-school and summer programs, Saturday programs, private, and charter schools. A limited number of clinical experiences may be approved in significantly different classrooms within their school of employment. Employed candidates are encouraged to seek assistance and support from their administrators to complete these requirements.

Internship/Student Teaching

The graduate-level student teaching/internship is the culminating experience of the Graduate Certificate in Teaching program, offering candidates the

opportunity to demonstrate their readiness for the initial Standard Professional I teaching license. Candidates are assigned to an appropriate classroom for a full-time, semester-long experience under the supervision of the classroom teacher and university faculty. Lateral entry teachers and teacher assistants must contact the Office of Field Experiences to determine the appropriateness of their classroom for the student teaching/internship experience and licensure requirements. This contact should take place at least one semester before student teaching.

Advising

All candidates are assigned an advisor upon formal admission to the program. Candidates should consult with their advisors at least once each semester.

Licensure

Upon successful completion of the Graduate Certificate, candidates will be recommended for the North Carolina initial Standard Professional I teaching license. For this license, candidates are required to complete an electronic licensure portfolio that is created during coursework and student teaching. Earning a passing score on the required PRAXIS II test is also mandatory for the licensure recommendation. Additional information on this test is available on www.ets.org/praxis.

Program Approval

All teacher education programs at UNC Charlotte are accredited by the National Council for Accreditation of Teacher Education and approved by the North Carolina State Board of Education.

COURSES IN ARTS EDUCATION

Art Education (ARTE)

ARTE 5121. Art Education Methods I (K-12). (3)

Prerequisite: Admission into Graduate Certificate in Teaching in Art program. Analysis of learning theories as related to growth and development in visual arts; organization of tools, media and materials; curriculum design in planning art units and lesson plans; evaluation and motivation techniques. Approximately 36 hours of clinical/classroom based field experience required.

ARTE 5122. Art Education Methods II (K-12). (3)

Prerequisite: ARTE 5121. Development of objectives for art education based on personal and historical references, philosophy, and psychology. Relationship of the arts and artists to contemporary society. Curriculum design, classroom management, and approximately 36 hours of clinical/classroom-based field experience required.

General Education (EDUC)

See the General Graduate Courses in Education heading at the beginning of this section for EDUC course descriptions.

Middle, Secondary, and K-12 Education (MDSK)

See the Middle Grades and Secondary Education heading within this section for MDSK course descriptions.

Reading, Language, and Literacy (READ)

See the Reading Education heading within this section for READ course descriptions.

Child and Family Studies: Early Childhood Education

- **Master of Education (M.Ed.)**
- **Master of Arts in Teaching (M.A.T.)**
- **Graduate Certificate in Child and Family Development: Birth through Kindergarten**
- **Graduate Certificate in Early Childhood Mental Health**

Department of Special Education and Child Development

spcd.uncc.edu

Graduate Program Director

Ms. Deana Murphy

Graduate Faculty

Dr. Cynthia Baughan, Assistant Professor

Ms. Jamie Brown, Lecturer

Dr. Vivian Correa, Professor

Ms. Deana Murphy, Senior Lecturer

Dr. JaneDiane Smith, Associate Professor

MASTER OF EDUCATION (M.ED.) IN CHILD AND FAMILY STUDIES: EARLY EDUCATION

The Master of Education (M.Ed.) in Child and Family Studies: Early Education program is for individuals with a bachelor's degree in Child and Family Development, Elementary Education, Special Education, or a related field.

The M.Ed.) in Child and Family Studies: Early Education prepares professionals for leadership positions that serve young children with and without disabilities and their families. It is conveniently designed for prospective students who wish to pursue an advanced degree on a part-time basis. The graduate degree program is for professionals who teach or provide services or intervention in infant, toddler, preschool, and kindergarten settings that include young children with and without disabilities; who administer family agency programs that have a

child development and family relations focus; who work as consultants, parent educators, inclusion specialists, program coordinators, supervisors, and staff development trainers; who wish to pursue certification as a Child Life Specialist (through the Child Life Council); or who seek research and evaluation expertise in child and family studies and community leadership in child and family programs. Graduates who possess an initial license in Birth-Kindergarten at the time of application and acceptance will qualify for the North Carolina Standard Professional 2 (SP2) Professional Educator's License in Birth-Kindergarten (B-K) issued by the North Carolina Department of Public Instruction upon completion of the program.

Admission Requirements

- 1) A bachelor's degree in Child and Family Development, Elementary Education, Special Education, or a related field from an accredited institution
- 2) Official transcripts of all previous work beyond high school documenting an overall GPA of at least 3.0 (based on a 4.0 scale)
- 3) Evidence of satisfactory scores on the Graduate Record Examination (GRE) or the Miller Analogies Test (MAT)
- 4) A personal statement outlining why the applicant seeks admission to the program and describing professional experiences with young children and their families
- 5) Three letters of recommendation from persons familiar with the applicant's personal or professional qualifications
- 6) Apply online at gradadmissions.uncc.edu

Degree Requirements

The M.Ed. in Child and Family Studies: Early Education requires a total of 33 credit hours of coursework.

Child and Family Studies Core Courses (15 credit hours)

- CHFD 6102 Learning and Development (3)
- CHFD 6115 Child and Family Advocacy (3)
- CHFD 6210 Inclusive Education for Young Children (3)
- CHFD 6220 Family Theory and Research (3)
- CHFD 6240 Advanced Studies in Infant and Child Development (3)

Applied Research/Evaluation Courses (6 credit hours)

- RSCH 6101 Research Methods (3)
- CHFD 6900 Research in Child and Family Studies (3)

Thematic Elective Courses (9 credit hours)

To be selected from the categories of: Instructional Systems Technology, Teaching English as a Second

Language, Leadership and Administration, Reading, Language, and Literacy; Research Methods; Early Intervention/Early Childhood Special Education; Child Life; or an individually planned option, with advisor approval.

Leadership Seminar (3 credit hours)

CHFD 7400 Applied Leadership in Child and Family Studies (3)

Clinical Field Experiences

Most courses require students to apply the knowledge learned in classes to community-based settings.

Master's Project/Thesis

The nature of the project/thesis is developed by the student in consultation with the major professor and presented to the Advisory Committee for approval. The project is usually something that is practical and useful to the student in the professional role that will be assumed upon the completion of the degree. The thesis takes a more research-oriented approach.

Elective Courses

The M.Ed. in Child and Family Studies: Early Education includes 9 elective credit hours which are determined in consultation with the student's academic advisor.

Advising

Upon admission, each student is assigned a faculty advisor who helps the student develop his or her program of study and must approve that program of study. Each student must also assemble a graduate committee for consultation and evaluation. Members of the committee include the student's faculty advisor and at least two other faculty members who represent major areas of concentration in the student's program.

Licensure

Successful completion leads to the North Carolina Standard Professional 2 (SP2) Professional Educator's License in Birth-Kindergarten (B-K).

Committees

Students should consult with their academic program advisor in the selection of the committee. The following guidelines are intended to assist the student and his or her academic program advisor in constituting the master's committee.

- 1) Chair - selected for content knowledge of the subject area that is selected for the culminating experience. This person should be from the major department. In addition, the chair must hold a graduate faculty appointment in the department.

- 2) Second and third members - selected for knowledge and expertise in the subject area (can be external to the department).
- 3) Technical advisor – an optional committee member selected for technical support (e.g., specialized skills in program evaluation, technical writing, assessment, curriculum design, graphics, ethnography, and survey research methodology). This person may be, but need not be, from the department.
- 4) Additional members - may be added if the committee chair agrees. These members may be from departments of the College other than the student's department, and may be from other colleges in the University. Additional members may also be from outside the University with the prior written permission of the Dean of the Graduate School. (This whole process should start at the beginning of the semester prior to graduation. However, the student may begin anytime after completing 18 hours.)

Research Opportunities/Experiences

The Child and Family Development faculty provide students with the opportunity to become involved in a variety of research endeavors. Each student will complete a research thesis.

Program Accreditation/Approval

All teacher education programs at UNC Charlotte are accredited by the National Council for Accreditation of Teacher Education. The M.Ed. in Child and Family Studies: Early Education has been approved by the North Carolina Department of Public Instruction.

MASTER OF ARTS IN TEACHING (M.A.T.) IN CHILD AND FAMILY STUDIES: EARLY CHILDHOOD EDUCATION (BIRTH- KINDERGARTEN)

The Master of Arts in Teaching (M.A.T.) program is designed for individuals who have completed the Graduate Certificate in Child and Family Development: Birth through Kindergarten. The M.A.T. program is a 39 credit hour program comprised of two phases, the Graduate Certificate phase (Phase I) and the Master's degree completion phase (Phase II). Completion of Phase I of the M.A.T. leads to the North Carolina Standard Professional 1 (SP1) Professional Educator's License in Birth-Kindergarten. Phase I requires 27 credit hours of coursework, including the graduate internship experience. Upon completion of Phase I, qualified candidates may apply for Phase II to work towards the

Master's degree and qualify for the North Carolina Standard Professional 2 (SP2) Professional Educator's License. For more information on the M.A.T., please visit pathwaytoteaching.com.

All courses for both phases of the M.A.T. must be completed within six years. Coursework within Phase I/Graduate Certificate must be completed within four years.

General Requirements for Admission to the Graduate School

Please refer to admission information in the "Graduate School" section of this *Catalog*.

Admission Requirements

Graduate Certificate in Teaching (M.A.T. Phase I Initial licensure only)

- 1) An undergraduate degree from a regionally accredited four-year institution
- 2) A cumulative undergraduate GPA of 3.0. (*For alternative ways to demonstrate academic competence, applicants may contact the Office of Teacher Education Advising, Licensure, and Recruitment (TEALR)*)
- 3) Three recommendations from persons knowledgeable of the applicant's interaction with children and families
- 4) A statement of purpose
- 5) A clear criminal background check
- 6) Apply online at gradadmissions.uncc.edu

M.A.T. (Phase II) Program

- 1) Completion of the Graduate Certificate in Teaching
- 2) A minimum graduate GPA of 3.5 in the Graduate Certificate in Teaching*
- 3) One recommendation from a full-time faculty member who has taught the applicant in the Graduate Certificate in Teaching program
- 4) A statement of purpose
- 5) Apply online at gradadmissions.uncc.edu

**Students with a GPA below 3.5 in the Graduate Certificate in Teaching may be considered for admission to the M.A.T. program with scores above the 30th percentile on either the Graduate Record Exam or Miller Analogies Test.*

Degree Requirements

Phase I/ Graduate Certificate Required Courses (27 credit hours)

- CHFD 5100 Development: Prenatal to Pre-Adolescence (3)
- CHFD 5114 Collaboration with Diverse Families: Prenatal to 36 Months (3)
- CHFD 6110 Family-Professional Partnerships (3)

- CHFD 6200 Curriculum and Learning Environments for Young Children (3)
- CHFD 6230 Emerging Literacy and Mathematical Understanding (3)
- CHFD 6400 Student Teaching Seminar: B-K Child and Family Development (3)
- SPED 5111 Issues in Early Intervention for Young Children with Disabilities (3)
- SPED 5112 Authentic Approaches to the Assessment of Young Children with Disabilities: Birth-Kindergarten (3)
- SPED 5210 Developmental Interventions for Young Children with Disabilities: Birth through Kindergarten (3)

Phase II/ Completion of the M.A.T. Required Courses (12 credit hours)

- RSCH 6101 Research Methods (3)
- CHFD 6300 Evidence-Based Practices in Child and Family Studies (3)
- CHFD 6330 Action Research (3)
- CHFD 7600 Seminar: Leadership in Education of Children and Families (3)

Capstone Experiences

The capstone experience for the M.A.T. will be fulfilled by completing the action research project.

Advising

Upon acceptance into the program, all students are assigned an advisor. Students are expected to meet with their advisor each semester to discuss their coursework.

Licensure

Upon successful completion of the M.A.T. Phase I/Graduate Certificate, students are recommended for the North Carolina Standard Professional 1 (SP1) Professional Educator's License. For this initial license, students are required to complete an electronic licensure portfolio that is created during coursework and the internship. Upon successful completion of the M.A.T. Phase II, students are recommended for the North Carolina Standard Professional 2 (SP2) Professional Educator's License. For the Professional 2 license, students are required to complete an advanced electronic licensure portfolio during coursework.

Committees

Students should consult with their academic program advisor in the selection of the committee. The committee chair should be selected for content knowledge of the subject area that is selected for the culminating experience. This person should hold a graduate faculty appointment in the CHFD program. Two additional committee members should be selected for knowledge and expertise in the student's

subject area. One of the additional members may be external to the student's department.

Program Accreditation/Approval

All teacher education programs at UNC Charlotte are accredited by the National Council for Accreditation of Teacher Education. The M.A.T. in Child and Family Studies: Early Childhood Education (Birth-Kindergarten) has been approved by the North Carolina Department of Public Instruction.

GRADUATE CERTIFICATE IN CHILD AND FAMILY DEVELOPMENT: BIRTH THROUGH KINDERGARTEN

The Graduate Certificate in Child and Family Development: Birth through Kindergarten is a 27 credit hour program that prepares professionals for careers that serve young children with and without disabilities and their families. It is designed for prospective students already working in professional settings who wish to pursue a North Carolina Standard Professional 1 (SP1) Professional Educator's License in Birth-Kindergarten (B-K) on a part-time basis.

All courses for the Graduate Certificate must be completed within four years.

General Requirements for Admission to the Graduate School

Please refer to admission information in the "Graduate School" section of this *Catalog*.

Admission Requirements for Graduate Certificate in Teaching Programs

- 1) An undergraduate degree from a regionally accredited four-year institution
- 2) A cumulative undergraduate GPA of 3.0. (*For alternative ways to demonstrate academic competence, applicants may contact the Office of Teacher Education Advising, Licensure, and Recruitment (TEALR)*)
- 3) Three recommendations from persons knowledgeable of the applicant's interaction with children and families
- 4) A statement of purpose
- 5) A clear criminal background check
- 6) Apply online at gradadmissions.uncc.edu

Certificate Requirements

- CHFD 5100 Development: Prenatal to Pre-Adolescence (3)
 CHFD 5114 Collaboration with Diverse Families: Prenatal to 36 Months (3)
 CHFD 6110 Family-Professional Partnerships (3)

- CHFD 6200 Curriculum and Learning Environments for Young Children (3)
 CHFD 6230 Emerging Literacy and Mathematical Understanding (3)
 CHFD 6400 Student Teaching Seminar: B-K Child and Family Development (3)
 SPED 5111 Issues in Early Intervention for Young Children with Disabilities (3)
 SPED 5112 Authentic Approaches to the Assessment of Young Children with Disabilities: Birth-Kindergarten (3)
 SPED 5210 Developmental Interventions for Young Children with Disabilities: Birth through Kindergarten (3)

Application for Degree

The Application for Degree/Graduation form supplied by the Graduate School must be received early in the last semester of the student's program.

Internship

A three-hour internship is required for Graduate Certificate students. The graduate-level internship is the culminating experience of the Graduate Certificate program, offering students the opportunity to demonstrate their readiness for the North Carolina Standard Professional 1 (SP1) Professional Educator's License. Students are assigned to an appropriate classroom for a full-time, semester-long experience under the supervision of the classroom teacher and university faculty. This internship can be done in a student's place of employment or the University can find a placement for the student. Lateral entry teachers and teacher assistants must contact the Office of Field Experiences to determine the appropriateness of their classroom for the internship experience and licensure requirements. This contact should take place at least one semester before the internship.

Clinical Field Experiences

Most courses require students to develop their knowledge, skills, and dispositions in community-based settings. *All students are expected to complete clinical experiences in at least two significantly different settings.* Candidates who are lateral entry teachers and teacher assistants must move beyond their own classrooms, and employed candidates are encouraged to seek assistance and support from their administrators.

Advising

All students are assigned an advisor upon formal admission to the program. Students should consult with their advisor at least once each semester.

Licensure

Upon successful completion of the Graduate Certificate, students are recommended for the North Carolina Standard Professional 1 (SP1) Professional Educator's License. For this license, students are required to complete an electronic licensure portfolio that is created during coursework and the internship. Students apply for the North Carolina Standard Professional 1 (SP1) Professional Educator's License in the TEALR Office.

Program Accreditation/Approval

All teacher education programs at UNC Charlotte are accredited by the National Council for Accreditation of Teacher Education. The Graduate Certificate in Child and Family Development: Birth through Kindergarten has been approved by the North Carolina Department of Public Instruction.

GRADUATE CERTIFICATE IN EARLY CHILDHOOD MENTAL HEALTH

The Graduate Certificate in Early Childhood Mental Health (ECMH) program is sponsored jointly by UNC Charlotte's School of Social Work and Department of Special Education and Child Development. It is an interdisciplinary post-baccalaureate certificate program that addresses the increasing need for mental health services for children from birth to five years of age. There is growing interest in infant and early childhood mental health; however, young children are rarely the focus of graduate training programs. Whereas mental health work with older children emphasizes increased personal choice-making and negotiation skills, mental health work with younger children is focused on the quality of the child's relationships, resources, and social environment. Consequently, parents and other caretakers are a much more integral part of prevention and intervention efforts for young children. Graduates of the EMCH certificate program will be able to:

- Promote awareness about the importance of early childhood mental health
- Work with diverse families with young children
- Identify evidence-informed services for young children and their families
- Recognize, refer, and perform ecologically valid mental health assessments of young children
- Explain the relationships between social, cognitive, and communication development in young children
- Support positive, relationship-focused communication between young children and their caretakers
- Facilitate positive social-communication skills between young children and their caretakers in a variety of settings

General Requirements for Admission to the Graduate School

Please refer to admission information in the "Graduate School" section of this *Catalog*.

Admission Requirements for Graduate Certificate Program

The ECMH certificate program welcomes professionals with a completed undergraduate or graduate degree in a human services field, including: counseling, education, early childhood special education, pediatrics, allied health services (i.e., occupational therapy, physical therapy, speech-language pathology), psychology, and social work. Individuals who are currently enrolled in a human service-related graduate degree program at UNC Charlotte are also welcome to apply to the ECMH certificate program.

If certificate applicants are not already enrolled in graduate courses at UNC Charlotte, they must first complete the Graduate School applications and be accepted by the UNC Charlotte Graduate School. In addition to Graduate School requirements, admission to the Graduate Certificate in ECMH requires the following:

- A cumulative undergraduate GPA of 3.0
- Three recommendations from persons knowledgeable about the applicant's interaction skills with children and families in a professional context
- A 2-3 page statement of purpose

Students interested only in the Graduate Certificate in ECMH are not required to take the GRE or MAT. Certificate students who later wish to apply to the M.S.W. or M.Ed. programs must follow all admissions requirements for those programs, including entrance examinations. Successful completion of courses in the ECMH certificate program does not guarantee admission to any other UNC Charlotte graduate program. If a certificate-only student would like to apply for admission to either the M.S.W. or M.Ed. program, the student must complete an additional graduate application. Students can begin the ECMH certificate program during any semester.

If an ECMH Graduate Certificate student is accepted into a master's degree program, courses completed in the Graduate Certificate program may be applied toward the Master of Social Work program or the M.Ed. in Child and Family Studies program at the discretion of the Graduate Program Director of the program to which the student applies and in compliance with existing University policy. However, credits earned in one certificate program

may not be used to satisfy the requirements of a second certificate program.

Certificate Requirements

The certificate program requires a minimum of 15 graduate credit hours, including four core courses and one elective course. Courses are typically available in the evening hours, but this can vary by semester. Courses required for the ECMH certificate program can be taken in any order.

Pre- and Corequisite Courses

Course prerequisites and corequisites for CHFD 6240, SPED 6242, and SOWK 7127 are waived for students completing only the Graduate Certificate in Early Childhood Mental Health. Permission of the Graduate Program Director is required for enrollment in courses with prerequisites.

Core Courses (12 credit hours)

CHFD 6240 Advanced Studies in Infant and Child Development (3)
SOWK 6171 Early Childhood Mental Health (3)
SOWK 7127 Advanced Social Work Practice with Families (3)
SPED 6242 Enhancing Communication and Supporting Behaviors in Inclusive Settings: B-K (3)

Elective Course (3 credit hours)

Select one of the following:

CHFD 6220 Family Theory and Research (3)
SPED 5112 Authentic Approaches to the Assessment of Young Children with Disabilities: Birth-Kindergarten (3)
SPED 6350 Young Children with Disabilities and their Families: Interdisciplinary Collaboration (3)

Time Limits

If a certificate student is later accepted into either the M.S.W. or M.Ed. program at UNC Charlotte, all courses for the degree must be completed within six years of initial enrollment. All courses for the Graduate Certificate in ECMH only must be completed within four years from initial enrollment in the certificate program.

COURSES IN CHILD AND FAMILY DEVELOPMENT (CHFD)

CHFD 5000. Topics in Child and Family

Development. (1-6) May include classroom and/or clinical experiences in the content area. *May be repeated for credit with permission of department.*

CHFD 5100. Development: Prenatal to Pre-

Adolescence. (3) Prerequisites: Admission to Teacher Education and GPA of at least 2.5. The study of

development (within the context of family, community, culture, and society) beginning at conception through adolescence. The potential influences of biological, genetic, environmental, and cultural factors on development are explored. Theories and research related to developmental processes are examined. A field-based clinical assignment of approximately 20 hours is required.

CHFD 5114. Collaboration with Diverse Families:

Prenatal to 36 months. (3) Prerequisites: Admission to Teacher Education and GPA of at least 2.5. Examines and applies in-depth research, theory and practices to create and implement evidence-based supports that build upon family and child strengths in a variety of home and community settings. Relationship-based approaches will be embedded throughout the course content. Explores the influence of family and community on the development of infants and toddlers through 30 hours of field-based experience.

CHFD 5200. Child Life: Supporting Children and

Families. (3) An overview of the Child Life field, introducing and examining concepts, principles, and applications for the Child Life profession. Students are introduced to the role of the Child Life Specialist in supporting ill children and their families to promote optimal coping and development. Includes site visits.

CHFD 6000. Topics in Child and Family

Development. (1-6) May include classroom and/or clinical experiences in the content area. *May be repeated for credit with permission of department.*

CHFD 6100. Adjustment Issues: Children in Family

Context. (3) Study of adjustment problems of childhood and adolescence with emphasis on the context and patterns of the family-of-origin system that influence behavior and attitudes as children with and without disabilities grow and develop.

CHFD 6102. Learning and Development. (3)

Prerequisite: Admission to the M.Ed. in Child and Family Studies or the M.A. in Counseling program. In-depth study of selected theories of learning and development.

CHFD 6110. Family-Professional Partnerships. (3)

Prerequisites: Admission to Teacher Education, GPA of at least 2.5, CHFD 5100, and CHFD 5114. An examination of the principles and practices of family-professional partnerships in terms of research, program implementation, evaluation, and collaboration. In-depth study of developmental designs, supportive programs designed to prevent problems, and programs and organizations which respond to diverse family needs and interests. Emphasis is placed on the process of family

involvement, communication, and collaborative leadership.

CHFD 6115. Child and Family Advocacy. (3)

Prerequisite: CHFD 6102. Study of the principles and practices of child and family advocacy.

CHFD 6120. Creativity, Learning Environments and Experiences. (3) Investigation of theories of creativity and their relationship to curriculum development.

CHFD 6130. Concepts of Teaching and Learning: Children's Play. (3) Examination of theories, trends and current practices in children's play.

CHFD 6200. Curriculum and Learning Environments for Young Children. (3) Prerequisites: Admission to Teacher Education and CHFD 5100. Examines theoretical and research foundations for designing, implementing, adapting, and evaluating curriculum that is responsive to the needs of young children who are culturally, linguistically, and ability diverse. Observational strategies are used to assess both the child (individual, sociocultural, and developmental characteristics) and the environment in order to identify best practices.

CHFD 6210. Inclusive Education for Young Children. (3) Pre- or corequisite: CHFD 6102. Inclusive education provides the opportunity for children with and without developmental disabilities to learn together. Inclusive early childhood curricula and instructional strategies are emphasized as is the professional role of interdisciplinary team member. Legislative mandates for inclusion are studied.

CHFD 6220. Family Theory and Research. (3) Pre- or corequisite: CHFD 6102. Study of family theories and research which employ the contextual framework of the family as a system and which explain family of origin, family functioning, family structure, and family process. Application of theory and research will include an understanding of the various levels of family functioning as a model for developing family support and intervention plans.

CHFD 6230. Emerging Literacy and Mathematical Understanding. (3) Prerequisites: Admission to Teacher Education, CHFD 5100, and CHFD 6200. Examines the development of language, literacy, and mathematical thinking in young children who are culturally, linguistically, and ability diverse. Research, current educational practice, and instructional materials and strategies are analyzed. Emphasis is on the design and assessment of integrated listening, speaking, reading, writing, and mathematical activities.

CHFD 6240. Advanced Studies in Infant and Child Development. (3) Prerequisite: CHFD 6102. An advanced course to extend knowledge of infant and early years development of typically and atypically developing children. Developmental domains of infants and young children and their relationships within family and society is emphasized.

CHFD 6300. Evidence-Based Practices in Child and Family Studies. (3) Prerequisites: Admission to the M.A.T. in Child and Family Studies: Early Childhood Education (B-K), and RSCH 6101. Corequisite: CHFD 6330. Investigates evidence-based practice guidelines, methods, and outcomes in assessment, intervention, instruction, and evaluation outcomes and/or policies that support child development in the context of families and communities. Culminates in a final project in which students identify a practice-relevant topic and conduct a literature review of the evidence pertaining to that topic.

CHFD 6330. Action Research. (3) Pre- or corequisite: CHFD 6300. Introduces students to action research in the context of self-reflective inquiry in students' own practice with strategies to improve practice. Fundamentals of the action research process including theoretical context, methods of collecting, analyzing, and describing data to prepare students to conduct action research independently. *Graded on a Pass/Unsatisfactory basis.*

CHFD 6400. Student Teaching Seminar: B-K Child and Family Development. (3) Prerequisite: Approval of an Application for Student Teaching and departmental approval. Planned sequence of experiences in the student's area of specialization conducted in an approved setting under the supervision and coordination of a University supervisor and a cooperating teacher. Student must demonstrate the competencies identified for the B-K teaching field. Approximately 35-40 hours per week in an assigned school setting and on-campus seminars scheduled throughout the semester.

CHFD 6800. Individual Study in Child and Family Studies. (1-6) Prerequisite: A written plan of study approved by the student's advisor and the individual study director. Designed to allow a student to pursue specialty interests under the supervision of an appropriate faculty member. Permission of the student's advisor and appropriate individual study director. *May be repeated for credit.*

CHFD 6900. Research in Child and Family Studies (Master's Thesis). (3) Prerequisites: RSCH 6101 and completion of at least 24 hours of graduate program. Design, implementation, presentation, and evaluation of an approved thesis in the student's specialty area. The thesis is of the student's own design under the

supervision of an advisor and graduate committee.
Graded on Pass/Unsatisfactory basis.

CHFD 7135. Readings in Learning and Development.

(3) Examines research data about the development of human behavior interpreted in terms of multiple disciplines, including psychology, anthropology and ethnology.

CHFD 7400. Applied Leadership in Child and Family Studies.

(3) Prerequisite: Completion of at least 30 credit hours of graduate program. An intensive, professional supervised field-based experience in which students demonstrate the ability to provide direct service, to apply research and theory in a field-based setting, and to assume leadership roles. A minimum of 200 clock hours is required.

CHFD 7600. Seminar: Leadership in Education of Children and Families.

(3) Prerequisite: Completion of at least 24 credit hours of graduate program. A synthesizing course of study focusing on review, compilation, analysis, and evaluation of the literature, research, and experiences relevant to the student's specialty area. Students demonstrate leadership by conducting a program evaluation, creating innovative solutions to challenges, and initiating and creating collaboration among persons and across agencies.

Counseling

- **Ph.D. in Counseling**
- **M.A. in Counseling**
- **Graduate Certificate in Play Therapy**
- **Graduate Certificate in Addiction Counseling**
- **Post-Master's Certificate in School Counseling**

Department of Counseling

counseling.uncc.edu

Graduate Program Directors

Dr. Phyllis Post – Doctoral Program, Play Therapy Concentration, and Graduate Certificate in Play Therapy

Dr. Valerie Balog – Master's Program

Dr. Pam Lassiter – Addiction Concentration

Dr. Sejal Parikh Foxx – School Counseling Concentration and Post-Master's Certificate in School Counseling

Graduate Faculty

Dr. Lyndon P. Abrams, Associate Professor

Dr. Valerie G. Balog, Clinical Associate Professor

Dr. John R. Culbreth, Professor

Dr. Sejal P. Foxx, Associate Professor

Dr. Susan R. Furr, Professor

Dr. Daniel Gutierrez, Assistant Professor

Dr. Henry L. Harris, Department Chair and Professor

Dr. Katie Lamberson, Assistant Professor

Dr. Pam S. Lassiter, Associate Professor

Dr. Clare P. Merlin, Assistant Professor

Dr. Phyllis B. Post, Professor

Dr. Edward A. Wierzalis, Clinical Associate Professor

PH.D. IN COUNSELING

The Ph.D. in Counseling is designed to provide doctoral-level preparation for professionals who seek higher education positions in counselor preparation programs and advanced clinical training and leadership positions in the counseling field. A unique feature of this program is its emphasis on increasing knowledge, awareness, and skills in interacting with socially and culturally diverse populations. The program addresses professional roles in five doctoral core areas: (1) counseling, (2) supervision, (3) teaching, (4) research and scholarship, and (4) leadership and advocacy. These five doctoral core

areas represent the foundational knowledge required of doctoral graduates in counselor education. Doctoral-level students in counselor education may work as counselor educators, counselor supervisors, direct service providers, program consultants, researchers, program evaluators, and in other roles that require leadership in the areas of counseling, human services, family development, and community organizations. Potential employment settings include institutions of higher education, schools, hospitals, employee assistance programs, substance abuse treatment centers, community mental health agencies, and private practice centers.

The Ph.D. in Counseling requires a minimum of 63 credit hours beyond those earned in an accredited master's program of at least 48 credit hours. Advanced preparation will be required in the following areas:

- 1) Implications of ways in which diversity (e.g., race, gender, age, religion, spirituality, ethnicity, mental/physical ability, nationality, and sexual orientation) influence counseling practice and counselor education.
- 2) Theories pertaining to the principles and practice of counseling, career development, group work, and consultation.
- 3) Clinical skill development in counseling, group work, and consultation.
- 4) Theories and practice of counselor supervision.
- 5) Design and implementation of quantitative research and methodology.
- 6) Design and implementation of qualitative research and methodology.
- 7) Models and methods of assessment and use of data.
- 8) Ethical and legal considerations in counselor education and supervision.
- 9) Instructional theory and methods relevant to counselor education.

Program Objectives

- 1) To acquire, integrate, and apply empirical and theoretical knowledge of the field of counseling.
- 2) To develop leadership and advocacy skills in counselor education, supervision, advanced counseling practice, and research.
- 3) To apply advanced skills and competencies in field-based settings.
- 4) To conduct research and generate new knowledge in counseling.
- 5) To design, adapt, and evaluate curricula in the field of counseling.
- 6) To develop depth and breadth in professional growth and continued life-long learning.
- 7) To examine the influence of social context and policy variables on human behavior.

- 8) To show increased sensitivity and clinical skills that demonstrate awareness of the diversity of race, gender, age, religion, ethnicity, mental/physical ability, nationality, and sexual orientation as relevant to counseling professionals.

In addition to a 100-hour clinically based doctoral practicum, doctoral students participate in internship experiences of at least 600 clock hours that include teaching, supervision, and research.

Students also collaborate with faculty as a part of their Professional Development Plan in teaching, supervision, counseling services, research, professional writing, and service to the community, region, and profession.

Additional Admission Requirements

Applicants should possess a CACREP-approved Master's Degree in counseling with a cumulative GPA of 3.5 (on a scale of 4.0) or higher. Students with master's degrees requiring less than 60 credit hours or degrees from non-CACREP-approved Master's programs may need to complete prerequisite courses. All doctoral students accepted into the program who graduated from a CACREP accredited program prior to 2009 or who graduated from a non-CACREP accredited program must provide documentation of a graduate level substance abuse/addiction course or add a substance abuse/addiction course to their program of study. At least one year of experience as a professional counselor is preferred.

Degree Requirements

Core Courses (21 credit hours)

CSLG 8100 Advanced Theories of Counseling (3)
 CSLG 8105 Doctoral Seminar (1)
 CSLG 8106 Advanced Multicultural Career Counseling (1)
 CSLG 8107 Advanced Group Seminar (1)
 CSLG 8110 Clinical Supervision in Counseling (3)
 CSLG 8203 Instructional Theory in Counselor Education (3)
 CSLG 8345 Advanced Multicultural Counseling (3)
 CSLG 8346 Applied Multicultural Counseling (3)
 CSLG 8998 Seminar in Prospectus Design (3)

Clinical Courses (12 credit hours)

CSLG 8431 Doctoral Practicum in Counseling (3)
 CSLG 8440 Doctoral Internship: Counseling (3)
 CSLG 8442 Doctoral Internship: Supervision (3)
 CSLG 8445 Doctoral Internship: Teaching (3)

Research Courses (24 credit hours)

RSCH 8110 Descriptive and Inferential Statistics (3)
 RSCH 8111 Qualitative Research Methods (3)
 RSCH 8120 Advanced Statistics (3)
 RSCH 8140 Multivariate Statistics (3)

RSCH 8210 Applied Research Methods (3)
CSLG 8999 Dissertation (1-9) (minimum of 9 credit hours)

Elective Courses (6 credit hours)

Select a minimum of two of the following:

CSLG 7000-8999 (3)
RSCH 7000-8999 (3)

Courses outside the above list must have approval of the student's Doctoral Advisory Committee and an Academic Petition must be submitted requesting the change.

Admission to Candidacy

Students are considered candidates for the doctoral degree on successful completion of the Comprehensive Examination and acceptance of the Dissertation Proposal.

Practicum

A Doctoral Practicum is taken in the first year of study. The practicum requires 100 hours over the course of a semester at an approved site in the community. The Practicum involves the acquisition of new skills and learning regardless of the site selected.

Internships

Doctoral students are required to complete a total of 600 clock hours of internship in the areas of teaching, supervision, and research. Students and their doctoral advisors develop collaboratively components of their internship experiences in accordance with relevant CACREP standards.

Elective Courses

Students in the Ph.D. in Counseling are required to choose two elective courses to complete their doctoral program. Electives may be any of the following. Electives other than those listed below may be selected with the approval of the doctoral advisory committee.

CSLG 7000-8999 (3)
RSCH 7000-8999 (3)

Advising

Students select a program advisor and committee by the end of their first fall semester in the program. The program advisors assist students during the initial stages of the program, which includes developing a Program of Study aligned with the program plan in DegreeWorks for the catalog year in which the student entered the program, developing a Professional Development Plan, and identifying faculty whose research interests and expertise are

congruent with students' areas of inquiry for the dissertation. The assistance of the advisor does not relieve students of responsibility for following departmental and University procedures. Following the comprehensive exam, students select a dissertation advisor/chair and committee. The program advisors continue to provide academic advisement to students through their program, regardless of whether they are part of students' dissertation committee.

Comprehensive Exam

The main objective of the written portion of the qualifying exam is to ensure that the student is adequately prepared to write a dissertation to complete the Ph.D. degree requirements. Being prepared means the following:

- 1) Examinees must have completed all degree core content courses.
- 2) Examinees must be able to analyze and synthesize information obtained from coursework and research within a multicultural counseling context.
- 3) Examinees must demonstrate advanced knowledge in the core areas of counselor education.
- 4) Examinees must demonstrate competencies in research methodology and evaluation.

The comprehensive exam is a 2-day written exam administered on campus.

Dissertation Committee

A Dissertation Committee, comprised of at least five faculty members, will be formally appointed for each student after admission to candidacy. At least three committee members must be on the Counseling Program faculty and one member will be appointed by the Graduate School. A person outside the University may serve as a full member of the Dissertation Committee in situations where knowledge or expertise of a particular nature is desired. With the mutual consent of the student and the faculty member, a faculty member will be designated to serve as the Chair of the Doctoral Committee. Chairs of Doctoral Committees are specifically responsible for seeing that the student progresses in an expeditious manner towards completion of the degree. Chairs will assist students in organizing committee meetings, conducting original research, presenting the proposal, and organizing the dissertation defense. Eligible faculty are all tenured faculty (Professor/Associate Professor), as well as Assistant Professors who have been reappointed for their second term. Each appointed Committee Member will have both voice and vote on all relevant matters pertaining to a doctoral student's progress towards the degree. At least four committee members must be present for the oral defense of the

dissertation. The oral defense is considered satisfactory upon the positive vote of at least four committee members. Prior to and following the appointment of this committee, students are encouraged to work with faculty on dissertation ideas.

Dissertation

Each candidate for the doctoral degree is required to prepare and present a dissertation that shows independent investigation and is acceptable in form and content to the Dissertation Committee. A doctoral dissertation must demonstrate the candidate's ability to conceive, design, conduct, and interpret independent, original, and creative research and must make a unique contribution to knowledge in the field of counseling. Under the direct supervision of the Doctoral Committee Chair, students are encouraged to consult regularly with their Dissertation Committee members during the planning, conducting and writing of the dissertation. Following the approval of the dissertation proposal students are required to maintain continuous enrollment (fall and spring semesters) for dissertation study until work is completed. Continuous enrollment begins on the date the Graduate School approves the student's dissertation topic. Students who exceed the required number of dissertation hours for degree completion will register for GRAD 9999 each semester until degree requirements have been completed.

Program Certifications/Accreditation(s)

The program has been accredited by the Council for the Accreditation of Counseling and Related Education Programs (CACREP).

MASTER OF ARTS IN COUNSELING

The M.A. program in Counseling is accredited by the Council for Accreditation of Counseling and Related Educational Programs (CACREP) in School Counseling, Clinical Mental Health Counseling, and Addiction Counseling. In addition, the program offers an additional secondary Play Therapy concentration.

All concentrations qualify graduates to become a Licensed Professional Counselor Associate (LPCA) in the state of North Carolina. Graduates can also apply for credentialing as an Nationally Certified Counselor (NCC) through the National Board of Certified Counselors.

The School Counseling concentration qualifies graduates for advanced-level K-12 school counseling licensure in North Carolina. Those completing the Addiction concentration can apply to become certificated as a Licensed Clinical Addiction Specialist (LCAS) through the NC Substance Abuse Professional

Practice Board. The Play Therapy concentration meets the educational requirements, as specified by the Association for Play Therapy (APT), for the Registered Play Therapist (RPT) credential, is recognition of academic achievement, and enhances professional standing.

Program Objectives

As prospective professional counselors, graduates of the program are prepared to: counsel clients, both individually and in groups, on educational, career, life planning, social, emotional, physical, spiritual, and organizational concerns; provide information to clients for educational, social, career, and/or life planning; consult with other professionals concerning client needs; and conduct needs assessments, evaluations, and other activities for program design.

Additional Admission Requirements

In addition to the general requirements for admission to the Graduate School, the criteria for admission to the M.A. program in Counseling include an applicant's potential success in forming effective interpersonal relationships in individual and small-group contexts; aptitude for graduate-level study; career goals and objectives; openness to self-examination; and potential for personal and professional self-development. Admission decisions are based on applicants' individual profiles and made by a committee of program faculty. Applicants with the highest profile rankings are invited to campus for an interview process; the number invited is determined by the number of anticipated openings in the program. Students are admitted to the program in the spring of each year, and they are expected to begin their studies the following summer or fall. The application deadline for each year's admissions process is December 1.

Prerequisite Requirements

Students are not required to have an undergraduate major in any particular field to enter the counseling program.

Degree Requirements

The M.A. program in Counseling requires a total of 60 credit hours of core courses for all students and specialization courses for students in school counseling, clinical mental health counseling, or addiction. In addition, the programs offers an additional secondary Play Therapy concentration. Each concentration includes a series of required courses, clinical experience courses, and elective courses.

Core Courses for All Students (30 credit hours)

CSLG 6100 Counseling Theories (3)

CSLG 6101 Ethical and Professional Issues in Counseling (3)
 CSLG 6104 Counseling Across the Lifespan (3)
 CSLG 6110 Counseling Techniques (3)
 CSLG 6111 Advanced Counseling Techniques (3)
 CSLG 6120 Group Counseling (3)
 CSLG 6145 Multicultural Counseling (3)
 CSLG 6150 Career Development and Counseling (3)
 RSCH 6101 Research Methods (3)
 RSCH 6109 Assessment and Evaluation Methods (3)

Concentrations

Addiction Concentration

Addiction Courses (12 credit hours)

CSLG 6160 Theories of Addiction (3)
 CSLG 6161 Assessment and Diagnosis of Addictive Disorders (3)
 CSLG 6162 Interventions in Addiction Counseling (3)
 CSLG 6163 Treatment Planning and Relapse Prevention in Addiction Counseling (3)
 or CSLG 6164 The McLeod Institute on Addiction (3)

Clinical Experiences (Addiction Setting) (9 credit hours)

CSLG 7430 Practicum in Counseling (3) (150 hours)
 CSLG 7435 Internship in Counseling (3) (300 hours) (taken twice)

Elective Courses (9 credit hours)

These courses must be approved by the student's advisor.

Clinical Mental Health Concentration

Clinical Mental Health Courses (9 credit hours)

CSLG 7170 Introduction to Clinical Mental Health Counseling (3)
 CSLG 6153 Diagnosis and Treatment in Counseling (3)

Plus one Addiction course from the following:

CSLG 6000 Topics in Counseling (1-6) (McLeod Institute)
 CSLG 6160 Theories of Addiction (3)
 CSLG 6161 Assessment and Diagnosis of Addictive Disorders (3)
 CSLG 6162 Interventions in Addiction Counseling (3)
 CSLG 6163 Treatment Planning and Relapse Prevention in Addiction Counseling (3)
 CSLG 6164 The McLeod Institute on Addiction (3)

Clinical Experiences (Clinical Mental Health Setting) (9 credit hours)

CSLG 7430 Practicum in Counseling (3) (150 hours)
 CSLG 7435 Internship in Counseling (3) (300 hours) (taken twice)

Elective Courses (12 credit hours)

These courses must be approved by the student's advisor.

Play Therapy Concentration

Play Therapy Courses (9 credit hours)

CSLG 7142 Introduction to Play Therapy (3)
 or CSLG 8142 Introduction to Play Therapy (3)
 CSLG 7143 Filial Therapy: An Approach to Parent Training (3)
 or CSLG 8143 Filial Therapy: An Approach to Parent Training (3)
 CSLG 7144 Contemporary Theories of Play Therapy (3)
 or CSLG 8144 Contemporary Theories of Play Therapy (3)

Elective Course (3 credit hours)

Select one in consultation with the Director of the Play Therapy Concentration:

For M.A. in Counseling students who receive permission from the Director of the Play Therapy Concentration:

CSLG 7430 Practicum in Counseling (3)
 CSLG 7435 Internship in Counseling (3)

For Ph.D. in Counseling students who receive permission from the Director of the Play Therapy Concentration:

CSLG 8431 Doctoral Practicum in Counseling (3)
 CSLG 8440 Doctoral Internship: Counseling (3)

School Counseling Concentration

School Counseling Courses (9 credit hours)

CSLG 7140 Consultation in School Counseling (3)
 CSLG 7141 The Professional School Counselor (3)
 CSLG 7646 Advocacy and Leadership in Professional School Counseling (3)

Clinical Experiences (School Setting) (9 credit hours)

CSLG 7430 Practicum in Counseling (3) (150 hours)
 CSLG 7435 Internship in Counseling (3) (300 hours) (taken twice)

Elective Courses (12 credit hours)

These courses must be approved by the student's advisor.

Comprehensive Exam

Students must successfully pass the Counselor Preparation Comprehensive Exam (CPCE) to graduate from the program. Students are expected to consult with their advisors during the first 24 hours of coursework concerning procedures and preparation for this experience.

Advising

All students should plan their program of study by December of their first year of study with their advisors.

Licensure

Students who graduate from the School Counseling concentration are eligible, upon passing the exam required by the North Carolina Department of Public Instruction (DPI), to be recommended for school counseling licensure from the North Carolina DPI. All graduates are eligible to apply for the credential of Licensed Professional Counselor Associate (LPCA) through the NCBLPC upon completion of the application and required exam.

GRADUATE CERTIFICATE IN ADDICTION COUNSELING

The Graduate Certificate in Addiction Counseling is designed to prepare students to assist those in need of counseling due to addiction.

Additional Admission Requirements

The certificate program admits **practitioners and students who either hold or are currently enrolled in a CACREP-accredited graduate degree program**. In addition to the general requirements for admission to a certificate program, applicants must provide official transcripts, three letters of recommendation from persons familiar with the applicant's personal and professional qualifications, and an essay describing the applicant's relevant experience and objectives in undertaking the Graduate Certificate in Addiction Counseling program.

Applications for admission to the Certificate Program will be considered as they are received and admissions will be ongoing. Students are admitted to the Graduate School in a special category for certificate students.

Certificate Requirements

Required Courses (9 credit hours)

- CSLG 6160 Theories of Addiction (3)
or CSLG 8160 Theories of Addiction (3)
- CSLG 6161 Assessment and Diagnosis of Addictive Disorders (3)
or CSLG 8161 Assessment and Diagnosis of Addictive Disorders (3)
- CSLG 6162 Interventions in Addiction Counseling (3)
or CSLG 8162 Interventions in Addiction Counseling (3)

Elective Course (3 credit hours)

Select one of the following:

- CSLG 6163 Treatment Planning and Relapse Prevention in Addiction Counseling (3)
or CSLG 8163 Treatment Planning and Relapse Prevention in Addiction Counseling (3)
- CSLG 6164 The McLeod Institute on Addiction (3)
CSLG 8164 The McLeod Institute on Addiction (3)

These four courses **plus 600 hours of supervised field experiences in substance abuse treatment facilities** are components of a University-approved certificate program. Students who successfully complete the four courses along with the 600 hours of field experience as a part of their master's degree in counseling at UNC Charlotte are eligible to apply for licensure under Criteria C with the North Carolina Substance Abuse Professional Practice Board.

GRADUATE CERTIFICATE IN PLAY THERAPY

The Graduate Certificate in Play Therapy program is designed to prepare students to work with children who are 10 years and younger in a developmentally appropriate way in both school counseling and community settings. It is available for students who have completed a master's degree in counseling, social work, or psychology and want additional training in play therapy. In addition, the program is available for students in other departments at UNC Charlotte and students at other universities in their M.A. and Ph.D. programs.

The Graduate Certificate in Play Therapy meets the educational requirements as specified by the Association for Play Therapy (APT) for the Registered Play Therapist (RPT) credential. The Graduate Certificate is recognition of academic achievement and enhances professional standing.

Additional Admission Requirements

- 1) An earned master's degree in counseling, social work, or psychology from an accredited university
- 2) Online application to Graduate Admissions accompanied by the application fee in effect
- 3) GPA required for entry into a master's degree program
- 4) Official transcripts
- 5) Two (2) letters of recommendation
- 6) Personal statement of interest

The program adheres to Graduate School Admissions deadlines. Please note that classes may fill before the Graduate School's final deadlines. Students are admitted to the Graduate School in a special category for Graduate Certificate students and must comply

with all policies and regulations of the Graduate School from the time they are admitted until they graduate.

Certificate Requirements

Students must complete 12 credit hours as follows.

Required Courses (9 credit hours)

- CSLG 7142 Introduction to Play Therapy (3)
or CSLG 8142 Introduction to Play Therapy (3)
- CSLG 7143 Filial Therapy: An Approach to Parent Training (3)
or CSLG 8143 Filial Therapy: An Approach to Parent Training (3)
- CSLG 7144 Contemporary Theories of Play Therapy (3)
or CSLG 8144 Contemporary Theories of Play Therapy (3)

Elective Course (3 credit hours)

Select one from the following:

- CSLG 7145 Special Topics in Play Therapy: Group, Conference, or Supervision (3)
- CSLG 8145 Special Topics in Play Therapy: Group, Conference, or Supervision (3)
- Other Elective Course determined in consultation with the Director of the Graduate Certificate in Play Therapy

POST-MASTER'S CERTIFICATE IN SCHOOL COUNSELING

The Post-Master's Certificate in School Counseling provides graduate level coursework related to school counseling. Successful completion of the program requirements enables the counselor to be recommended for licensure in school counseling from the North Carolina Department of Public Instruction. A minimum of 12 credit hours is required for the post-master's certificate. All coursework applied to a certificate must be completed within four years. Transfer credit is not accepted into the certificate program.

This program has been designed for counselors who want to become eligible for licensure as school counselors by the Department of Public Instruction in North Carolina. The completion of this program, in addition to passing the PRAXIS II Specialty Area Test for School Counselors, qualifies students to become licensed School Counselors. In addition to the required courses, an additional internship may be required should the student need further clinical training. Any additional coursework is based on the individual review of each applicant's graduate transcript(s) and selected program option.

The certificate program is available online through Distance Education only for those applicants from CACREP-approved programs who qualify for CAS-level licensure [Options A and B]. Visit distanceed.uncc.edu for additional information.

Additional Admission Requirements

- 1) A master's degree in counseling from an accredited university in Agency Counseling, Clinical Mental Health Counseling, Community Counseling, or Rehabilitation Counseling
- 2) Written application to Graduate Admissions accompanied by the application fee in effect
- 3) A Statement of Purpose
- 4) Letter(s) of Recommendation
- 5) Official transcripts (undergraduate/graduate)

Candidates wishing to begin in Summer or Fall semesters must submit their application by March 1 to the Graduate School.

Certificate Requirements

Program Options

Option A

For counselors who graduated from a 60 credit CACREP accredited program in Agency Counseling, Clinical Mental Health Counseling, Community Counseling, or Rehabilitation Counseling.

Based on a review of the applicant's transcript, a program of study is designed that indicates the counselor has completed the below Course Requirements.

Upon successful completion of Option A and a passing score on the PRAXIS II test, candidates are eligible for CAS-level Licensure in School Counseling.

Option B

For counselors who graduated from CACREP accredited programs in Agency Counseling, Clinical Mental Health Counseling, Community Counseling, or Rehabilitation Counseling with less than 60 credit hours.

Based on a review of applicant's transcript, a program of study is designed that is equivalent to a 60 credit school counseling program, including the below Course Requirements.

Upon successful completion of Option B and a passing score on the PRAXIS II test, candidates are eligible for CAS-level Licensure in School Counseling.

Option C

For counselors who graduated from non-accredited counseling programs in Agency Counseling, Clinical Mental Health Counseling, Community Counseling,

or Rehabilitation Counseling.

Based on a review of applicant's transcript, a program of study is designed that is equivalent to a 48 credit school counseling program, including the below Course Requirements.

Candidates successfully completing Option C and passing the PRAXIS II test are eligible for M-level Licensure.

Required Courses (12 credit hours)

CSLG 7140 Consultation in School Counseling (3)

CSLG 7141 The Professional School Counselor (3)

CSLG 7436 Advanced Internship in School Counseling (3)

CSLG 7646 Administration and Leadership of School Counseling Services (3)

Additional Program Requirements and Information

In addition to completing required courses, students must pass the PRAXIS II Specialty Area Test for School Counseling to qualify for state licensure. Registration and information are available at ets.org.

Upon completion of all coursework and passing the PRAXIS II, candidates are admitted to candidacy and must apply for graduation at the start of their last semester. Candidates must also make application for their school counseling license a month prior to program completion in the TEALR Office.

COURSES IN COUNSELING (CSLG)

CSLG 6000. Topics in Counseling. (1-6) May include classroom and/or clinic experiences in the content area. *May be repeated for credit with permission of department.*

CSLG 6100. Counseling Theories. (3) Examination of the counseling relationship from various theoretical frameworks, including client-centered, psychoanalytic, Gestalt, transactional analysis, rational emotive, reality, and behavior theories.

CSLG 6101. Ethical and Professional Issues in Counseling. (3) Ethical and legal responsibilities, ethical standards, interpretations of laws by local authorities, and court decisions that impact the counseling profession. Skills of practical, ethical, and legal consultation are also emphasized.

CSLG 6104. Counseling Across the Lifespan. (3) Examines major theories of human development across the lifespan from psychological, emotional, cognitive, physical, social and moral perspectives. In addition, a framework for understanding sociocultural, situational, environmental factors that

impact individuals, families and communities is provided. Specific counseling methods and techniques that can be utilized in an integrated approach to help individuals and families address developmental challenges are integrated throughout the course.

CSLG 6109. Research in Counseling. (3) Examination of principles and practices for research and development of programs in counseling with emphasis on developmental designs, preventive programs, objectives and organizations.

CSLG 6110. Counseling Techniques. (3) Examination of concepts of individual counseling and the means for establishing facilitative relationships including competence in basic counseling skills and interventions.

CSLG 6111. Advanced Counseling Techniques. (3) Prerequisites: CSLG 6100 and 6110. Counseling interventions useful in facilitating client change and growth from an action-oriented, problem management perspective. Strategies for cognitive, affective, and behavioral change will be practiced.

CSLG 6115. Person-to-Person Relationships. (3) Examination of concepts and methods for improving human relationships. This course has an experiential component.

CSLG 6120. Group Counseling. (3) Investigation of concepts of group counseling and the means for developing facilitative interaction in groups which includes an experiential component as a major learning activity.

CSLG 6121. The Leadership and Design of Structured Groups. (3) Methods of creating psychoeducational groups. Focus on applying psychological theories to the selection of group content. Leadership issues such as screening, dealing with difficult members, and leader roles are addressed.

CSLG 6145. Multicultural Counseling. (3) Approaches to counseling that focus on multicultural differences so the counselor will be more effective in dealing with clients from a variety of cultural backgrounds.

CSLG 6150. Career Development and Counseling. (3) Designed to help counselors and/or career educators develop skills to use career theory and information with an emphasis on understanding individual lifestyle development, career education over the life span, and supportive career counseling.

CSLG 6152. Approaches to Career Development (K-12). (3) Counselors and vocational development

coordinators gain an understanding and skills necessary for (1) the development, management and evaluation of a comprehensive, competency-based K-12 career education/ counseling program, (2) infusing career education into K-12 curriculum in a counselor/consultant capacity, and (3) establishing and leading successful individual and group career development activities.

CSLG 6153. Diagnosis and Treatment in Counseling.

(3) Cross-listed as CSLG 8153. Prerequisite: Graduate standing in M.A. in Counseling program. Developing diagnostic skills using the *Diagnostic and Statistical Manual of Mental Disorders (DSM-V)* multi-axial classification system for mental and emotional disorders. Provides an overview of theory, research, and practice related to diagnosis and treatment. Diagnostic criteria is studied with a sensitivity to cultural and ethnic issues.

CSLG 6160. Theories of Addiction. (3) Introduction to the theoretical, philosophical, and historical premises upon which addiction is explained and treatment and prevention are based. Biological, psychological, and sociological etiologies of substance use and related addictive disorders are studied.

CSLG 6161. Assessment and Diagnosis of Addictive Disorders. (3) Process and procedures for professional biopsychosocial assessment and diagnosis of substance use and related addictive disorders in adolescents and adults. Implications of addiction for clients and their families are addressed.

CSLG 6162. Interventions in Addiction Counseling. (3) A counseling techniques course designed to help students who have worked as professional addiction counselors and those who have little or no experience working with addicted individuals and their families.

CSLG 6163. Treatment Planning and Relapse Prevention in Addiction Counseling. (3) An introduction to the principles and practices upon which addiction treatment and relapse prevention are based. Students gain practical experience in assessment, diagnosis, treatment planning, and relapse prevention planning with addicted clients.

CSLG 6164. The McLeod Institute on Addiction. (3) Cross-listed as CSLG 8164. A hybrid course delivered through a combination of independent learning, self-directed study, attending the McLeod Institute on Addiction conference, and completing all required course assignments by end of Summer Session I. The McLeod Institute on Addiction is a conference offered annually during the third week in May. The topics vary yearly and are designed to provide both broad

and specific knowledge germane to addiction counseling. *May be repeated for credit.*

CSLG 6200. Introduction to Theories of Family Counseling. (3) Examination of appropriate interventions in working with families focusing on major theorists and techniques in the field.

CSLG 6201. Counseling Needs of Women. (3) Women's development and needs, the problems they bring to counselors, strategies for helping with them, myths about women and biases in psychological research.

CSLG 6202. Counseling Military Families and Children. (3) Cross-listed as CSLG 8202. Provides the opportunity to learn about the unique culture of military families and children. Specific challenges and stressors they encounter while serving in the U.S. Armed Forces are thoroughly addressed. Some of the topics explored include: characteristics of active duty personnel; National Guard and Reserve members; military children; stages of deployment; and various social, emotional, physical, and mental health concerns. Students completing this course also learn about evidence-based approaches and interventions, and develop a more in-depth understanding of how to work effectively with this specific population.

CSLG 6204. Counseling Military Veterans. (3) Cross-listed as CSLG 8204. A comprehensive overview of issues impacting military veterans. Specific cultural factors such as race, gender, and sexual orientation are also taken into consideration. Topics include: career transitions, family matters, mental health stigma, traumatic brain injury, suicide, PTSD, depression, homelessness, and addiction. Resilience and strength of military veterans is also addressed. In addition, students learn about evidence-based techniques, strategies, and approaches utilized to work effectively with military veterans.

CSLG 6800. Individual Study in Counseling. (1-6) Prerequisite: Permission of the student's advisor. Independent study under the supervision of an appropriate faculty member. *May be repeated for credit.*

CSLG 7110. Individual Assessment. (3) Examination of the major aptitude, intelligence, and other psychological tests commonly used in counseling with emphasis on test theory as well as the administration, scoring, and interpretation of tests and the communication of their results.

CSLG 7120. Administration and Supervision of Counseling Services. (3) Planning, operation, implementation and supervision of counseling and guidance services in schools and agencies with

emphasis on the development of administrative and supervisory skills.

CSLG 7140. Consultation in School Counseling. (3)

Introduction to the professional school counselor's role (K-12) in counseling, consulting, and coordinating school and community resources for the optimum benefit of the student.

CSLG 7141. The Professional School Counselor. (3)

Cross-listed as CSLG 8141. An introduction to the profession of school counseling using the ASCA National Model as a basis for practice and program development. To support the school academic mission, students identify the necessary skills needed for the integration of various counseling activities that will include classroom guidance, individual and group counseling, consultation, program design, and coordinating school and community resources. Students also begin developing their professional School Counselor E-portfolio.

CSLG 7142. Introduction to Play Therapy. (3) Cross-listed as CSLG 8142. Enhancing the counseling relationship with children by using play media to establish facilitative relationships with children under the age of ten years.

CSLG 7143. Filial Therapy: An Approach to Parent Training. (3) Cross-listed as CSLG 8143.

Prerequisite: CSLG 7142. An advanced level play therapy course that focuses on concepts and skills for training parents/caretakers/teachers to be therapeutic agents in their children's lives through the utilization of child centered play therapy skills in regularly scheduled structured play sessions with children.

CSLG 7144. Contemporary Theories of Play Therapy. (3) Cross-listed as CSLG 8144.

An advanced exploration of fundamental issues involved in play therapy, this seminar course focuses on an in-depth study of various theoretical approaches, modalities, techniques, and applications of play therapy. Historical and theoretical foundations of play therapy are presented as are current issues in providing appropriate counseling services to children aged three to ten years old.

CSLG 7145. Special Topics in Play Therapy: Group, Conference, or Supervision. (1-3) Cross-listed as CSLG 8145.

Focuses on a variety of topics in play therapy such as conference, supervision of play therapy, and group play therapy. May be offered in alternative formats, such as weekend sessions and distance learning options.

CSLG 7146. Counseling Adolescents. (3) Cross-listed as CSLG 8146. Prerequisites: Graduate standing and permission of instructor. Focuses on counseling pre-

adolescents and adolescents. Attention is given to the cognitive and socio-emotional development of pre-adolescents and adolescents, current issues affecting this population, ethical considerations when counseling this age group, and developmentally responsive counseling interventions.

CSLG 7151. Approaches to Adult Career Development. (3) Prerequisite: CSLG 6150.

For the career development specialist who needs to survey an environment in which adults are seeking career counseling; assess needs; develop interventions strategies to meet needs; and assess outcomes.

CSLG 7153. Research Techniques and Computer Applications in Career Counseling. (3) Prerequisites:

RSCH 6101, RSCH 6109, and RSCH 6110. Skills in preparing a literature review upon which to base a research study; critiquing theoretical, philosophical, and research material and reports; and conducting and reporting a research study. Focus on understanding the effective application of computer technology to the provision of career-related services in mental health, education, rehabilitative or other human services settings.

CSLG 7160. Solution-Focused Brief Therapy. (3)

Prerequisites: CSLG 6110, CSLG 6100, and CSLG 7430. An introduction to counseling in a time-limited manner while helping clients understand how they maintain their problems and how to construct solutions.

CSLG 7170. Introduction to Clinical Mental Health Counseling. (3)

Counseling in community agency settings, including the roles and functions of a professional counselor, assessing the needs of an agency population and the interworkings of various agencies and agency networks.

CSLG 7190. Introduction to Pastoral Counseling. (3)

Prerequisites: CSLG 6100 and CSLG 6110. Introduction to the field of pastoral counseling including both theological and counseling dimensions.

CSLG 7191. Advanced Issues in Pastoral Counseling. (3)

Prerequisite: CSLG 7190. Specific content relevant to pastoral counseling including didactic and experiential foci.

CSLG 7205. Techniques of Family Counseling. (3)

Prerequisites: CSLG 6100 and CSLG 6200. An overview of techniques used by family counselors working from communications, structural or strategic orientations.

CSLG 7430. Practicum in Counseling. (3)

Prerequisites: CSLG 6100, CSLG 6101, CSLG 6110,

and CSLG 7142 if working with children age 10 and younger. Supervision of individual and group counseling interventions conducted in field setting; special attention to the development of the counseling relationship of evaluative criteria for self and peer assessment. A minimum of 10 hours per week is required in field experience. *Graded on a Pass/Unsatisfactory basis.*

CSLG 7435. Internship in Counseling. (3)

Prerequisites: CSLG 7430 and CSLG 7142 if working with children age 10 and younger. Students participate in delivering counseling services in a field setting and receive supervision of their work during weekly seminars. A minimum of 20 hours per week in field experience is required. *Graded on a Pass/Unsatisfactory basis. This is a two semester internship and May be repeated for credit.*

CSLG 7436. Advanced Internship in School Counseling. (3)

Offered specifically for students enrolled in the Post-Master's Certificate Program in School Counseling. A minimum of 20 hours per week in field placement is required and students have the opportunity to demonstrate advanced level skills in weekly seminars. *Graded on a Pass/Unsatisfactory basis.*

CSLG 7600. Sexual Orientation Diversity in Clinical Practice. (3)

Considers the experience of being gay, lesbian, bisexual, or transgendered in our society. Theoretical understandings of sexual orientation are covered, as well as the impact of societal prejudice on gay, lesbian, bisexual, and transgendered individuals and their communities. The experience of diversity with such communities is discussed, especially racial/ethnic diversity. Exploration of individual values combines with an emphasis on clinical practice to make this course relevant both personally and professionally.

CSLG 7601. Counseling and Spirituality. (3)

Incorporates the spiritual dimension into the counseling process. It is specifically designed to help counselors understand their own spirituality and facilitate the inclusion of the spirituality of others with whom they provide counseling services. Spirituality is viewed as an important component to the achievement of mental health and to a balanced sense of wellness. Basic beliefs and various models spiritual development are examined.

CSLG 7645. Cognitive-Behavior Theory and Practice. (3)

An introduction to the theory and practice of cognitive-behavior therapy that can be applied in the school setting. Major theories (cognitive therapy, cognitive behavior modification, REBT, and reality therapy) are examined, and treatment planning and application of techniques are studied. *(Summer)*

CSLG 7646. Advocacy and Leadership in Professional School Counseling. (3)

Cross-listed as CSLG 8646. Developing effective leadership skills for school counselors with an emphasis on organization, planning, management, and evaluation of comprehensive school counseling programs based on the ASCA National Model. Developing skills in the utilization of data for systemic change and student success are detailed in individual student advocacy projects. Requires the completion of their professional School Counselor E-portfolio.

CSLG 7680. Crisis Counseling. (3)

Focuses on a general crisis intervention model and its application to specific crisis situations. Topics include: suicide intervention, rape crisis, telephone counseling, and disaster intervention.

CSLG 7681. Grief and Loss Counseling. (3)

Examines the theory of loss, the tasks involved in grieving, and the skills needed by a counselor working with grief and loss issues. Loss will be examined from a broad perspective and includes issues associated with death, loss of relationships, and loss of abilities.

CSLG 7800. Individual Study in Counseling. (1-6)

Prerequisite: Permission of advisor. Independent study under the supervision of an appropriate faculty member. *May be repeated for credit.*

CSLG 8000. Topics in Counseling. (1-6)

May include classroom and/or clinic experiences in the content area. *May be repeated for credit with permission of department.*

CSLG 8100. Advanced Theories of Counseling. (3)

The principles and practices of traditional and more current theories are examined. Students explore philosophical and psychological assumptions of the counseling theories and engage in critical thinking as they examine the rationale and consequences of their pre-conceived notions about conditions that influence human behavior and change.

CSLG 8105. Doctoral Seminar. (1)

Required in the first semester of doctoral study. The course serves as an orientation for doctoral students about the doctoral program, doctoral culture, the counseling faculty, and current and emerging professional issues in counselor education and supervision. Students will become familiar with CACREP standards and how they apply to counselor education. In addition, students will have the opportunity to learn about the research trends in the field of counseling. Finally the course will address professional development as a scholar. *Graded on a Pass/Unsatisfactory basis.*

CSLG 8106. Advanced Multicultural Career

Counseling. (1) Prerequisites: CSLG 6150 or equivalent, and CSLG 8345. Designed to help advance student's level of knowledge by examining the most recent career development theory and research practices. Provides knowledge and require students to use higher level critical thinking skills needed to enhance the quality of the career development interventions delivered to diverse populations in our global economy. Students should have completed an introductory course in career development and counseling before enrolling in this course. *Graded on a Pass/Unsatisfactory basis.*

CSLG 8107. Advanced Group Seminar (1).

Prerequisites: CSLG 6120 or equivalent, and CSLG 8431. Enhance understanding of group theory and practice. Integrates advanced group theory with application of group leadership skills. Students develop counseling skills by providing leadership to small laboratory counseling groups. Group leadership skills are linked to theoretical stages of group development. *Graded on a Pass/Unsatisfactory basis.*

CSLG 8110. Clinical Supervision in Counseling. (3)

A critical overview of the conceptual and empirical literature on counseling supervision, including models, approaches/techniques, relationship and process issues, and ethical and legal considerations. Students will develop conceptual knowledge, skills, and self-awareness concerning these topic areas through readings, seminar discussions, and application via supervising master's level students.

CSLG 8111. Solution-Focused Brief Therapy. (3)

Prerequisites: CSLG 6110, CSLG 6100, and CSLG 7430. An introduction to counseling in a time-limited manner while helping clients understand how they maintain their problems and how to construct solutions.

CSLG 8141. The Professional School Counselor. (3)

Cross-listed as CSLG 7141. An introduction to the profession of school counseling using the ASCA National Model as a basis for practice and program development. To support the school academic mission, students identify the necessary skills needed for the integration of various counseling activities that will include classroom guidance, individual and group counseling, consultation, program design, and coordinating school and community resources. Students also begin developing their professional School Counselor E-portfolio.

CSLG 8142. Introduction to Play Therapy. (3) Cross-listed as CSLG 7142. Enhancing the counseling relationship with children by using play media to establish facilitative relationships with children under the age of ten years.

CSLG 8143. Filial Therapy: An Approach to Parent Training. (3)

Cross-listed as CSLG 7143.

Prerequisite: CSLG 8142. An advanced level play therapy course that focuses on concepts and skills for training parents/caretakers/teachers to be therapeutic agents in their children's lives through the utilization of child centered play therapy skills in regularly scheduled structured play sessions with children.

CSLG 8144. Contemporary Theories of Play Therapy. (3)

Cross-listed as CSLG 7144. An advanced exploration of fundamental issues involved in play therapy, this seminar course focuses on an in-depth study of various theoretical approaches, modalities, techniques, and applications of play therapy. Historical and theoretical foundations of play therapy are presented as are current issues in providing appropriate counseling services to children aged three to ten years old.

CSLG 8145. Special Topics in Play Therapy: Group, Conference, or Supervision. (1-3)

Cross-listed as CSLG 7145. Focuses on a variety of topics in play therapy such as conference, supervision of play therapy, and group play therapy. The course may offer alternative formats, such as weekend sessions and distance learning options.

CSLG 8146. Counseling Adolescents. (3)

Cross-listed as CSLG 7146. Prerequisites: Graduate standing and permission of instructor. Focuses on counseling pre-adolescents and adolescents. Attention is given to the cognitive and socio-emotional development of pre-adolescents and adolescents, current issues affecting this population, ethical considerations when counseling this age group, and developmentally responsive counseling interventions.

CSLG 8153. Diagnosis and Treatment in Counseling. (3)

Cross-listed as CSLG 6153. Prerequisite: Graduate standing in Ph.D. in Counseling program. Developing diagnostic skills using the *Diagnostic and Statistical Manual of Mental Disorders (DSM-V)* multi-axial classification system for mental and emotional disorders. Provides an overview of theory, research, and practice related to diagnosis and treatment. Diagnostic criteria is studied with a sensitivity to cultural and ethnic issues.

CSLG 8160. Theories of Addiction. (3)

Introduction to the theoretical, philosophical, and historical premises upon which addiction is explained and treatment and prevention are based. Biological, psychological, and sociological etiologies of substance use and related addictive disorders are studied.

CSLG 8161. Assessment and Diagnosis of Addictive Disorders. (3) Process and procedures for professional biopsychosocial assessment and diagnosis of substance use and related addictive disorders in adolescents and adults. Implications of addiction for clients and their families are addressed.

CSLG 8162. Interventions in Addiction Counseling. (3) A counseling techniques course designed to help students who have worked as professional addiction counselors and those who have little or no experience working with addicted individuals and their families.

CSLG 8163. Treatment Planning and Relapse Prevention in Addiction Counseling. (3) An introduction to the principles and practices upon which addiction treatment and relapse prevention are based. Students gain practical experience in assessment, diagnosis, treatment planning, and relapse prevention planning with addicted clients.

CSLG 8164. The McLeod Institute on Addiction. (3) Cross-listed as CSLG 8164. A hybrid course delivered through a combination of independent learning, self-directed study, attending the McLeod Institute on Addiction conference, and completing all required course assignments by end of Summer Session I. The McLeod Institute on Addiction is a conference offered annually during the third week in May. The topics vary yearly and are designed to provide both broad and specific knowledge germane to addiction counseling. *May be repeated for credit.*

CSLG 8200. Introduction to Theories of Family Counseling. (3) Examination of appropriate interventions in working with families focusing on major theorists and techniques in the field.

CSLG 8201. Counseling Needs of Women. (3) Women's development and needs, the problems they bring to counselors, strategies for helping with them, myths about women and biases in psychological research.

CSLG 8202. Counseling Military Families and Children. (3) Cross-listed as CSLG 6202. Provides the opportunity to learn about the unique culture of military families and children. Specific challenges and stressors they encounter while serving in the U.S. Armed Forces are thoroughly addressed. Some of the topics explored include: characteristics of active duty personnel; National Guard and Reserve members; military children; stages of deployment; and various social, emotional, physical, and mental health concerns. Students completing this course also learn about evidence-based approaches and interventions, and develop a more in-depth understanding of how to work effectively with this specific population.

CSLG 8203. Instructional Theory in Counselor Education. (3) Prepares students to become professors in counselor education. An examination of the theories and methods of teaching in higher education will be explored. Readings from professional journals, lecture, discussion, and practical application in the classroom are used to meet course objectives.

CSLG 8204. Counseling Military Veterans. (3) Cross-listed as CSLG 6204. A comprehensive overview of issues impacting military veterans. Specific cultural factors such as race, gender, and sexual orientation are also taken into consideration. Topics include: career transitions, family matters, mental health stigma, traumatic brain injury, suicide, PTSD, depression, homelessness, and addiction. Resilience and strength of military veterans is also addressed. In addition, students learn about evidence-based techniques, strategies, and approaches utilized to work effectively with military veterans.

CSLG 8345. Advanced Multicultural Counseling. (3) An advanced exploration of fundamental issues involved in culturally competent counseling, this seminar course focuses on an in-depth study of various cultures seeking counseling services. Students examine various oppression models and have an opportunity to apply them to cultures in our community.

CSLG 8346. Applied Multicultural Counseling. (3) The impact of oppression on the daily lives of marginalized groups. Students conduct extensive field-based investigations into various cultures in order to gain mastery-level knowledge of the practical day-to-day experiences especially as they involve accessing mental health services. Special focus on counseling applications that are appropriate within and between cultures. Learning to utilize systems interventions and the mastering the skills of consultation are key components of this course.

CSLG 8442. Doctoral Internship: Supervision. (3) Provides students with the practical experiences necessary to provide individual supervision of counselors, including field supervision and analyses of counseling audio and videotapes. Students have the opportunity to test their conceptual knowledge, skill, and self-awareness developed through prerequisite coursework. Students receive weekly individual/triadic supervision and regular weekly group supervision. A minimum of 200 clock hours is required. *Graded on a Pass/Unsatisfactory basis.*

CSLG 8431. Doctoral Practicum in Counseling. (3) Practicum is an applied course where students develop and/or refine their counseling skills. These skills will be conceptually linked counselor education

and supervision. Working in sites throughout the community, students produce audio and/or video tapes of individual and group counseling practice for supervision. *Graded on a Pass/Unsatisfactory basis.*

CSLG 8440. Doctoral Internship: Counseling. (3)

Prerequisites: CSLG 8100 and CSLG 8431. Students deliver counseling in a field setting and receive individual/triadic supervision and regular weekly group supervision. A minimum of 200 clock hours is required. *Graded on a Pass/Unsatisfactory basis. May be repeated for credit with permission of department.*

CSLG 8445. Doctoral Internship: Teaching. (3)

Students deliver teaching in counselor education in a field setting and receive weekly individual/triadic supervision and regular weekly group supervision. A minimum of 200 clock hours is required. *Graded on a Pass/Unsatisfactory basis.*

CSLG 8600. Sexual Orientation Diversity in Clinical Practice. (3) Considers the experience of being gay, lesbian, bisexual, or transgendered in our society. Theoretical understandings of sexual orientation are covered, as well as the impact of societal prejudice on gay, lesbian, bisexual and transgendered individuals and their communities. The experience of diversity with such communities is discussed, especially racial/ethnic diversity. Exploration of individual values combines with an emphasis on clinical practice to make this course relevant both personally and professionally.

CSLG 8601. Counseling and Spirituality. (3)

Incorporates the spiritual dimension into the counseling process. It is specifically designed to help counselors understand their own spirituality and facilitate the inclusion of the spirituality of others with whom they provide counseling services. Spirituality is viewed as an important component to the achievement of mental health and to a balanced sense of wellness. Basic beliefs and various models spiritual development are examined.

CSLG 8604. Counseling Sexual Minority Families and Couples. (3)

Focuses on the unique challenges facing the counselor who is providing clinical services to gay, lesbian, bisexual and transgendered families and couples. Topics include: the impact of oppression on primary relationships, the political implications of sexual minority relationships, relationship models, parenting, and interacting with the outside world.

CSLG 8645. Cognitive-Behavior Theory and Practice. (3)

An introduction to the theory and practice of cognitive-behavior therapy that can be applied in the school setting. The major theories (cognitive therapy, cognitive behavior modification, REBT, and reality

therapy) will be examined, and treatment planning and application of techniques will be studied.

CSLG 8646. Advocacy and Leadership in

Professional School Counseling. (3) Cross-listed as CSLG 7646. Developing effective leadership skills for school counselors with an emphasis on organization, planning, management, and evaluation of comprehensive school counseling programs based on the ASCA National Model. Developing skills in the utilization of data for systemic change and student success are detailed in individual student advocacy projects. Requires the completion of their professional School Counselor E-portfolio.

CSLG 8680. Crisis Counseling. (3) Focuses on a general crisis intervention model and its application to specific crisis situations. Topics include: suicide intervention, rape crisis, telephone counseling, and disaster intervention.

CSLG 8681. Grief and Loss Counseling. (3) Examines the theory of loss, the tasks involved in grieving, and the skills needed by a counselor working with grief and loss issues. Loss will be examined from a broad perspective and includes issues associated with death, loss of relationships, and loss of abilities.

CSLG 8800. Individual Study in Counseling. (1-6)

Prerequisite: permission of student's advisor. Independent study under the supervision of an appropriate faculty member. *May be repeated for credit. Graded on a Pass/Unsatisfactory basis.*

CSLG 8998. Seminar in Prospectus Design. (3)

Provide students the opportunity to identify and define a research area of inquiry and develop a proposal draft for the dissertation study. Students will be expected to select, plan and outline an original research study appropriate for the dissertation requirement.

CSLG 8999. Dissertation. (1-9) Under the direction of a dissertation advisor and committee, students are expected to design and execute an original research study. This study should address a significant issue or problem related to counseling or counselor education. *Graded on a Pass/Unsatisfactory basis.*

Curriculum and Instruction

• Ph.D. in Curriculum and Instruction

Dept of Middle, Secondary & K-12 Education

mdsk.uncc.edu

Graduate Program Director

Dr. Paul Fitchett

Graduate Concentration Coordinators

Dr. Pilar Blitvitch, Literary Concentration Co-Coordinator

Dr. Vic Cifarelli, Mathematics Concentration Coordinator

Dr. Brian Kissel, Literary Concentration Co-Coordinator

Dr. Chance Lewis, Urban Concentration Coordinator

Dr. Spencer Salas, Literary Concentration Co-Coordinator

Dr. Bruce Van Sledright, Elementary Education Concentration Coordinator

Graduate Faculty

Dr. Julianna Avila, Assistant Professor

Dr. Ian Binns, Assistant Professor

Dr. Pilar Blitvitch, Professor

Dr. Lil Brannon, Professor

Dr. Bettie Ray Butler, Assistant Professor

Dr. Ann Cash, Assistant Professor

Dr. Jeong-Lim Chae, Associate Professor

Dr. Vic Cifarelli, Professor

Dr. Heather Coffey, Associate Professor

Dr. Warren DiBiase, Associate Professor

Dr. Anthony Fernandes, Associate Professor

Dr. Paul Fitchett, Associate Professor

Dr. Amy Good, Associate Professor

Dr. Michael Green, Associate Professor

Dr. Stephen Hancock, Associate Professor

Dr. Tina Heafner, Professor

Dr. Janice Hinson, Professor

Dr. Charles Hutchison, Professor

Dr. Jeanneine Jones, Professor

Dr. Scott Kissau, Associate Professor

Dr. Brian Kissel, Associate Professor

Dr. Cy Knoblauch, Professor

Dr. Lan Kolano, Professor

Dr. Chance Lewis, Professor

Dr. Ron Lunsford, Professor

Dr. Adriana Medina, Associate Professor

Dr. Roslyn Mickelson, Professor

Dr. Erin Miller, Assistant Professor

Dr. Maryann Mraz, Professor

Dr. Teresa Petty, Associate Professor

Dr. Paola Piloneta, Associate Professor

Dr. Drew Polly, Associate Professor

Dr. David Pugalee, Professor

Dr. S. Michael Putman, Professor

Dr. Robert Rickelman, Professor

Dr. Tracy Rock, Professor

Dr. Adalira Saenz-Ludlow, Professor

Dr. Spencer Salas, Associate Professor

Dr. Tehia Starker, Associate Professor

Dr. Michelle Stephan, Associate Professor

Dr. D. Bruce Taylor, Professor

Dr. Bruce Van Sledright, Professor

Dr. Greg Wiggan, Associate Professor

Dr. Karen Wood, Professor

PH.D. IN CURRICULUM AND INSTRUCTION

The Ph.D. in Curriculum and Instruction is designed to prepare teacher education faculty and other educational professionals for work in various agency and educational settings. The program is interdisciplinary and involves faculty from across the University campus, and primarily the Departments of English; Mathematics and Statistics; Middle, Secondary, & K-12 Education; and Reading and Elementary Education. The program focuses on urban issues and perspectives related to curriculum and instruction with concentrations in (1) Urban Education, (2) Literacy Education (oriented toward Reading Education, English Education, or Teaching English as a Second Language), (3) Mathematics Education, and (4) Elementary Education. Studies include a substantive core in urban education and educational research. Students may focus their study on education for learners at elementary, middle grades, secondary, K-12, or post-secondary/adult levels.

Curriculum Objectives

- 1) Lead inquiry into the nature of curriculum theory and the relationship that theory has upon the major sources, components, and processes required in curriculum development, particularly within expanding urban-regional environments.
- 2) Demonstrate relationships among curriculum theory and design, models of and research about teaching and learning, variations among learners, and the ideological, social, and disciplinary contexts of teaching and learning, including the influence on urban-regional schools, state and national policies, curriculum philosophy, and political pressures.
- 3) Guide curriculum development and evaluation in its pragmatic context by applying curriculum

theory, policy, and practice for diverse learners within a variety of educational settings.

Research and Evaluation Objectives

- 1) Use appropriate quantitative and qualitative research methods to solve problems in urban education and related disciplines, detect new patterns, and assess the effectiveness of instructional programs and teaching methodologies for all learners.
- 2) Communicate research and evaluation findings in a variety of written and electronic formats, such as evaluation reports, professional articles, grant proposals, conference presentations, and technical reports, with the consistent underlying purpose of supporting educational effectiveness and reform in urban-regional environments.

Specialty Objectives

- 1) Apply theory and research in one's area of specialization to detecting new patterns, identifying problems, and solving urban-regional problems of curriculum, teaching, learning, and assessment through collaborative problem identification, research projects, policy formation, and professional development.
- 2) Exhibit sustained intellectual curiosity, broad understandings, specialized knowledge, and professional commitments pertaining to one's selected area of specialization within the context of urban-regional schools.

Additional Admission Requirements

Applicants should submit a current vitae and a professional writing sample. A review committee will conduct an initial review of application materials and recommend selected applicants for on-campus interviews. The selection committee will then make final recommendations to the Graduate School relative to acceptance into the program based on the merits of the application materials and the interview process.

Prerequisite Requirements

The intended audience for the Ph.D. in Curriculum and Instruction includes education professionals who hold the master's degree. It is anticipated that most applicants will be experienced teachers or school leaders with the North Carolina "G" or "M" license or equivalent licenses from other states. However, the program will welcome and accommodate non-licensed candidates with appropriate professional experiences who have been involved in teaching or educational program development and evaluation.

Degree Requirements

The Ph.D. in Curriculum and Instruction requires a minimum of 60 credit hours of coursework, including

the dissertation. Students must maintain a cumulative average of 3.0 in all coursework taken. An accumulation of more than two C grades will result in termination of enrollment in the graduate program. If students make a grade of U in any course, enrollment in the program will be terminated.

The program will consider the transfer of a limited number of courses from an accredited institution (typically no more than six credit hours), providing the Curriculum and Instruction Committee determines that the course or courses to be transferred are appropriate for the program of study and are graduate-level courses beyond the master's degree. Grades for these transfer courses must be an A or B. All dissertation work must be completed at UNC Charlotte.

Students must successfully complete requirements for the comprehensive examination and dissertation. All students must complete a residency requirement of at least 18 credit hours over three successive terms of enrollment. Students must complete their degree, including dissertation, within eight years. The Ph.D. website (mdsk.uncc.edu/academic-programs/phd-ci) contains additional information, including updated planning sheets for each concentration.

Concentration Course Requirements

There are four concentrations available within the Ph.D. in Curriculum and Instruction program.

- 1) Urban Education
- 2) Literacy Education (oriented toward Reading Education, English Education, or Teaching English as a Second Language)
- 3) Mathematics Education
- 4) Elementary Education

Each of the available concentrations offers a variety of required and concentration-specific course offerings at the doctoral level. Programs of study are as follows:

Required Core Courses (12-15 credit hours)

Each concentration requires core coursework in Urban Foundations. The Urban concentration requires 15 credit hours. Mathematics, Literacy, and Elementary Education concentrations require 12 credit hours.

- EDCI 8180 Critical Issues and Perspectives in Urban Education (3)
- EDCI 8182 Power, Privilege, and Education (3)
- EDCI 8184 Social Theory and Education (3)
- EDCI 8186 Globalization, Urbanization, and Urban Schools (3)
- EDCI 8314 Urban Educational Reform (3) (*required only for Urban concentration*)

Research Methodology Courses (15 credit hours)

Each concentration must also complete at least 15 credit hours of research coursework, which also count toward dissertation preparation hours. Please note that five courses are required but not necessarily sufficient. Additional courses not listed require Graduate Program Director approval.

Required Courses

RSCH 8110 Descriptive and Inferential Statistics (3)
RSCH 8210 Applied Research Methods (3)

Elective Courses

Select three or more of the following:

EDCI 8121 Applied Research Methods in the Teaching of English (3)
EDCI 8250 Applied Research in Literacy Education (3)
RSCH 8111 Qualitative Research Methods (3)
RSCH 8112 Survey Research Methods (3)
RSCH 8113 Single-Case Research (3)
RSCH 8120 Advanced Statistics (3)
RSCH 8121 Qualitative Data Collection and Analysis (3)
RSCH 8130 Presentation and Computer Analysis of Data (3)
RSCH 8140 Multivariate Statistics (3)
RSCH 8150 Structural Equation Modeling (3)
RSCH 8196 Program Evaluation Methods (3)

Specialization Courses (21-24 credit hours)

Each concentration must also complete specialization coursework specific to the concentration as follows. (21 credit hours for the Urban concentration; 24 credit hours for Mathematics, Literacy, and Elementary Education concentrations).

Urban Concentration (21 credit hours)

Select from the following. Students may enroll in 6 credit hours of courses outside of this list with approval of the Program Advisor.

EDCI 8070 Topics in Urban Educational Leadership (3)
EDCI 8133 Multiculturalism and Children's Literature (3)
EDCI 8134 Early Black American Literature (3)
EDCI 8139 Perspectives in African American Literature (3)
EDCI 8300 Social Stratification and Urban Schools and Communities (3)
EDCI 8310 Transformative Black Education (3)
EDCI 8311 Critical Readings in Urban Education Research (3)
EDCI 8312 Urban Schooling, Curriculum, and Pedagogy (3)
EDCI 8320 Social Deviance, Delinquency, and Education (3)

EDCI 8330 History of Urbanization and Its Impact on Schooling (3)
EDCI 8660 Readings in Urban Educational Research (3)
EDCI 8682 Seminar in Professional and Grant Writing (3)
EDCI 8880 Independent Study in Urban Education (1-3)

Mathematics Education Concentration (24 credit hours)

Required Courses (18 credit hours)

EDCI 8112 Theoretical Foundations of Learning Mathematics (3)
EDCI 8113 Research in Mathematics Education (3)
EDCI 8114 Advanced Topics in Mathematics Education (3)
EDCI 8115 Issues in the Teaching of Secondary School Mathematics (3)
EDCI 8160 Readings in Mathematics Education (3)
EDCI 8609 Curriculum and Instruction Seminar (3)

Elective Courses (minimum 6 credit hours)

Select from the following. Students may enroll in 6 credit hours of graduate-level courses outside of the below list with approval of the Program Advisor.

EDCI 8004 Topics in Analysis (3)
EDCI 8008 Topics in Geometry and Topology (3)
EDCI 8101 Real Analysis for Secondary Mathematics Teachers I (3)
EDCI 8102 Real Analysis for Secondary Mathematics Teachers II (3)
EDCI 8103 Computer Techniques and Numerical Methods (3)
EDCI 8105 Problem Solving in Discrete Mathematics (3)
EDCI 8106 Modern Algebra for Secondary Mathematics Teachers (3)
EDCI 8107 Linear Algebra for Secondary Mathematics Teachers (3)
EDCI 8118 Non-Euclidean Geometry (3)

Literacy Education Concentration (24 credit hours)

Select from the following. Concentration Coordinator consultation is required to enroll in the below courses. Students may enroll in graduate-level credit outside of the below list with approval of the Program Advisor.

ADMN 8101 Perspectives on Adult Learning Theory (3)
EDCI 8040 Topics in Reading Education (3)
EDCI 8070 Topics in Urban Educational Leadership (3)
EDCI 8120 Literacy and Educational Public Policy (3)
EDCI 8129 Linguistics and Language Learning (3)
EDCI 8131 Research in English Studies (3)
EDCI 8132 Research in Literary Theory (3)

EDCI 8133 Multiculturalism and Children's Literature (3)
 EDCI 8134 Early Black American Literature (3)
 EDCI 8135 African American Literary Theory and Criticism (3)
 EDCI 8137 Language and Culture (3)
 EDCI 8138 Comparative Language Study (3)
 EDCI 8139 Perspectives in African American Literature (3)
 EDCI 8140 Current Issues and Practices in Literacy Education (3)
 EDCI 8183 Teaching English as a Second Language (3)
 EDCI 8201 Perspectives in Immigration and Urban Education (3)
 EDCI 8252 K-12 Writing Development and Instruction (3)
 EDCI 8254 Collaborative Leadership in Literacy Education (3)
 EDCI 8255 Middle/Secondary Reading and Writing (3)
 EDCI 8256 Diagnostic Assessment and Instruction in Reading (3)
 EDCI 8420 Writing Program Administration and Supervision (3)
 EDCI 8462 Supervision of Student Teachers (3)
 EDCI 8640 Readings in Literacy Research (3)
 EDCI 8681 Seminar in College Teaching (3)
 EDCI 8682 Seminar in Professional and Grant Writing (3)
 EDCI 8840 Independent Study in Reading, Language, and Literacy (3)
 ENGL 6008 Topics in Advanced Technical Communication (3)
 ENGL 6062 Topics in Rhetoric (3)
 ENGL 6070 Topics in English (3)
 ENGL 6103 Introduction to Children's Literature and Culture (3)
 ENGL 6111 Shakespeare's Comedies and Histories (3)
 ENGL 6112 Shakespeare's Tragedies (3)
 ENGL 6113 Milton (3)
 ENGL 6116 Technical/Professional Writing (3)
 ENGL 6123 The Augustan Age, 1660-1785 (3)
 ENGL 6125 The Romantic Era, 1785-1832 (3)
 ENGL 6126 The Victorian Era, 1832-1900 (3)
 ENGL 6127 Seminar in Language, Culture, and Society (3)
 ENGL 6141 American Romanticism (3)
 ENGL 6142 American Realism and Naturalism (3)
 ENGL 6143 American Modernism (3)
 ENGL 6144 Stylistics (3)
 TESL 6000 Topics in Teaching English as a Second Language (16)

Elementary Education Concentration (24 credit hours)

Required Courses (12 credit hours)

EDCI 8153 Pro-Seminar in Elementary Education (3)

EDCI 8156 Critical Issues in Elementary School Professional Development and Teacher Learning (3)
 EDCI 8157 Analysis of Inquiry Teaching and Learning in Elementary Schools (3)
 EDCI 8650 Critical Readings in Elementary Education Research (3)

Elective Courses (12 credit hours)

Select from the following, in consultation with the Program Advisor. Students may enroll in graduate-level credit outside of this list with approval of the Program Advisor.

ADMN 8130 Educational Governance and Policy Studies (3)
 ADMN 8160 Introduction to Educational Administration (3)
 EDCI 8113 Research in Mathematics Education (3)
 EDCI 8120 Literacy and Educational Public Policy (3)
 EDCI 8129 Linguistics and Language Learning (3)
 EDCI 8133 Multiculturalism and Children's Literature (3)
 EDCI 8152 Varieties of Constructivism in Elementary Education (3)
 EDCI 8154 History of Education in America (3)
 EDCI 8155 Using Process and Outcome Data to Drive Continuous School Improvement (3)
 EDCI 8314 Urban Educational Reform (3)
 EDCI 8681 Seminar in College Teaching (3)
 PPOL 8689 The Social Context of Schooling (3)

Dissertation Courses (9 credit hours)

All concentrations must complete 9 credit hours of dissertation coursework.

EDCI 8699 Dissertation Proposal Seminar (3) *(taken after successful completion of the comprehensive examinations and pre-proposal meeting with committee members)*

EDCI 8999 Dissertation Research (3) *(minimum of 6 credit hours)*

Advising

An Advisor is assigned to each student within the first year of study. The Advisor and the Concentration Coordinator provide initial advising until the end of the first year (12 credit hours) when the Advisor assumes responsibility. By the beginning of the second year, the student is required to submit a Program of Study which is approved by the Advisor and the Concentration and Program Coordinators. Advisors also support the student in identifying faculty whose research interests and expertise are congruent with the student's probable area of dissertation inquiry. The assistance of the Advisor does not relieve the student of responsibility for completing required work and for following departmental or University procedures. In the semester in which the

student takes the Comprehensive Examination, the student reaches agreement with a faculty member to serve as dissertation chair. The chair must be a member of the Curriculum & Instruction faculty.

Admission to Candidacy

Students are considered candidates for the doctoral degree upon: (a) successful completion of the Comprehensive Examination and (b) approval of the Dissertation Proposal. Candidacy must be achieved at least six months before the degree is conferred.

Application for Degree

Students must submit an Application for Degree in the semester in which they successfully defend their dissertation proposal. Adherence to Graduate School deadlines and requirements is expected. Degree requirements are completed with the successful defense of the dissertation and when the final copy of the dissertation has been filed in the Graduate School.

COURSES IN CURRICULUM AND INSTRUCTION (EDCI)

EDCI 8004. Topics in Analysis. (3) Cross-listed as MATH 6004. Prerequisite: EDCI 8101, MATH 6101 or permission of department. Topics in analysis selected so as to complement regular course offerings in this area of mathematics. *May be repeated for credit with change of topic.*

EDCI 8008. Topics in Geometry and Topology. (3) Cross-listed as MATH 6008. Topics selected from Euclidean geometry, non-Euclidean geometry, projective geometry, differential geometry, point-set topology, algebraic topology. *May be repeated for credit with change of topic.*

EDCI 8020. Topics in English Education. (3) Examination of special topics germane to English education in urban-regional environments at the elementary, middle, and secondary school levels as well as the community and four-year college, including historical perspectives on current problems, effectiveness of programs and practices in urban schools, and emerging theories on teaching and learning. Extensive reading and discussion of topics from multiple perspectives. *May be repeated for credit with change of topic.*

EDCI 8040. Topics in Reading Education. (3) Cross-listed as READ 6000. Examination of special topics germane to reading education in urban-regional environments at the elementary, middle, and secondary school levels as well as the community and four-year college, including historical perspectives on current problems, effectiveness of programs and

practices in urban schools, and emerging theories of learning. Extensive reading and discussion of topics from multiple perspectives. *May be repeated for credit with change of topic.*

EDCI 8061. Topics in Urban Educational Research.

(3) Examination of the research in specific areas germane to urban educational settings and problems. Emphasis on different research questions and methodologies used to investigate similar problems. Examination of alignment of research findings with educational change in urban environments of the elementary, middle, and secondary school levels as well as the community and four-year college. *May be repeated for credit with change of topic.*

EDCI 8070. Topics in Urban Educational Leadership.

(3) Examination of special topics germane to leadership in urban education environments at the elementary, middle, and secondary school levels as well as the community and four-year college. Extensive reading and discussion of topics from multiple perspectives. *May be repeated for credit with change of topic.*

EDCI 8075. Topics in Urban-Regional Education. (3) Examination of special topics germane to education in urban-regional environments at the elementary, middle, and secondary school levels as well as the community and four-year college. Extensive reading and discussion of topics from multiple perspectives. *May be repeated for credit with change of topic.*

EDCI 8101. Real Analysis for Secondary Mathematics Teachers I. (3)

Cross-listed as MATH 6101. Prerequisite: Permission of Department of Mathematics and Statistics. Study of the axiomatic methods and characteristics of axiomatic systems. Axiomatic and historical development of the real and complex numbers. Introduction to transfinite numbers. Rigorous development of limits and continuity of functions.

EDCI 8102. Real Analysis for Secondary Mathematics Teachers II. (3)

Cross-listed as MATH 6102. Prerequisite: EDCI 8101 or MATH 6101. A rigorous approach to differentiation and integration of functions of one real variable.

EDCI 8103. Computer Techniques and Numerical Methods. (3)

Cross-listed as MATH 6103. Prerequisite: EDCI 8101, MATH 6101, or permission of department. Computer systems, programming, and the computer solution of numerical problems.

EDCI 8105. Problem Solving in Discrete

Mathematics. (3) Cross-listed as MATH 6105. Propositional and predicate calculus, counting

techniques, partially ordered sets, lattices, graphs, and trees.

EDCI 8106. Modern Algebra for Secondary Mathematics Teachers. (3) Cross-listed as MATH 6106. Prerequisite: MATH 3163 or its equivalent or permission of department. Topics chosen from group theory, rings and ideals, integral domains, fields and elementary Galois theory.

EDCI 8107. Linear Algebra for Secondary Mathematics Teachers. (3) Cross-listed as MATH 6107. Prerequisite: MATH 2164 or its equivalent or permission of department. Systems of linear equations, matrices, vector spaces, linear transformations, determinants, canonical forms of matrices, inner products.

EDCI 8112. Theoretical Foundations of Learning Mathematics. (3) Introductions to theories of learning that have influenced the teaching of mathematics in K-12. An overview of theories that have guided reforms in mathematics teaching; contemporary constructivist theories of mathematics learning.

EDCI 8113. Research in Mathematics Education. (3) An introduction and overview of research in the teaching and learning of mathematics in K-12. Overview of contemporary research perspectives and paradigms; interpreting and synthesizing the research literature; survey of contemporary research problems in mathematics teaching and learning; development of classroom-based research studies.

EDCI 8114. Advanced Topics in Mathematics Education. (3) Prerequisite: Enrollment in the Mathematics Education specialization of the Doctoral Program in Curriculum and Instruction. Advanced research topics in the teaching and learning of mathematics. Includes a survey, interpretation, and synthesis of contemporary research problems in mathematics teaching and learning. *May be repeated for credit with change of topic.*

EDCI 8115. Issues in the Teaching of Secondary School Mathematics. (3) Prerequisite: Students must be enrolled in the Master of Arts in Mathematics Education Program. Study of major issues affecting secondary mathematics education: analysis of the impact of learning theories on methods of teaching; assessment methods for improving mathematics learning; analysis of the historical and programmatic development of the secondary school mathematics curriculum leading to current trends, issues, and problems; and analysis of the role of technology in the secondary mathematics classroom.

EDCI 8118. Non-Euclidean Geometry. (3) Cross-listed as MATH 6118. History of Euclid's Fifth

Postulate and attempts to prove it; work of Gauss, Bolyai, Lobachevsky and others; systematic development of hyperbolic geometry; relative consistency of hyperbolic geometry; relative consistency of hyperbolic and Euclidean geometries.

EDCI 8120. Literacy and Educational Public Policy. (3) Examination of competing definitions of literacy and development of literacy practices related to debates in American education public policy about the ends of schooling, the strategies of teaching, and the priorities of the language arts curricula. Evaluation of assumptions, reasoning, and research bases linking literacy to policy. Study of the historical and current methods of establishing district, statewide and federal policies about literacy education programs, materials, personnel, grants, and licensure.

EDCI 8121. Applied Research Methods in the Teaching of English. (3) Cross-listed as ENGL 6674. Provides the opportunity to apply research methods in classrooms. Examine identities as readers, writers, teachers, and especially as classroom researchers.

EDCI 8129. Linguistics and Language Learning. (3) Cross-listed as ENGL 5263. Readings in, discussions of, and application of linguistically oriented theories of language acquisition, directed toward gaining an understanding of language-learning processes and stages.

EDCI 8131. Research in English Studies. (3) Cross-listed as ENGL 6101. The discipline of English--its nature, its history, and its methods. Emphasis on (1) the interrelations of literature, language, and writing; and (2) the diversity of cultural origins and critical perspectives in English studies, with concentration on selected major critical approaches. Intensive writing and practice in methods of research.

EDCI 8132. Research in Literary Theory. (3) Cross-listed as ENGL 6102. Modern literary theory focusing on the theoretical concepts which underpin literary analysis. Emphases may differ from semester to semester; readings will focus on major theoretical statements and on criticism which applies several approaches to particular literary works. Students are required to apply what they have learned.

EDCI 8133. Multiculturalism and Children's Literature. (3) Cross-listed as ENGL 6104. Focuses on significant authors, illustrators, or themes in children's and/or adolescent literature.

EDCI 8134. Early Black American Literature. (3) Cross-listed as ENGL 6147. A survey of African-American literature, emphasizing the major authors, those relevant historical and social factors, and those

specific literary movements that have influenced the development of African-American literature.

EDCI 8135. African American Literary Theory and Criticism. (3) Cross-listed as ENGL 5158.

Prerequisites: ENGL 2301, ENGL 3100, and ENGL 3200, or permission of instructor or graduate status. History of an African American approach to literary analysis, including a practicum in modern criticism.

EDCI 8137. Language and Culture. (3) Cross-listed as ENGL 6165. An introduction to learner-centered approaches to teaching English as a Second Language (ESL) and English as a Foreign Language (EFL) to non-native learners who need to learn English for a very definite academic, professional or vocational purpose.

EDCI 8138. Comparative Language Study. (3) Cross-listed as ENGL 6166. Rhetorical theories, past and present, focusing on ways that these varied frameworks of understanding have informed the generation, understanding, and pedagogy of writing and other modes of discourse. Emphases vary from semester to semester, readings concentrate on major selected rhetorical theories and on implications of these theories for the understanding and pedagogy of discourse.

EDCI 8139. Perspectives in African American Literature. (3) Cross-listed as ENGL 6147. A survey of African-American literature, emphasizing the major authors, those relevant historical and social factors, and those specific literary movements that have influenced the development of African-American literature.

EDCI 8140. Current Issues and Practices in Literacy Education. (3) Cross-listed as READ 6100. Theories, research, and instructional methods associated with reading and language arts, preschool through high school; questions of effectiveness related to instructional approaches and materials; related topics such as multicultural literacy, the role of phonics, and assessment.

EDCI 8152. Varieties of Constructivism in Elementary Education. (3) Examines Piaget's constructivism and various concentrations of constructivism that have arisen in the latter half of the 20th century.

EDCI 8153. Pro-Seminar in Elementary Education. (3) Introduces candidates to elementary education faculty and their research programs to allow doctoral students to connect early in their program with faculty who will chair or serve on their committees. *Graded on a Pass/Unsatisfactory basis.*

EDCI 8154. History of Education in America. (3) In-depth study of the philosophic and historical events influencing the development of the contemporary school. Literature related to trends in curriculum, instruction, social justice, and school configuration will be emphasized.

EDCI 8155. Using Process and Outcome Data to Drive Continuous School Improvement. (3)

Prerequisite: RSCH 8110. Consideration and study of how successful elementary schools collect and use data to drive their reform activities, with a focus on providing culturally and individually responsive instructional programs.

EDCI 8156. Critical Issues in Elementary School Professional Development and Teacher Learning. (3)

Foundations of professional development, opportunities for teacher learning to improve practices in curriculum development, instructional leadership, and classroom management, and an understanding of the influence of socially responsive professional development in urban elementary schools.

EDCI 8157. Analysis of Inquiry Teaching and Learning in Elementary Schools. (3)

Prerequisite: RSCH 8111. Focus on topics associated with inquiry teaching and learning in an elementary school setting including historical background; underlying theoretical and philosophical frameworks; models of inquiry instruction; and curricular implications.

EDCI 8160. Readings in Mathematics Education. (3)

Readings in the teaching and learning of mathematics K-16; analysis of the historical development of the K-16 mathematics curriculum leading to current trends, issues, and problems; theory, methods, and techniques for assessment; and analysis of contemporary issues.

EDCI 8180. Critical Issues and Perspectives in Urban Education. (3)

Introduction to some of the current critical issues in urban education. Topics include: structural inequality, immigration, poverty, (re)segregation, the impact of race, class, ethnicity, gender and language, as well as *No Child Left Behind*. In this course, these topics and other issues will be examined from critical, historical, socio-cultural, and political perspectives. This is an intensive reading and writing course that also requires participation in school and/or community activities to better understand the urban environment.

EDCI 8182. Power, Privilege, and Education. (3)

Addresses the critical interconnections of race, class, gender, sexuality and power and privilege in education and beyond. Investigates how these intersections influence individual and group level outcomes. Decodes issues of power and privilege in

schools and society, and explores how this awareness can help create an entirely new social landscape.

EDCI 8183. Teaching English as a Second Language.

(3) Cross-listed as TESL 5103. For current and future teachers of English as a Second Language (ESL) to master a variety of approaches, methods, and techniques of teaching ESL and other competencies prescribed by the state of North Carolina.

EDCI 8184. Social Theory and Education. (3) An overview of classical and contemporary developments and debates in social theory, as well as their influences in educational research. It emphasizes the principles and processes of theory development and the application of theory in research. Enhances understanding of theoretical models and analyses and how they form social lens for the examination of school processes.

EDCI 8186. Globalization, Urbanization, and Urban Schools.

(3) Explores globalization locally and internationally, with special emphasis on how global development processes are affecting urban communities and urban schools. Explores issues of global governance, global inequality, low-wage economics, and the transnationalization of the globe. It investigates conceptual and theoretical issues underlying globalization, and their impacts on the production of knowledge, educational policy, and school curricula.

EDCI 8201. Perspectives in Immigration and Urban Education. (3) Examines theories, issues, policies and historical trends in the education of immigrant students in urban public schools. Topics include: theories of immigrant adaptation in relation to race, gender, social class, language learning, and immigration status, demographic trends and their influence on urban schools and on teacher preparation, broader political influences on immigrant education, and the role of family and community in shaping immigrant students' educational trajectories. Students critically analyze scholarly research and theoretical work related to immigration and education in variety of fields.

EDCI 8250. Applied Research in Literacy Education.

(3) Cross-listed as READ 6250. Introduction to the research interests of faculty, with emphasis on research in urban educational issues and problems. Seminar and individual support for replication attempts, instrument development and field-testing in pilot studies, practice in and critique of different methods of data-gathering and data analysis.

EDCI 8252. K-12 Writing Development and Instruction. (3) Cross-listed as READ 6252. Theories, research, and critical issues related to students'

writing development and effective writing instruction. Field experience required.

EDCI 8254. Collaborative Leadership in Literacy Education.

(3) Cross-listed as READ 6474. Prerequisites: Completion of Phase II and READ 6260 course. Investigates models and strategies for assuming the leadership responsibilities of a literacy specialist, including mentoring, staff development, school-wide literacy program development and assessment, supporting the action research of teachers, and developing partnerships with parents and community volunteers.

EDCI 8255. Middle/Secondary Reading and Writing.

(3) Cross-listed as READ 6255. Prerequisite: Completion of Phase I. Theories, research, and instructional methods associated with reading and writing in the content areas, with a special emphasis on grades 6-12. Field experience and action research project are required.

EDCI 8256. Diagnostic Assessment and Instruction in Reading.

(3) Cross-listed as READ 6260. Prerequisite: Completion of Phase II. Examination, uses, and critique of theories and research about literacy processes and problems; diagnosis and correction of reading disabilities; instructional strategies and action research designed to improve reading proficiency.

EDCI 8265. Multiliteracies in a Global World:

Reading and Writing Texts in New Times. (3) Cross-listed as READ 6565. Multiliteracies takes literacy beyond a focus on traditional print-based literacy to multiple-forms of knowing, including print, images, video, and combinations of forms in digital contexts. Students are immersed in both the theory and practice of multiliteracies and considers how globalization has created a more complex environment for teachers and students.

EDCI 8300. Social Stratification and Urban Schools and Communities.

(3) Prerequisite: EDCI 8184. Investigates social stratification in schools and society. It uses school-society integration framework to explore socially reproducing aspects of the social and economic systems. Through examination of current and past patterns of social organizations and power structures, it produces knowledge about education and mobility opportunities. Emphasizes the socioeconomic implications of school stratification and how this impacts students' life chances.

EDCI 8310. Transformative Black Education.

(3) Engages students in an in-depth study of the philosophical, psychological, cultural and historical bases for Black education and the theoretical perspectives underlying a transformative approach to

the education of students of African descent in America. The issues covered include the education debt, resilience, psychological effects of racism, education in the Diaspora, African-centered education, culturally nurturing curriculum and pedagogy, and African students in America.

EDCI 8311. Critical Readings in Urban Education Research. (3) Prerequisites: RSCH 8111 and RSCH 8121. Furthers students' understanding and practice of Urban Education research studies conducted primarily through qualitative research. The methods presented and the studies covered are of particular importance to anyone conducting qualitative research in urban schools and communities. One critical component of this course is the study of a variety of standpoints and anti-racist methodologies in Urban Education.

EDCI 8312. Urban Schooling, Curriculum, and Pedagogy. (3) At the heart of 'Urban Schooling' are curriculum and pedagogy. Explores the literature on successful teachers, principals, and educational reformers who have developed curriculum and/or pedagogy that have proven effective in urban schools. Critically examines current practices such as managed curriculum and teaching to the test in urban classrooms and proposes education for democracy, that is culturally relevant and emancipatory.

EDCI 8314. Urban Educational Reform. (3) Explores the educational reform movements since 1954, the landmark Brown v. Board of Education Supreme Court case. The major focus is on the current federal legislation, No Child Left Behind, as well as state and local reform as they impact urban schooling.

EDCI 8320. Social Deviance, Delinquency, and Education. (3) Critically examines social deviance and delinquency and their influence on education and beyond. Examines how violence against children is sustained through public policies and social structures and institutions. Explores contemporary forms of deviance, and how they affect student outcomes. Particular consideration is given to the causes of crime, as well as the punishment and treatment of offenders. In addition, special attention is given to deterrence and crime prevention.

EDCI 8330. History of Urbanization and Its Impact on Schooling. (3) Focuses on a historical contextualization of urban developments and their impacts on schools. It examines the American educational system as it relates to politics, economic, cultural practices and public policies. The course explores the shift in the American educational system from rural to urban schools, and it investigates how urbanization shaped schools and created the

framework for current issues in urban schools. The course concludes with an analysis of urbanization in Charlotte, North Carolina and how Charlotte schools have been impacted.

EDCI 8420. Writing Program Administration and Supervision. (3) Study of and supervised experiences in the development, administration, supervision, and evaluation of writing programs in urban educational settings. Students may focus on programs at the elementary, middle, or secondary schools or within community and four-year colleges. Emphasis on program development that supports writers from diverse backgrounds.

EDCI 8460. Internship in Urban Education. (3) Prerequisite: Permission of instructor. Internship experiences planned and guided cooperatively by University and school personnel.

EDCI 8462. Supervision of Student Teachers. (3) Concentrated practice in the supervision of student teachers with emphasis on support of student teachers in urban schools. Internship experience with direct faculty supervision in seminars and school settings.

EDCI 8609. Curriculum and Instruction Seminar. (3) Cross-listed as MATH 6609. A series of regularly scheduled meetings in which each student presents one or more topics selected by the instructor.

EDCI 8610. Readings in Mathematics Education. (3) Prerequisites: Enrollment in the Mathematics Education specialization of the Doctoral Program in Curriculum and Instruction. Readings in the teaching and learning of mathematics K-16; analysis of the historical development of the K-16 mathematics curriculum leading to current trends, issues, and problems; theory, methods, and techniques for assessment; and analysis of contemporary issues impacting the teaching of mathematics.

EDCI 8640. Readings in Literacy Research. (3) Study of methodology and findings of historical and current research about needs and characteristics of diverse literacy learners in urban-regional environments, successful programs and policies, and promising solutions to educational challenges confronting literacy teachers and literacy learners.

EDCI 8650. Critical Readings in Elementary Education Research. (3) Critical review, analysis, and synthesis of current and historical literature having special significance for elementary education, with specific focus on research related to educational theory and practice and their implications for teaching at the elementary level.

EDCI 8660. Readings in Urban Educational Research.

(3) Study of methodology and findings of historical and current research about needs and characteristics of urban schools, diverse populations in urban-regional environments, legal and ethical issues, policy-making, and promising solutions to educational challenges of poverty, social justice, language differences, and conflicting values.

EDCI 8681. Seminar in College Teaching. (3) Issues, theories, and research about teaching late adolescent and adult learners. Limited opportunities for supervised teaching experiences with faculty who support students as they teach or co-teach undergraduate courses.

EDCI 8682. Seminar in Professional and Grant Writing. (3) Introduces the forms of professional and grant writing expected of education professionals. Emphasis on writing for publication and writing for federal and state funding. Collaborative writing and peer assessment will be part of the process.

EDCI 8685. Sociocultural Perspectives Language and Literacy. (3) Focuses on sociocultural aspects of literacy and language. Students are immersed in texts and theorists foundational to this line of inquiry and scholarship including the work of Lev Vygotsky, Mikhail Bakhtin, and James Wertsch. The role of culture and social interaction and their influence on language development and learning are explored, as well as its profound implications for teaching, schooling, and education. Students will apply these theories to the analysis of data. The seminar course is an optional selection for students in the Curriculum & Instruction doctoral program.

EDCI 8699. Dissertation Proposal Seminar. (3)

Prerequisite: Permission of Program Coordinator, Concentration Coordinator, or Advisor. Identification of a research question and development of the proposal for an original research study appropriate for the dissertation requirement. *May be repeated for credit.*

EDCI 8840. Independent Study in Reading, Language, and Literacy. (3) Cross-listed as READ 6800.

Prerequisite: Permission of the student's advisor. Independent study of a literacy education problem or issue under the supervision of an appropriate faculty member. *May be repeated for credit.*

EDCI 8850. Independent Study in Elementary Education. (3)

Prerequisite: Permission of the student's advisor. Independent study of an elementary education problem or issue under the supervision of an appropriate faculty member. *May be repeated for credit.*

EDCI 8880. Independent Study in Urban Education.

(1-3) Prerequisite: Permission of the student's advisor. Independent study of an urban education problem or issue under the supervision of an appropriate faculty member. *May be repeated for credit.*

EDCI 8999. Dissertation Research. (3) Prerequisite:

Committee approval of the dissertation proposal. Execution of original research study that addresses the solution to an urban educational problem in curriculum, teaching, learning, or leadership. *Graded on a Pass/Unsatisfactory basis. May be repeated for credit.*

Curriculum and Supervision

- **M.Ed. in Curriculum and Supervision***
- **Graduate Certificate in Curriculum and Supervision***

**Not accepting applicants for the 2016-2017 academic year*

Department of Educational Leadership
edld.uncc.edu

MASTER OF EDUCATION IN CURRICULUM AND SUPERVISION

****NOT ACCEPTING APPLICANTS FOR THE
2016-2017 ACADEMIC YEAR****

The M.Ed. in Curriculum and Supervision is designed to prepare highly competent program leaders for the school systems of North Carolina. UNC Charlotte is particularly dedicated to serving the 23 school districts located in the Southwestern Piedmont area of the state. To achieve its objectives, the program is designed to attract high-quality students and help them develop specific competencies to enable them to define, communicate, interpret, and assess teachers in the implementation of state and local curricula.

Program Objectives

The major educational objectives of the program are to develop instructional leaders who have advanced knowledge and skills in curriculum development and supervisory practices to assist the school system by:

- 1) Guiding principals and teachers in the interpretation of curriculum standards and specific competencies for instructional development.
- 2) Directing teachers in curriculum and instructional alignment to maximize success for the highest levels of student achievement possible.
- 3) Promoting the expectations that effective teachers are masters of their subject content, highly knowledgeable of human dynamics, directly responsive to individual differences in students and are well accomplished in the art and science of pedagogy and student assessment.
- 4) Encouraging participants in the program to self-direct their personal and professional growth as educators by:
 - a) Taking responsibility for their own learning;
 - b) Initiating professional inquiry through conversations with colleagues;
 - c) Critically reading the professional literature;
 - d) Participating voluntarily in personal and professional development opportunities; and
 - e) Setting high expectations for their professional performance.
- 5) Guiding participants to promote in teachers the skills to respond effectively to children's differences as influenced by development, exceptionalities, and diversity by:
 - a) Developing and advanced understanding of human development;
 - b) Expecting and respecting differences among children that are influenced by development, exceptionalities, and diversity;
 - c) Promoting understanding and respect for all members of the classroom community;
 - d) Helping students, parents, and colleagues develop a global perspective; and
 - e) Applying their knowledge at all levels of interaction with students: from modifying instruction for individuals to creating classroom environments where all students feel welcome and can be successful learners.
- 6) Demonstrating advanced knowledge of the content and pedagogy in curriculum and supervision by:
 - a) Demonstrating advanced knowledge of the range of appropriate content;
 - b) Helping children to acquire the knowledge and skills appropriate for specific grade levels and development through many effective instructional and assessment practices;
 - c) Using technology in a variety of ways to support learning;
 - d) Helping students develop competencies applicable across the curriculum; and
 - e) Helping children make sense of their learning by connecting school content and students' lives outside of school and by integrating curriculum.
- 7) Improving educational practice through self-reflection, self-evaluation, and applied research by:
 - a) Engaging in study that leads to continuous improvement of teaching and learning;
 - b) Actively investigating and solving educational problems through data gathering and assessment;
 - c) Continuously monitoring the learning problems and successes of each learner;
 - d) Making appropriate adjustments in both instruction and learning environments based on analysis of data; and

- e) Regularly monitoring the effects of their actions on academic achievement.
- 8) Serving as educational leaders by:
 - a) Actively participating as leaders in areas in which they can contribute to solving educational problems, such as School Advisory Teams and committees in professional organizations;
 - b) Taking responsibility for sharing in decision-making relative to school-wide and/or system-wide issues;
 - c) Readily asking for and sharing successful instructional approaches and solutions with colleagues, supervisors, and educational leaders; and
 - d) Providing mentoring for colleagues.

The Program

Today, curriculum specialists and instructional supervisors must be able to elicit support and create program structures and climates that foster the kinds of creativity, change, and innovation that will educate the most diversified group of children ever in America's schools. To meet this challenge, the M.Ed. program focuses on curriculum development. It enables candidates to develop specific competencies related to curriculum leadership, instructional practice and supervisory roles. It emphasizes performance and competence in school-based leadership and the overall quality of K-12 instruction.

The M.Ed. program provides for 33 credit hours of classroom study followed by an internship. In the cohort, a part-time student can complete the program in two years. Students average two courses per semester while the final six credit hours of each student's program are in the internship and a seminar. The internship semester is undertaken on a full-time basis (typically during the summer term just prior to graduation). The program faculty work with students and school districts to arrange for the internships to be completed with minimum impact on their current positions.

General Curriculum Plan

The 39 semester-hour M.Ed. program includes nine hours of professional education core courses and 30 hours of coursework in curriculum and educational administration and leadership (including academic experience in internships and seminars).

Professional Education Core Courses (9)

EIST 6101 The Adult Learner
 RSCH 6101 Research Methods
 CUSU 6100 Fundamentals of Educational Leadership

Core Courses in Educational Administration and Leadership (21)

ADMN 6120 Instructional Leadership
 CUSU 6105 Legal Aspects of Schooling
 CUSU 6122 Foundations of Curriculum Theory and Development
 CUSU 6130 Supervision of Instruction
 EIST 5000 Instructional Technology
 RSCH 6196 Program Evaluation Methods
 An elective or CUSU 6123 Designs in Curriculum Practices

Internship/Seminars (9)

CUSU 6601 Seminar in Curriculum and Supervision
 CUSU 6491 Internship and Seminar: Curriculum and Supervision

Additional Admissions Requirements

In order to be considered for admission to the M.Ed. program, applicants are expected to submit the following materials to the Graduate Admissions Office:

- 1) A completed online application
- 2) Evidence of a bachelor's degree or its equivalent from an accredited institution with an overall GPA of at least 3.0
- 3) One official transcript of previous academic work attempted beyond high school
- 4) A score of 50th percentile or higher on the Graduate Record Examination or the Miller Analogies test taken within the previous five years
- 5) Three professional recommendations, including one from the applicant's immediate supervisor
- 6) A description of previous relevant employment, including evidence of at least two years of successful teaching experience in K-12
- 7) Evidence of a clear "A" level license
- 8) Applicant must be a full time teacher
- 9) A personal statement of purpose or intent for entering the program

Applications to the program will be accepted by October 1 for admission the following spring semester. The October 1 deadline requires a complete admissions packet. The application process is designed to ensure selection of a highly competent and diverse cohort of students. The number admitted each year will be based on current resources, but it is expected to be approximately 20 students. Upon successful completion of the program and Praxis examination, graduates will receive a recommendation for North Carolina licensure as a Curriculum-Instructional Specialist (licensure area 113 Level I).

POST-MASTER'S CERTIFICATE IN CURRICULUM AND SUPERVISION

****NOT ACCEPTING APPLICANTS FOR THE 2016-2017 ACADEMIC YEAR****

The Post-Master's Certificate program in Curriculum and Supervision is designed to prepare highly competent program leaders for the school systems of North Carolina. UNC Charlotte is particularly dedicated to serving the 23 school districts located in the Southwestern Piedmont area of the state. To achieve its objectives, the program is designed to attract high-quality students and help them develop specific competencies to enable them to define, communicate, interpret, and assess teachers in the implementation of state and local curricula.

Program Objectives

The major educational objectives of the program are to develop instructional leaders who have advanced knowledge and skills in curriculum development and supervisory practices to assist the school system by:

- 1) Guiding principals and teachers in the interpretation of curriculum standards and specific competencies for instructional development.
- 2) Directing teachers in curriculum and instructional alignment to maximize success for the highest levels of student achievement possible.
- 3) Promoting the expectations that effective teachers are masters of their subject content, highly knowledgeable of human dynamics, directly responsive to individual differences in students and are well accomplished in the art and science of pedagogy and student assessment.
- 4) Encouraging participants in the program to self-direct their personal and professional growth as educators by:
 - a) Taking responsibility for their own learning;
 - b) Initiating professional inquiry through conversations with colleagues;
 - c) Critically reading the professional literature;
 - d) Participating voluntarily in personal and professional development opportunities; and
 - e) Setting high expectations for their professional performance.
- 6) Guiding participants to promote in teachers the skills to respond effectively to children's differences as influenced by development, exceptionalities, and diversity by:
 - a) Developing an advanced understanding of human development and how we learn;
 - b) Expecting and respecting differences among children that are influenced by development, exceptionalities, and diversity;
 - c) Promoting understanding and respect for all members of the classroom community;
 - d) Helping students, parents, and colleagues develop a global perspective; and
 - e) Applying their knowledge at all levels of interaction with students: from modifying instruction for individuals to creating classroom environments where all students feel welcome and can be successful learners.
- 7) Demonstrating advanced knowledge of the content and pedagogy in curriculum and supervision by:
 - a) Demonstrating advanced knowledge of the range of appropriate content;
 - b) Helping children to acquire the knowledge and skills appropriate for specific grade levels and development through many effective instructional and assessment practices;
 - c) Using technology in a variety of ways to support learning;
 - d) Helping students develop competencies applicable across the curriculum; and
 - e) Helping children make sense of their learning by connecting school content and students' lives outside of school and by integrating curriculum.
- 8) Improving educational practice through self-reflection, self-evaluation, and applied research by:
 - a) Engaging in study that leads to continuous improvement of teaching and learning;
 - b) Actively investigating and solving educational problems through data gathering and assessment;
 - c) Continuously monitoring the learning problems and successes of each learner;
 - d) Making appropriate adjustments in both instruction and learning environments based on analysis of data; and
 - e) Regularly monitoring the effects of their actions on academic achievement.
- 9) Serving as educational leaders by:
 - a) Actively participating as leaders in areas in which they can contribute to solving educational problems, such as School Advisory Teams and committees in professional organizations;
 - b) Taking responsibility for sharing in decision-making relative to school-wide and/or system-wide issues;
 - c) Readily asking for and sharing successful instructional approaches and solutions with colleagues, supervisors, and educational leaders; and
 - d) Providing mentoring for colleagues.

The Program

Today, curriculum specialists and instructional supervisors must be able to elicit support and create

program structures and climates that foster the kinds of creativity, change, and innovation that will educate the most diversified group of children ever in America's schools. To meet this challenge, the certificate program focuses on curriculum development. It enables candidates to develop specific competencies related to curriculum leadership, instructional practice and supervisory roles. It emphasizes performance and competence in school-based leadership and the overall quality of K-12 instruction.

The internship semester is undertaken on a full-time basis (typically during the summer term just prior to graduation). The program faculty will work with students and school districts to arrange for the internships to be completed with minimum impact on their current positions.

Educators who hold a master's degree in an educational area and who possess an "M" level teaching certificate can apply for the 21 semester hour Advance Certificate in Curriculum and Supervision. The Advance Certificate leads to state licensure as an Instructional Specialist (**licensure area 113 Level I**).

The Advance Certificate program provides for 15 credit hours of classroom study followed by an internship. Students average one course per semester with an internship in the final semester. The internship semester is undertaken on a full-time basis. The program faculty will try to work with students and school districts to arrange for the internships to be completed with minimum impact on their current positions.

General Curriculum Plan

ADMN 6120 Instructional Leadership
 CUSU 6100 Fundamentals of Educational Leadership
 CUSU 6122 Foundations of Curriculum Theory and Development
 CUSU 6130 Supervision of Instruction
 CUSU 6601 Seminar in Curriculum and Supervision
 CUSU 6491 Internship and Seminar: Curriculum and Supervision (6 hours)

Additional Admissions Requirements

In order to be considered for admission to the Advance Certificate program, applicants are expected to submit the following materials to the Graduate Admissions Office:

- 1) A completed online application
- 2) Evidence of a master's degree in education or its equivalent from an accredited institution with an overall GPA of at least 3.5
- 3) One official transcript of previous academic work attempted beyond the bachelor's degree

- 4) Three professional recommendations, including one from the applicant's immediate supervisor
- 5) A description of previous relevant employment, including evidence of at least three years of successful teaching experience in K-12
- 6) Evidence of a clear "M" level license
- 7) Applicant must be a full time educator
- 8) A personal statement of purpose or intent for entering the program

Applications to the program will be accepted until November for admission the following spring semester. The November 1 deadline requires a complete admissions packet. This process is designed to ensure selection of a highly competent and diverse group of students. The number admitted each year will be based on current resources. Upon successful completion of the program and Praxis examination, completers will receive a recommendation for North Carolina licensure as a Curriculum-Instructional Specialist, licensure area 113 level I.

COURSES IN CURRICULUM AND SUPERVISION (CUSU)

CUSU 6000. Topics in Curriculum and Supervision.

(1-6) May include classroom and/or clinical experiences in the content area. *May be repeated for credit with change of topic and permission of department.*

CUSU 6100. Fundamentals of Educational Leadership. (3)

The developing role of educational organizations in the United States and the societal and cultural influences that affect the delivery of schooling. Structure and organization of American schools, administrative and organizational theory, legal, moral, and ethical dimensions of schooling within the context of restructuring and reform.

CUSU 6105. Legal Aspects of Schooling. (3)

Education law for education professionals which focuses on the legal rights and responsibilities of students, teachers, and administrators and how these legal provisions affect educational policy and practice.

CUSU 6122. Foundations of Curriculum Theory and Development. (3)

Foundations of historical curriculum development, philosophic beliefs, and understanding of the development of the American public school system.

CUSU 6123. Designs in Curriculum Practices. (3)

Examines the field of curriculum with particular emphasis on the classroom application of different models of teaching and the change process.

CUSU 6130. Supervision of Instruction. (3)

Introduction to clinical supervision and development of skills in classroom observation, analysis, evaluation, and assistance. Systems of observation, principles of adult development in school settings, techniques for conducting classroom observations and conferences, and development of staff development programs to remedy assessed weaknesses.

CUSU 6491. Internship in Curriculum and Supervision. (6)

Prerequisite: Permission of the department. Internship under the supervision of University and on-site personnel in a setting consistent with the student's professional goals in which the student will be involved in the diverse activities expected of the professional administrator.

CUSU 6601. Seminar in Curriculum and Supervision. (3)

Capstone class in curricular and supervisory leadership. Exploration of seminal topics and preparation for the internship.

CUSU 6800. Independent Study in Curriculum and Supervision. (1-6)

Prerequisite: Permission of the student's advisor. Independent study under the supervision of an appropriate faculty member. *May be repeated for credit.*

CUSU 8000. Topics in Curriculum and Supervision. (1-6)

May include classroom and/or clinical experiences in the content area. *May be repeated for credit with change of topic and permission of department.*

CUSU 8126. National and International Developments in the Community College. (3)

Prerequisite: Admission to the doctoral program in Educational Leadership or Curriculum and Instruction and advisor approval. Doctoral seminar study that compares international issues and developments in the community college in other countries with those of the United States. Topics include: historical development of junior/community college, the role of the community college in different cultures, types of programs offered, and trends for the future. There will also be opportunity for students to pursue individual areas of interest.

CUSU 8127. Comparative Higher Education. (3)

Prerequisite: Admission to the doctoral program in Educational Leadership or Curriculum and Instruction and advisor approval. Doctoral seminar study that compares international issues and developments in higher education in other countries with those in the United States. Topics include: historical development of the university, purpose of the university in different cultures, current expectations for faculty and students, and trends for the future. There will also be

opportunity for students to pursue individual areas of interest.

CUSU 8800. Independent Study in Curriculum and Supervision. (1-6)

Prerequisite: Permission of the student's advisor. Independent study under the supervision of an appropriate faculty member. *May be repeated for credit.*

CUSU 8999. Dissertation Research. (3)

Prerequisite: Permission of the Ed.D. program coordinator. Execution of original research study that addresses the solution to an educational or school-related problem or that addresses a substantive curricular or supervisory leadership or programmatic issue.

Educational Leadership

• Ed.D. in Educational Leadership

Department of Educational Leadership

edld.uncc.edu

Graduate Program Director

Dr. Patti Wilkins

Graduate Faculty

Dr. Lynn Ahlgrim-Dezell, Associate Professor
 Dr. Bob Algozzine, Professor
 Dr. James Bird, Associate Professor
 Dr. Mark D'Amico, Associate Professor
 Dr. Sandra Dika, Associate Professor
 Dr. Mickey Dunaway, Associate Professor
 Dr. Claudia Flowers, Professor
 Dr. Dawson Hancock, Professor and Associate Dean
 Dr. Do-Hong Kim, Associate Professor
 Dr. Richard Lambert, Professor
 Dr. Jae Hoon Lim, Associate Professor
 Dr. Florence Martin, Associate Professor
 Dr. Brenda McMahon, Associate Professor
 Dr. Lisa Merriweather, Associate Professor
 Dr. Debra Morris, Clinical Assistant Professor
 Dr. Rebecca Shore, Associate Professor
 Dr. Chuang Wang, Professor
 Dr. Jim Watson, Assistant Professor
 Dr. Patti Wilkins, Clinical Assistant Professor

ED.D. IN EDUCATIONAL LEADERSHIP

The mission of the Department of Educational Leadership is to prepare educators as leaders. The Ed.D. in Educational Leadership is designed to prepare educational administrators who can assume mid-level and senior-level leadership positions in public school and post-secondary settings. The program includes three concentrations: (1) superintendent, (2) curriculum/supervision, and (3) higher education.

Program Objectives

Graduates of the program are prepared to:

- 1) Exhibit a broad understanding of their roles as educational leaders in the organizations they serve
- 2) Demonstrate leadership competencies and skills necessary to accomplish the goals of complex organizations
- 3) Interact successfully with the numerous institutions and interests that influence their organizations

- 4) Understand theoretical concepts that undergird organizational theory and behavior, leadership, social psychology, policy, educational administration, and research
- 5) Address issues that face educational leaders, including resource acquisition and management; policy development and analysis; program management; community relations; curriculum development; and personnel selection, development, and evaluation

Concentrations

Superintendent or Curriculum/Supervision Concentration

This school program is designed to serve the needs of those interested in the study of issues regarding the administration of PK-12 public and private educational institutions. These students pursue careers as superintendents and senior level administrators. In addition to the program requirements regarding leadership experiences (see below), prospective students must hold a Master of School Administration, Master of Education in Curriculum Supervision, Master of Education in Instructional Technology, or a comparable degree. These students must already have a valid "M" level certificate in an appropriate field. Appropriate PK-12 North Carolina licensure will be recommended at the completion of the program. A Superintendent Concentration or Curriculum/Supervision Concentration may be chosen by working with the advisor and selecting the appropriate courses and experiences.

Note to Students in one of the School

Concentrations: *The Department of Educational Leadership follows the North Carolina Standards for Superintendents as approved by the State Board of Education, September 6, 2007. A complete copy of the standards and guidelines is available online at <http://www.ncpublicschools.org/docs/effectiveness-model/ncees/standards/superintendent-standards.pdf>.*

Higher Education Concentration

The Higher Education Concentration is designed for those interested in careers as senior level leaders in post-secondary settings, including higher education, adult education, and research. To ensure the effectiveness and competence of individuals in such positions, coursework within the program is comprised of foundational work in educational leadership, research, and higher education with further specialization available in adult education or educational research. Prospective students should already have a Master's degree in an appropriate and related field. They are neither required to hold North Carolina PK-12 licensure nor will any license or certificate be recommended upon graduation.

Additional Admission Requirements Superintendent or Curriculum/Supervision Concentration

In addition to the general requirements for admission to the Graduate School, applicants must have a master's degree from an accredited institution. Applicants should have a minimum of three years of documented successful work-related experience. The applicant should provide a statement of purpose, description of previous relevant employment, and the nature of previous educational experiences in the essay. Recommendations from employers and former University instructors are required.

Admission decisions are competitive. These decisions are made by a departmental admissions committee that includes program faculty. Applicants with the highest profile rankings are invited to participate in interviews that are conducted by the Ed.D. Admissions Committee. The interview is designed to provide evidence of an applicant's academic strength, leadership potential, and personal characteristics. Decisions are based not only on the comparative profiles of all applicants, but also on the commitment of the Admissions Committee to achieve diversity among the students admitted each year. Admission decisions are made in the Spring and Fall prior to each semester.

Higher Education Concentration

In addition to the general requirements for admission to the Graduate School, applicants must have a master's degree from an accredited institution. Candidates must have an entry-level license in educational administration or supervision; and they must have a minimum of three years of successful leadership experience, which may include the full-time internships. Applicants must also submit a personal essay of purpose; a description of their previous relevant employment, highlighting their leadership experiences in school-settings; and recommendations from school administrators and former university instructors.

Admission decisions are based on a comparison on of applicant profiles and are made by a departmental admissions committee that includes program faculty. Applicants with the highest profile rankings are invited to participate in interviews that are conducted by the Ed.D. Admissions Committee. It is designed to provide evidence of an applicant's academic strength, leadership potential, and personal characteristics. Admission decisions are based not only on the comparative profiles of all applicants, but also on the commitment of the Admissions Committee to achieve diversity among the students admitted in each year's cohort group. Admission decisions are made in the Spring and Fall prior to each semester.

Degree Requirements

The Ed.D. program consists of a minimum of 60 credit hours beyond the master's degree.

Superintendent Concentration

Foundation Courses (9 credit hours)

- ADMN 8101 Perspectives on Adult Learning Theory (3)
- ADMN 8110 Organization Theory and Behavior (3)
- ADMN 8160 Introduction to Educational Administration (3)

Concentration Courses (24 credit hours)

- ADMN 8120 Advanced School Law (3)
- ADMN 8121 Doctoral Seminar in Curriculum Design (3)
- ADMN 8130 Educational Government and Policy (3)
- ADMN 8140 School Finance (3)
- ADMN 8150 Human Resources and Development (3)
- ADMN 8410 Advanced Internship in Educational Leadership Part 1 (3)
- ADMN 8420 Advanced Internship in Educational Leadership Part 2 (3)
- ADMN 8610 Interdisciplinary Seminar (3)

Research Courses (12 credit hours)

- RSCH 8110 Descriptive and Inferential Statistics (3)
- RSCH 8111 Qualitative Research (3)
- RSCH 8120 Advanced Statistics (3)
- RSCH 8210 Applied Educational Research (3)

Elective Courses (6 credit hours)

Elective courses must be at the 8000 level and offered at UNC Charlotte.

Select from the following:

- ADMN 8000-level courses
- EIST 8000-level courses
- RSCH 8000-level courses
- CUSU 8126 National and International Developments in the Community College (3)
- CUSU 8127 Comparative Higher Education (3)
- Other 8000-level courses as approved by the advisor

Proposal Design Course (3 credit hours)

- ADMN 8699 Dissertation Design Seminar (3)

Dissertation Course

Students continue to enroll in dissertation study (a minimum of 3 credit hours per semester) until completion of the degree.

- ADMN 8999 Dissertation (3)

Curriculum and Supervision Concentration Foundation Courses (9 credit hours)

ADMN 8101 Perspectives on Adult Learning Theory (3)
ADMN 8110 Organizational Theory and Behavior (3)
ADMN 8160 Introduction to Educational Administration (3)

Concentration Courses (24 credit hours)

ADMN 8120 Advanced School Law (3)
ADMN 8121 Doctoral Seminar in Curriculum Design (3)
ADMN 8122 Advanced Curriculum Theory and Development (3)
ADMN 8125 Doctoral Seminar in Instruction (3)
ADMN 8140 School Finance (3)
ADMN 8489 Practicum in Staff Development (3)
ADMN 8610 Interdisciplinary Seminar (3)
ADMN 8660 Instructional Leadership Seminar (3)

Research Courses (12 credit hours)

RSCH 8110 Descriptive and Inferential Statistics (3)
RSCH 8111 Qualitative Research (3)
RSCH 8120 Advanced Statistics (3)
RSCH 8210 Applied Educational Research (3)

Elective Courses (6 credit hours)

Elective courses must be at the 8000 level and offered at UNC Charlotte.

Select from the following:

- ADMN 8000-level courses
- EIST 8000-level courses
- RSCH 8000-level courses
- CUSU 8000 Topics in Curriculum and Supervision (1-6)
- CUSU 8126 National and International Developments in the Community College (3)
- CUSU 8127 Comparative Higher Education (3)
- Other 8000-level courses as approved by the advisor

Proposal Design Course (3 credit hours)

ADMN 8699 Dissertation Design Seminar (3)

Dissertation Course

Students continue to enroll in dissertation study (a minimum of 3 credit hours per semester) until completion of the degree.

ADMN 8999 Dissertation (3)

Higher Education Concentration Foundation Courses (9 credit hours)

ADMN 8101 Perspectives on Adult Learning Theory (3)
ADMN 8110 Organization Theory and Behavior (3)

ADMN 8160 Introduction to Educational Administration (3)

Concentration Courses (15 credit hours)

ADMN 8171 The American College Student (3)
ADMN 8172 Higher Education in the United States (3)
ADMN 8173 Legal Issues in Higher Education (3)
ADMN 8174 Higher Education Finance and Budgeting (3)
ADMN 8175 Non-Traditional Approaches to Higher Education (3)

Research Courses (12 credit hours)

RSCH 8110 Descriptive and Inferential Statistics (3)
RSCH 8111 Qualitative Research (3)
RSCH 8120 Advanced Statistics (3)
RSCH 8210 Applied Educational Research (3)

Elective Courses (15 credit hours)

Elective courses must be at the 8000 level and geared toward the student's doctoral dissertation and/or professional pathway. Elective courses include other higher education, adult education, advanced educational research, educational instructional systems technology, and related courses.

Select from the following:

- ADMN 8000-level courses
- EIST 8000-level courses
- RSCH 8000-level courses
- CUSU 8126 National and International Developments in the Community College (3)
- CUSU 8127 Comparative Higher Education (3)
- Other 8000-level courses as approved by the advisor

Proposal Design Course (3 credit hours)

ADMN 8699 Dissertation Design Seminar (3)*

**Students may take ADMN 8699 only after all coursework is completed or during the final semester of coursework.*

Dissertation Course (6 credit hours)

ADMN 8999 Dissertation (3)**

***Students must take ADMN 8999 only after all other coursework in the program is completed. Students must maintain continuous enrollment in ADMN 8999, to include at least one Summer Session, until degree completion and must be enrolled during the semester in which they graduate. Failure to maintain continuous enrollment in ADMN 8999 will result in dismissal from the program.*

Internship

All Superintendent and Curriculum Supervision

Concentration students seeking licensure are required to complete an internship or practicum in a K-12 school district. The internship is based upon identified objectives and organizational areas within the school system of the internship assignment. Students are also required to complete a project based upon a current educational leadership topic related to student achievement. Higher Education Concentration students may choose to include a practicum in their course of studies.

Advising

Doctoral students will have the benefit of three phases of advising as they pursue their degree.

Phase 1: The doctoral coordinator or an assigned faculty member serves as the "temporary advisor" when students enter the program. During this phase, the advisor plans a course of study with students during the initial stages of the program. A Program Planning Sheet is used to document tentative plans for projected coursework. The planning sheet should be kept by the student and a copy should be provided to the advisor.

Phase 2: By the end of the first year of the program, students select a "program advisor" to serve as a guide through the completion of the coursework. This person also serves as the coordinator of the process to complete the Qualifying Examination. This advisor also helps the student identify faculty whose research interests and expertise are congruent with the student's probable area of inquiry for the dissertation. This advisor in consultation of the student has the responsibility for creating a "doctoral committee" that is made up of the faculty who prepares and evaluates the written and oral comprehensive qualifying exam. (See Qualifying Examination section of the Handbook.)

The responsibility of the doctoral committee members includes:

- 1) the approval of the student's course of study;
- 2) approval of the dissertation proposal; and
- 3) evaluation of the final dissertation and oral defense.

Phase 3: Upon successful completion of the Qualifying Examinations, students are recommended for admission to candidacy. They may then select a "dissertation advisor" and a dissertation committee and complete a "Change of Advisor Form" if needed. These committee members are appointed to serve on the committee with mutual consent between the student and each faculty member. The committee consists of four members of the Graduate Faculty: the Chairperson and two other members from the Department and one member appointed by the

Graduate School from outside the Department of Educational Leadership.

The purpose of this process is to provide students with an opportunity to develop a direct working relationship with several faculty members. At the same time, it provides an individualized and personalized approach to the advising process. For example, some students may choose to keep the same faculty member to serve as both the program advisor and the dissertation advisor. Likewise, the doctoral committee and the dissertation committee could include some or all of the same faculty.

Qualifying Examination

Students are required to successfully pass a written and oral examination. The examination is based upon the core areas of the respective specializations.

Dissertation

Students must complete and defend a dissertation focused on a specific problem or question relevant to their specialization. Students must be continually enrolled in ADMN 8999 (Fall, Spring, and Summer) for dissertation research credit, beginning with the semester following completion of the comprehensive examination and continuing through the semester of their graduation. Defense of their dissertation is conducted in a final oral examination that is open to members of the University community.

Application for Degree and Application for Candidacy

Students may submit an Application for Degree and an Application for Candidacy during the semester in which they successfully defend their dissertation proposal. Adherence to Graduate School deadlines is expected. Degree requirements are completed when a student successfully defends the dissertation and files the final copy of the dissertation in the Graduate School.

Program Certification/Accreditations

- National Council for the Accreditation of Teacher Education (NCATE)
- North Carolina Department of Public Instruction (NCDPI)

COURSES IN EDUCATIONAL LEADERSHIP / SCHOOL ADMINISTRATION (ADMN)

ADMN 8000. Topics in Educational Leadership. (1-6)
Major topics in educational leadership. *May be repeated for credit with change of topic and permission of department.*

ADMN 8101. Perspectives on Adult Learning Theory.

(3) The examination of how adults learn in instructional settings. Characteristics of the adult learner are examined. Students investigate adult learning theory, as well as current trends and advancements in adult learning. Focus on making better instructional decisions and media selection for the education and training of adults.

ADMN 8110. Organizational Theory and Behavior.

(3) Prerequisite: Admission to Ed.D. in Educational Leadership. Analysis of the structure and organization of public education in the United States in terms of organizational theory and historical development. Consideration of organizational change theory, organizational development, and the planning process.

ADMN 8120. Advanced School Law. (3)

Prerequisite: ADMN 6105 or 6107 or permission of the instructor. Current policy issues, including educational finance, testing/grouping, desegregation/integration, and the provision of public educational services to private-school students.

ADMN 8121. Doctoral Seminar in Curriculum Design. (3)

Examination of principles and practices for educational leaders in program design, implementation and evaluation.

ADMN 8122. Advanced Curriculum Theory and Development. (3)

An examination of philosophic thought and its relationship to educational theories which have led to assumptions for educational practices in American schools.

ADMN 8125. Doctoral Seminar in Instruction. (3)

Analysis of models of teaching and the match between attributes of the models and the instructional outcomes desired by the teacher.

ADMN 8130. Educational Governance and Policy Studies. (3)

Prerequisite: Admission to Ed.D. program in Educational Leadership. An examination of the institutional structure for policy-making in American education and the theories, models and practices that relate to policy-making in education.

ADMN 8140. School Finance. (3)

Prerequisite: Admission to Ed.D. in Educational Leadership or permission of instructor. An examination of the theory and operation of public school finance systems and school business administration with special attention to local, state, and federal sources of revenue and such business functions as budgeting and financing capital outlay projects.

ADMN 8150. Human Resources Development and Administration. (3)

Prerequisite: ADMN 8110 or initial licensure as school administrator. Examination of personnel administration in educational institutions, including administration of personnel at the school district level and its contribution to the overall management and operation of a school system.

ADMN 8160. Introduction to Educational Administration. (3)

Examination of behavioral components of administrative theory, organization, decision-making and planning for educational development including appraisal of significant functions, techniques, practices and problems as they relate to public school systems, social institutions, and the system of social and governmental agencies.

ADMN 8170. Introduction to the Community College. (3)

Prerequisites: Admission to a doctoral program and permission of the advisor and instructor. An overview of the two-year college with an emphasis on the comprehensive community college. Content will focus on the history and evolution of the community college including origin, culture, mission, structure, and governance. Special attention is paid to effective leadership and administration, finances, faculty, curriculum and instruction, student services and access, institutional effectiveness, community education, and economic development.

ADMN 8171. The American College Student. (3)

An examination of issues related to the contemporary American college student. The primary topics include a review of college student development theory, particularly related to identity and intellectual development, approaches to college student engagement, measures for student success, the social identity of college students, and differences among students from various higher education settings.

ADMN 8172. Higher Education in the United States. (3)

A review of the development of American higher education utilizing historical perspectives and relating them to the contemporary system. Topics include: college students, faculty, curriculum, governance, finance, and the context that informs change in American post-secondary education.

ADMN 8173. Legal Issues in Higher Education. (3)

Examination of the legal context of American higher education and current legal issues of importance to higher education leaders including legal requirements, legal rights, and legal allowances.

ADMN 8174. Higher Education Finance and Budgeting. (3)

Examination of issues at the center of contemporary discussions of higher education finance and the challenges facing the financing of higher

education. Topics include: the economic environment of higher education, tuition and affordability, regulations and compliance, budgets, and policy implications.

ADMN 8175. Non-Traditional Approaches to Higher Education. (3) New approaches to higher education that vary from the traditional higher education model. Examples include: online, for-profit, competency-based credit, corporate educational institutions, and satellite campuses in other states and countries. Access, funding, cost, quality, size, performance, and future directions of these non-traditional approaches are examined.

ADMN 8180. Teaching Strategies for Adults in a Diverse Society. (3) Explores the practice of teaching adults in its complexity and variety. It is a study of methods and techniques employed in facilitating adult learning as well as an in-depth concentration of the role of philosophical orientation on teaching. Emphasis is placed on the process of designing and delivering effective individual and group learning experiences for adult learners, applying methods to learning objectives, the examining the role of the educators and their philosophies and the influence of context on the teaching of adults.

ADMN 8181. Equity and Social Justice in Adult Education. (3) Engages learners in critical thought and discussion around issues of equity, social justice, and adult education. Through exploration of concepts such as oppression, discrimination, power, privilege, and hegemony, learners develop an understanding of how markers of difference (e.g., race, gender, class, sexual orientation, etc.) impact one's sense of fairness, pedagogy, and practice. A core aim of the course is to assist learners in understanding how equity and social justice impact adult education. Through gaining an appreciation for the theoretical underpinnings of social justice education and the manifestations of oppression that necessitated its development, learners develop a sensitivity to adult education as a collaborative endeavor that takes into account the person, the environment (both macro and micro), and the adult educator.

ADMN 8410. Advanced Internship in Educational Leadership Part I. (3) Prerequisites: ADMN 8110, ADMN 8120, ADMN 8130, and ADMN 8140. Internship experiences planned and guided cooperatively by University and school personnel, including some work in private, community, or social service organizations. Accompanying cohort seminar for integrating and synthesizing knowledge and skills useful to practicing school leaders.

ADMN 8420. Advanced Internship in Educational Leadership Part II. (3) Prerequisite: ADMN 8410. Continuation of ADMN 8410.

ADMN 8439. Practicum in Adult Education. (3) Prerequisites: ADMN 8101, admission to the doctoral program, and permission of the advisor and instructor. Explore and expand an identified area of adult education that builds on professional and/or academic experiences previously engaged in or studied. Includes a variety of activities and experiences developed by the student in consultation with the instructor. These enable students to extend skills or develop new competencies as they work with adults in selected contexts in the community. *May be repeated for credit two times.*

ADMN 8489. Practicum in Staff Development. (3) Examination of techniques of delivering in-service training and development of leadership for in-service educational programs including design and implementation of a staff development program in a school setting.

ADMN 8610. Interdisciplinary Seminar. (3) Prerequisite: Admission to Ed.D. in Educational Leadership. Ideas, values, cultures, and contemporary issues affecting society generally and education particularly and principles and practices for responding to the public with whom school leaders interact. *May be repeated for credit.*

ADMN 8660. Instructional Leadership Seminar. (3) Prerequisite: ADMN 8122. Investigation and evaluation of current trends and issues in supervision as they relate to the role of the educational leader, with special attention to the role of facilitating the teaching/learning process.

ADMN 8695. Advanced Seminar in Teaching and Learning. (3) Examination of a number of current teaching models to provide a framework for choosing those appropriate for a given classroom setting with special attention to the relationship between teaching strategies and learning outcomes.

ADMN 8699. Dissertation Proposal Seminar. (3) Prerequisite: Completion of research requirements. Identification and definition of a research area and development of a proposal draft for an original research study appropriate for the dissertation requirement.

ADMN 8800. Individual Study in Educational Administration. (1-6) Prerequisite: Permission of the student's advisor. Independent study under the supervision of an appropriate faculty member. *May be repeated for credit.*

ADMN 8999. Dissertation Research. (3) Prerequisite: Permission of Ed.D. Program Director. Execution of original research study that addresses the solution to an educational or school-related problem or that addresses a substantive educational leadership or programmatic issue.

Educational Research, Measurement, and Evaluation

- **Ph.D. in Educational Research, Measurement, and Evaluation**

Department of Educational Leadership
edld.uncc.edu

Graduate Program Director
 TBD

PH.D. IN EDUCATIONAL RESEARCH, MEASUREMENT, AND EVALUATION

The doctoral program at UNC Charlotte prepares professionals who seek advanced research, statistical, and evaluation skills for positions in a wide variety of educational institutions including higher education, K-12 school districts, for-profit companies, nonprofit agencies, community colleges, think tanks, government organizations, and other institutions concerned with solving problems in education.

The program builds on the Master of Education (M.Ed.) or comparable program. The 60-credit Ph.D. program includes 9 credit hours in foundations, 21 credit hours in research methodology and data analyses, 6 credit hours in internship, 6 credit hours of an individually designed specialty, and 9 credit hours in dissertation design and study. Additional coursework may be required for students who do not have a foundation in research.

Transfer Credit

The program accepts up to two courses as transfer from a regionally accredited doctoral granting institution, providing the Education Research Doctoral Committee determines that the course or courses to be transferred are equivalent to similar courses required in the UNC Charlotte Ph.D. program or fit the specialty area. The grade in these transfer courses must be an A or B. All of the dissertation work must be completed at UNC Charlotte.

Timelines

Students are admitted for either full-time study or intensive part-time study and begin in the fall or spring semester. Students must complete their degree, including the dissertation, within 8 years. The

minimum time for completion for a full-time student is 3 years.

Additional Admission Requirements

Applications for admission are accepted twice a year to begin doctoral studies in the Fall or Spring semester.

The following documents/activities must be submitted in support of the application:

- Official transcript(s) of all academic work attempted since high school indicating a GPA of 3.5 (on a scale of 4.0) in a graduate degree program*
- Official report of score on the GRE or MAT that is no more than 5 years old*
- At least three references* of someone who knows the applicant's current work and/or academic achievements in previous degree work
- A two page essay describing prior educational and research experiences and objectives for pursuing doctoral studies*
- A current resume or vita
- A professional writing sample (e.g., published article, manuscript submitted for publication, term paper submitted in prior coursework, abstract of thesis, teaching manual)
- International students must submit official and acceptable English language proficiency test scores on the Test of English as a Foreign Language (TOEFL), the Michigan English Language Assessment Battery (MELAB), or the International English Language Testing System (IELTS). All tests must have been taken within the past two years**

**These items are required of applicants to any of UNC Charlotte's doctoral programs.*

***See the Graduate School's website for minimum acceptable scores.*

Degree Requirements

Core Courses (9 credit hours)

ADMN 8695 Advanced Seminar in Teaching and Learning (3)
 EDCI 8180 Critical Issues and Perspectives in Urban Education (3)
 RSCH 8210 Applied Research Methods (3)

Research Methods and Advanced Content (21 credit hours)

RSCH 8110 Descriptive and Inferential Statistics (3)
 RSCH 8111 Qualitative Research Methods (3)
 RSCH 8120 Advanced Statistics (3)
 RSCH 8121 Qualitative Data Collection and Analysis (3)

RSCH 8140 Multivariate Statistics (3)
 RSCH 8196 Program Evaluation Methods (3)
 RSCH 8220 Advanced Measurement (3)

Research Specialization (9 credit hours)

Select three of the following:

RSCH 8112 Survey Research Methods (3)
 RSCH 8113 Single-Case Research (3)
 RSCH 8130 Presentation and Computer Analysis of Data (3)
 RSCH 8150 Structural Equation Modeling (3)
 RSCH 8230 Classical and Modern Test Theory (3)
 RSCH 8890 Special Topics in Research (3)
(Hierarchical Linear Modeling)

8000 level research courses from other doctoral programs across the University may be considered.

Secondary Area of Concentration (6 credit hours)

Students are required to complete a secondary concentration of their choice, with the approval of their doctoral advisor/committee. Areas may include elective courses from: (a) educational leadership; (b) curriculum and instruction; (c) statistics; (d) counseling; (e) early childhood; (f) special education; (g) instructional systems technology; and (h) higher education.

Internship (6 credit hours)

RSCH 8410 Internship in Educational Research (3)
 RSCH 8411 Internship in Teaching Educational Research (3)

Proposal Design (3 credit hours)

RSCH 8699 Dissertation Proposal Design (3)

Dissertation (minimum 6 credit hours)

RSCH 8999 Doctoral Dissertation Research (1-9)

Additional Degree Requirements

In addition to coursework and the dissertation, students must complete a portfolio of achievements related to the three focus areas of research, collaboration, and teaching. This portfolio must receive satisfactory ratings from the Portfolio Review Committee at two critical junctures known as Benchmark One and Benchmark Two. The first benchmark serves as a Qualifying Examination and includes demonstration of writing, collaboration, and research skills. The second benchmark is comparable to the comprehensive exams required by some Ph.D. programs. Students receive opportunities to build this portfolio through the Research and Practice coursework. Examples of possible products in the portfolio include: research based paper, journal article review, conference presentation, evaluation project, team study, and research report.

Dissertation Requirements

The purpose of the dissertation is for doctoral students to demonstrate their ability to synthesize the professional literature and generate new knowledge for the profession through using well-established research tools. For the Ph.D. in Education Research, Measurement, and Evaluation Education, the dissertation may be quantitative, qualitative, or mixed methods. Whatever type of design, it must adhere to current standards for quality as reflected in professional writing on the chosen method of research design and reflected in the current literature. Students must be continuously enrolled for dissertation research credits through and including the semester of graduation. Defense of the dissertation is conducted in a final oral examination that is open to the University community.

Application for Degree

Students must submit an Application for Degree during the semester in which they successfully defend their dissertation proposal. Adherence to Graduate School deadlines is expected. Degree requirements are completed when students successfully defend their dissertation and file the final copy of the dissertation in the Graduate School.

COURSES IN EDUCATIONAL RESEARCH, MEASUREMENT, AND EVALUATION (RSCH)

RSCH 6101. Research Methods. (3) Identification of logical, conceptual, and empirical research problems; application of methods and procedures, including conducting library research, interpreting research findings, and preparing reviews of related literature.

RSCH 6109. Assessment and Evaluation Methods. (3) Prerequisite: RSCH 6101 or equivalent.

Fundamentals of individual and group assessment, including selection, administration, and interpretation of norm-referenced and criterion-referenced assessment instruments and demonstration of competencies prescribed by the State of North Carolina and other professional organizational standards.

RSCH 6110. Descriptive and Inferential Statistics. (3) Prerequisite: RSCH 6101 or equivalent. Identification of objective reporting and decision-making statistics; application of descriptive and inferential methods; illustration of elementary parametric and non-parametric techniques in hypothesis testing; and, demonstration of the fundamentals of data processing.

RSCH 6120. Advanced Statistics. (3) Prerequisites: RSCH 6101 and RSCH 6110 or equivalent.

Application of advanced topics in probability and statistics as a basis for objective decision-making, with emphasis on the following practices through analysis of prepared data: multiple correlation and regression, one-way and n-way analysis of variance and covariance, advanced ANOVA designs, advanced non-parametric methods, and, selected multivariate statistical procedures.

RSCH 6130. Presentation and Computer Analysis of Data. (3) Fundamentals of data presentation and analysis using computer-based statistical packages (e.g., SPSS, SYSTAT, BMDP, SAS); application of basic descriptive statistics, correlational and associational measures, and inferential statistics emphasized in a series of analyses of prepared data; description of data sets and preparation of graphic presentations.

RSCH 6800. Independent Study in Research. (3) Faculty-directed independent study of topics not provided by other research course offerings and/or to examine, extend, and enrich extant research knowledge through supervised individual study.

RSCH 6890. Special Topics in Research. (3) Faculty-directed study and in-depth analysis of a selected area of research.

RSCH 7111. Qualitative Research Methods. (3) Cross-listed as RSCH 8111. Demonstration of historical, philosophical, biographical, ethnographic, and case study methods; location of information sources, application of methods of data collection and analysis, field techniques, and strategies for writing research results.

RSCH 7112. Survey Research Methods. (3) Cross-listed as RSCH 8112. Prerequisite: RSCH 6101 or equivalent. Techniques of survey research, including developing proposals, addressing ethical issues, selecting direct and indirect methods, preparing questionnaires, sampling, analyzing and presenting data, writing research reports, extending applications to program evaluation.

RSCH 7113. Single-Case Research. (3) In-depth study of single-case research methods, including data collection, research designs, data display and analysis, and report writing.

RSCH 7121. Qualitative Data Collection and Analysis. (3) Prerequisite: RSCH 7111 or permission of instructor. An advanced qualitative research methods course introducing various qualitative data collection and analysis techniques. Multiple analytic strategies are surveyed and compared from a range of social sciences. Also provides a practical introduction to the use of computer packages for qualitative data analysis.

RSCH 7140. Multivariate Statistics. (3) Cross-listed as RSCH 8140. Prerequisites: RSCH 6101, RSCH 6110, and RSCH 6120, or equivalent. Multiple regression, multivariate analysis of variance, discriminant function analysis, factor analysis, and other multivariate methods applied to descriptive, correlational, and experimental research problems.

RSCH 7196. Program Evaluation Methods. (3) Cross-listed as RSCH 8196. Examination of principles, strategies, and techniques of program evaluation in order to identify, clarify, and apply defensible criteria that indicate a program's value, quality, utility, effectiveness, and/or significance.

RSCH 8110. Descriptive and Inferential Statistics. (3) Prerequisite: RSCH 8210 or equivalent. Identification of objective reporting and decision-making statistics; application of descriptive and inferential methods; illustration of elementary parametric and non-parametric techniques in hypothesis testing; and, demonstration of the fundamentals of data processing.

RSCH 8111. Qualitative Research Methods. (3) Cross-listed as RSCH 7111. Demonstration of historical, philosophical, biographical, ethnographic, and case study methods; location of information sources, application of methods of data collection and analysis, field techniques, and strategies for writing research results.

RSCH 8112. Survey Research Methods. (3) Cross-listed as RSCH 7112. Prerequisite: RSCH 8210 or equivalent. Techniques of survey research, including developing proposals, addressing ethical issues, selecting direct and indirect methods, preparing questionnaires, sampling, analyzing and presenting data, writing research reports, extending applications to program evaluation.

RSCH 8113. Single-Case Research. (3) In-depth study of single-case research methods (i.e., data collection, research designs, data display and analysis, and proposal writing), using single-case research to establish evidence-based practices, and effect size metrics for single-case research.

RSCH 8120. Advanced Statistics. (3) Prerequisites: RSCH 8210 and 8110 or equivalent. Application of advanced topics in probability and statistics as a basis for objective decision-making, with emphasis on the following practices through analysis of prepared data: multiple correlation and regression, one-way and n-way analysis of variance and covariance, advanced ANOVA designs, advanced non-parametric methods, and, selected multivariate statistical procedures.

RSCH 8121. Qualitative Data Collection and Analysis. (3) Prerequisite: RSCH 8111 or permission of instructor. An advanced qualitative research methods course introducing various qualitative data collection and analysis techniques. Multiple analytic strategies are surveyed and compared from a range of social sciences. Also provides a practical introduction to the use of computer packages for qualitative data analysis.

RSCH 8130. Presentation and Computer Analysis of Data. (3) Fundamentals of data presentation and analysis using computer-based statistical packages (e.g., SPSS, SYSTAT, BMDP, SAS); application of basic descriptive statistics, correlational and associational measures, and inferential statistics emphasized in a series of analyses of prepared data; description of data sets and preparation of graphic presentations.

RSCH 8140. Multivariate Statistics. (3) Cross-listed as RSCH 7140. Prerequisites: RSCH 8210, RSCH 8110, and RSCH 8120 or equivalent. Multiple regression, multivariate analysis of variance, discriminant function analysis, factor analysis, and other multivariate methods applied to descriptive, correlational, and experimental research problems.

RSCH 8150. Structural Equation Modeling. (3) Prerequisites: RSCH 8110 and RSCH 8120, or equivalent. Applies general statistical modeling techniques to establish relationships among variables. Topics include: regression models, path analysis models, exploratory and confirmatory factor analyses, latent variables, basic steps in structural equation modeling, multiple indicators and multiple causes (MIMIC) model, multi-group model, multilevel model, mixture model, structured mean model, second order factor model, latent variable growth model, and dynamic factor model.

RSCH 8196. Program Evaluation Methods. (3) Cross-listed as RSCH 7196. Examination of principles, strategies, and techniques of program evaluation in order to identify, clarify, and apply defensible criteria that indicate a program's value, quality, utility, effectiveness, and/or significance.

RSCH 8210. Applied Research Methods. (3) Advanced study of qualitative (e.g., Case Study, Ethnography, Grounded Theory) and quantitative (e.g., Experimental, Single Subject, Descriptive, Correlational, Causal-Comparative) research methods and evaluation research approaches.

RSCH 8220. Advanced Measurement. (3) Prerequisite: RSCH 8110 or equivalent. Advanced Measurement is an overview course offered once a year and presents a wide array of higher-level information on measurement issues, including the

selection, administration and interpretation of traditional and non-traditional standardized and individually constructed tests. Topics include: classical and modern test theories and is intended as an overview for consumers of research.

RSCH 8230. Classical and Modern Test Theory. (3)

Prerequisites: RSCH 8110 or equivalent, RSCH 8220 or equivalent. Advanced level course applying the principles of classical and modern test theory. Topics include: mathematical and statistical concepts, models, assumptions, and problems of classic test theory, basic and advance concepts of item response theory, validity and reliability, test construction, test equating, and standard setting.

RSCH 8410. Internship in Educational Research. (3)

Prerequisite: RSCH 8140 or equivalent. Issues and concepts in statistical consulting, educational research design, and educational measurement are applied to practical problems in the field. This course supports the professional development of doctoral students as they gain experience applying educational research methods to research projects for school systems and related agencies.

RSCH 8411. Internship in Teaching Educational Research. (3)

Prerequisites: ADMN 8695 and RSCH 8210, or equivalents. Issues and concepts in teaching adults and preparing educational researchers are applied in the college teaching experience. This course supports doctoral students as they experience a graduated co-teaching process ultimately resulting in assumption of full college teaching responsibilities for university courses in educational research topics.

RSCH 8699. Dissertation Proposal Design. (3)

Identification and definition of a research area and development of a proposal draft for an original research study appropriate for the dissertation requirement.

RSCH 8800. Independent Study in Research. (3)

Faculty-directed independent study of topics not provided by other research course offerings and/or to examine, extend, and enrich extant research knowledge through supervised individual study.

RSCH 8890. Special Topics in Research. (3) Faculty-directed study and in-depth analysis of a selected area of research.

RSCH 8999. Dissertation. (1-9) Under the direction of a dissertation advisor and committee, students are expected to design and execute an original research study. This study should address a significant issue or program related to educational research.

Elementary Education

- **Master of Education in Elementary Education (M.Ed.)** *(for individuals with a bachelor's degree and license in Elementary Education)*
- **Master of Arts in Elementary Education (M.A.T.)** *(for individuals with an approved bachelor's degree, not in Elementary Education, who are seeking licensure and a master's degree in Elementary Education or for individuals who have completed the Graduate Certificate)*
- **Graduate Certificate in Teaching - Elementary Education**
- **Graduate Certificate in Elementary Mathematics Education**

Department of Reading and Elementary Education

reel.uncc.edu

Graduate Directors for M.Ed. Program

Dr. S. Michael Putman
Dr. Tehia Starker-Glass

Graduate Director for M.A.T. and Graduate Certificate in Teaching Program

Dr. Drew Polly

Graduate Director for Graduate Certificate in Elementary Mathematics Education

Dr. Drew Polly

Graduate Faculty

Dr. Ian Binns, Assistant Professor
Dr. Erik Byker, Assistant Professor
Dr. Elizabeth Coleman, Assistant Professor
Dr. Amy Good, Associate Professor
Dr. Michael Green, Associate Professor
Dr. Stephen D. Hancock, Associate Professor
Dr. Janice Hinson, Professor
Dr. Brian Kissel, Associate Professor
Dr. Christy Luce, Clinical Associate Professor
Dr. Erin Miller, Assistant Professor
Dr. Paola Pilonieta, Associate Professor
Dr. Drew Polly, Associate Professor
Dr. S. Michael Putman, Professor and Department Chair
Dr. Tracy Rock, Professor
Dr. Tehia Starker, Associate Professor
Dr. Bruce VanSledright, Professor

Dr. Jean Vintinner, Clinical Teaching Assistant
Professor

MASTER OF EDUCATION (M.ED.) IN ELEMENTARY EDUCATION

Description of Program

The M.Ed. in Elementary Education is designed for experienced teachers who wish to become instructional leaders, advanced practitioners, and global educators. Upon completion of the program, students will qualify for the North Carolina advanced Standard Professional II teaching license in Elementary Education.

1) Instructional Leader

This degree program enables graduates to develop leadership skills as well as specialized content knowledge to effectively impact elementary education. Graduates of this program will also be advocates for students' cultural and academic needs as well as advocates for effective and relevant educational practices and policies.

2) Advanced Practitioners

Completion of this degree program will enable graduates to acquire deep theoretical and content knowledge to become advanced practitioners in specific emphasis areas. Graduates will have the capacity to facilitate student learning through inquiry-based practices. Graduates will also possess knowledge and practice that will prepare them to enter Ph.D. programs throughout the country and world.

3) Global Educators

Graduates of this degree program will contribute to a rigorous and critical analysis of learning in their classroom, the school, and global society. The program enables graduates to promote an educational milieu that values culture, reflective practice, and multiple worldviews.

Program Goals

- Master teachers are self-directed and ethical in their personal and professional growth as educators.
- Master teachers are responsive to children's differences as influenced by development, exceptionalities, and diversity.
- Master teachers are well-grounded in the technology, content, and pedagogy of the elementary curriculum and emphasis area.
- Master teachers are effective in urban, rural, and suburban cultural contexts
- Master teachers are self-reflective, educational advocates, and educational researchers.

- Master teachers are collaborative and impactful educational leaders.
Master teachers are globally aware of the impact of local education.

Concentrations

Concentrations available in the M.Ed. in Elementary Education program include:

- Academically or Intellectually Gifted
- Elementary Mathematics
- Instructional Systems Technology (Technology Integration)
- Literacy
- Science, Technology, Engineering, and Mathematics (STEM)
- Special Education
- Teaching English as a Second Language

General Requirements for Admission to the Graduate School

Please refer to the information found in The Graduate School section of this *Catalog*.

Additional Admission Requirements

- 1) Official transcripts of all previous academic work beyond high school with a minimum undergraduate GPA of 2.75
- 2) Completion of a Bachelors in Elementary Education from an approved program
- 3) Official reports of GRE or MAT examination
- 4) An essay describing statement of purpose for undertaking graduate study
- 5) Apply online: graduateschool.uncc.edu

Degree Requirements

The M.Ed. in Elementary Education is a 33 credit hour online program. The Programs of Study include 18 credit hours of required courses and 11-15 credit hours of courses from one of the following concentrations: Academically or Intellectually Gifted; Elementary Mathematics; Instructional Systems Technology; Literacy; Science, Technology, Engineering, and Mathematics (STEM) Education, Special Education; and Teaching English to Second Language Learners.

Core Courses (18 credit hours)

Phase I. Developing Perspectives (9 credit hours)

ELED 6200 Current Issues in Global and Urban Elementary Schools (3)

ELED 6201 Theories of Human Development and Learning in Cultural Contexts (3)

ELED 6202 Classroom Management and Leadership for Diverse Learners (3)

Phase II. Collaborative Inquiry (6 credit hours)ELED 6203 Instructional Differentiation for 21st

Century Learners (3)

RSCH 6101 Research Methods (3)

Phase III. Investigative Leadership (3 credit hours)

ELED 6303 Teacher Inquiry and Data Analysis in the Elementary Classroom (3)

Concentrations (11-15 credit hours)**Academically or Intellectually Gifted***

SPED 5211 Nature and Needs of Gifted Students (3)

SPED 6124 Methods of Instructing Gifted Students (3)

SPED 6161 Social and Emotional Needs of Gifted Students (3)

SPED 6224 Adapting Curriculum Material and Classroom Differentiation (3)

**This concentration leads to the North Carolina Licensure if the student successfully completes all of the related licensure requirements.*

Elementary Mathematics*

ELED 6311 Number Systems and Operations: K-5 Mathematical Tasks (3)

ELED 6312 Geometry and Spatial Visualization: K-5 Assessment (3)

ELED 6313 Algebraic Reasoning: K-5 Discourse and Questioning (3)

ELED 6314 Rational Numbers and Operations: K-5 Learning Trajectories (3)

ELED 6315 Data Analysis and Measurement: K-5 Classroom Interactions (3)

Note: ELED 6316 (Mathematical Modeling: K-5 Leadership) must also be completed in order to earn the North Carolina Add-On License

**This concentration leads to the North Carolina Licensure if the student successfully completes all of the related licensure requirements.*

Instructional Systems Technology (Technology Integration)

(Note: This concentration is not accepting students for 2015-2016.)

EIST 6100 Readings in EIST (3)

EIST 6101 The Adult Learner (3)

EIST 6110 Instructional Design (3)

EIST 6135 Learning, Media, Resources, and Technology (3)

Literacy

READ 6100 Current Issues and Practices in Literacy Education (3)

READ 6204 Teaching Reading to English Language Learners (3)

READ 6250 Emergent and Elementary Literacy (3)

READ 6252 K-12 Writing Development and Instruction (3)

READ 6265 Multiliteracies in a Global World:

Reading and Writing Texts in New Times (3)

Science, Technology, Engineering, and Mathematics (STEM) Education

ELED 6210 Current Issues in STEM Education (3)

ELED 6211 Integrating Engineering into the Elementary School Curriculum (3)

ELED 6212 Integrating Digital Learning and STEM with Elementary School Learners (3)

ELED 6213 Global Awareness in STEM Education (3)

ELED 6214 Designing and Developing STEM Curricula (3)

Special Education

(Note: This concentration is not accepting students for 2015-2016.)

EDUC 6254 Individualizing Instruction for Diverse Learners (3)

SPED 6502 Advanced Classroom Management (3)

SPED 6503 Instructional Design in Special Education (3)

SPED 6690 Consultation and Collaboration (2)

Teaching English as a Second Language

(Note: This concentration is not accepting students for 2015-2016.)

ENGL 6161 Introduction to Linguistics (3)

TESL 5104 Authentic Assessment (3)

TESL/FLED 5130 Second Language Methods (3)

TESL 6205 Second Language Acquisition in K-12 Settings (3)

Elective Course (3 credit hours)

An elective course may include any non-required course selected from a variety of graduate-level course offerings within the College of Education, designed to support concentration, additional research courses, and advanced knowledge in specific content. Advisor approval for elective courses must be granted via permit.

Clinical Field Experiences

Students in the M.Ed. program participate in structured field experiences that require them to apply coursework in their classroom settings, analyze K-5 student learning, and reflect on their practice in the context of theories on teaching and learning. Students deepen their understanding of the knowledge, skills, and professional dispositions that foster student learning. These experiences broaden their ability to help all students learn, including children with exceptionalities and students from diverse ethnic/racial, linguistic, gender, and socioeconomic groups. These structured field experiences are designed to take place in multiple settings within the candidate's school community or districts, after-

school programs, alternate youth centers, or in the schools and classrooms in which the candidates work.

Capstone Requirements

The capstone experience for the M.Ed. will be fulfilled by successfully completing the Teacher Inquiry Project in the ELED 6303 course. Only students in their final semester of coursework are eligible to enroll in ELED 6303.

Advising

All students are assigned an advisor upon formal admission to the program. Students are required to attend the advising seminar at the start of each semester.

Licensure

The master's (M.Ed.) program in Elementary Education is a K-6 instructional degree that leads to the "M" level teaching license.

Research Opportunities/Experiences

Faculty members in the Department of Elementary Education faculty are deeply committed to research in urban schools. As a result, candidates will have opportunities to become involved in classroom-based research.

Program Approval

All teacher education programs at UNC Charlotte are accredited by the National Council for Accreditation of Teacher Education. The M.Ed. in Elementary Education is awaiting approval by North Carolina State Board of Education.

MASTER OF ARTS IN TEACHING (M.A.T.) IN ELEMENTARY EDUCATION

The Master of Arts in Teaching (M.A.T.) program is designed for individuals who hold a bachelor's degree. The M.A.T. program is a 39 credit hour program composed of two phases: the Graduate Certificate phase (Phase I) and the Master's degree completion phase (Phase II). Completion of Phase I leads to the initial Standard Professional I teaching license in Elementary Education. Phase I requires 27 credit hours of coursework, including the graduate student teaching/internship experience. Upon completion of Phase I, qualified candidates may apply for the M.A.T. in Elementary Education (Phase II). The M.A.T. in Elementary Education is a part of the University of North Carolina Distance Education Consortium (online.northcarolina.edu). Completion of the remaining requirements for the Master's degree

(Phase II) qualifies candidates for the advanced Standard Professional II teaching license. For more information on the M.A.T., visit pathwaytoteaching.com.

All courses for both phases of the Graduate Certificate/M.A.T. must be completed within six years. Coursework within Phase I/Graduate Certificate must be completed within four years.

General Requirements for Admission to the Graduate School

Please refer to the information found in The Graduate School section of this *Catalog*.

Admission Requirements for all M.A.T. programs

- 1) Completion of the Graduate Certificate in Teaching
- 2) A minimum graduate GPA of 3.5 in the Graduate Certificate in Teaching in Elementary Education
- 3) One recommendation from a full-time faculty member who taught the student in the Graduate Certificate in Teaching program
- 4) A statement of purpose
- 5) Apply online at graduateschool.uncc.edu

Degree Requirements

Phase I/Graduate Certificate Required Courses (27 credit hours)

- ELED 5101 Child Development and Instructional Design for Elementary School Learners (3)
- ELED 5201 Teaching Mathematics (3)
- ELED 5202 Integrating Curriculum for Diverse Elementary School Learners (3)
- ELED 5301 Assessing, Modifying, and Integrating Math (3)
or ELED 6255 Math CAMMP (3)
- ELED 5400 Teaching and Integrating Science (3)
- ELED 5401 Teaching and Integrating Social Studies (3)
- ELED 6470 Graduate Student Teaching/Internship in Elementary Education (3)*
- READ 5200 Teaching Reading to Primary (Grades K-2) Grade Learners (3)
- READ 5300 Teaching Reading to Intermediate (Grades 3-6) Grade Learners (3)

**Must be taken in the final semester for the initial licensure program. Can be taken with ELED 5400.*

Phase II/Completion of the M.A.T. Required Courses (12 credit hours)

- ELED 6202 Classroom Management and Leadership for Diverse Learners (3)*
- ELED 6203 Instructional Differentiation for 21st Century Learners (3)*

ELED 6303 Teacher Inquiry and Data Analysis in the Elementary Classroom (3)* (Capstone Course)**
 RSCH 6101 Research Methods (3)

*Requires employment as an elementary teacher.

**Must be taken in the final semester of the program.

Clinical Field Experiences

All courses require students to develop their knowledge, skills, and dispositions in public school/agency settings. *During Phase I of the program, all students are expected to complete clinical experiences in at least three significantly different settings.*

Clinical field experiences provide opportunities for helping all students learn, including children with exceptionalities and students from diverse ethnic/racial, linguistic, gender, and socioeconomic groups. During clinical experiences, students apply theories and understandings gained in coursework, analyze K-6 student learning, and develop the ability to positively impact all learners. Each course in Phase I of the program requires 20 clinical hours. These structured experiences can take place in multiple settings such as neighboring schools or districts, after-school programs, or in the schools and classrooms in which the candidates work. All elementary education courses in Phase II of the program require employment as an elementary teacher as extensive action research is done in the classroom setting.

Candidates who are lateral entry teachers and teacher assistants must move beyond their own classrooms and schools for at least two clinical experiences. Alternative settings must be approved by the instructor. A limited number of clinical experiences may be approved in *significantly different* classrooms within their school of employment. Employed candidates are encouraged to seek assistance and support from their administrators.

Internship/Student Teaching

The graduate-level student teaching/internship is the culminating experience in Phase I of the M.A.T., offering students the opportunity to demonstrate their readiness for the initial Standard Professional I teaching license. Students are assigned to an appropriate classroom for a full-time, semester-long experience under the supervision of the classroom teacher and University faculty. Lateral entry teachers and teacher assistants must contact the Office of Field Experiences to determine the appropriateness of their classroom for the student teaching/internship experience and licensure requirements. This contact should take place at least one semester before student teaching.

Elementary education courses taken in Phase II of the M.A.T. require employment as an elementary teacher.

Capstone Requirements

The capstone experience for the M.A.T. will be fulfilled by successfully completing the Teacher Inquiry Project in the ELED 6303 course.

Advising

All students are assigned an advisor upon formal admission to the program. Students should consult with their advisors at least once each semester.

Licensure

Upon successful completion of the Phase I/Graduate Certificate, students will be recommended for the North Carolina initial Standard Professional I teaching license. For this initial license, students are required to complete an electronic licensure portfolio that is created during coursework and student teaching. Upon successful completion of Phase II, students will be recommended for the North Carolina advanced Standard Professional II teaching license. For the advanced license, students are required to complete an advanced electronic licensure portfolio during coursework.

Research Opportunities/Experiences

Faculty members in the Department of Reading and Elementary Education are deeply committed to research in urban schools. As a result, candidates will have opportunities to become involved in practical and meaningful classroom-based research.

Program Approval

All teacher education programs at UNC Charlotte are accredited by the National Council for Accreditation of Teacher Education. The M.A.T. in Elementary Education has been approved by the North Carolina State Board of Education.

GRADUATE CERTIFICATE IN TEACHING: ELEMENTARY EDUCATION

The Graduate Certificate in Teaching: Elementary Education is a 27 credit hour program designed for students who hold a bachelor's degree. Upon successful completion of the Graduate Certificate, students are eligible for the North Carolina Standard Professional I teaching license.

The required courses for the Graduate Certificate are identical to Phase I of the M.A.T. Upon completion of the Graduate Certificate, qualified students have the option of continuing into Phase II to complete the

M.A.T. Admission to the Graduate Certificate is separate and distinct from admission to a graduate degree program and not an indication of automatic admission to the M.A.T. degree program. For more information on this option, refer to the M.A.T. section above.

All courses for the Graduate Certificate must be completed within four years.

General Requirements for Admission to the Graduate School

Please refer to the information found in The Graduate School section of this *Catalog*.

Admission Requirements for all Graduate Certificates in Teaching Programs

- 1) An undergraduate degree from a regionally accredited four-year institution
- 2) A cumulative undergraduate GPA of 3.0. [For alternative ways to demonstrate academic competence, contact the Office of Teacher Education Advising, Licensure, and Recruitment (TEALR)]
- 3) Three recommendations from persons knowledgeable of your interaction with children or youth
- 4) Statement of purpose
- 5) Clear criminal background check
- 6) Apply online at graduateschool.uncc.edu

Program Requirements

- ELED 5101 Child Development and Instructional Design for Elementary School Learners (3)
 ELED 5201 Teaching Mathematics (3)
 ELED 5202 Integrating Curriculum for Diverse Elementary School Learners (3)
 ELED 5301 Assessing, Modifying, and Integrating Math (3)**
 ELED 5400 Teaching and Integrating Science (3)
 ELED 5401 Teaching and Integrating Social Studies (3)
 ELED 6470 Graduate Student Teaching/Internship in Elementary Education (3)*
 READ 5200 Teaching Reading to Primary (Gr. K-2) Grade Learners (3)
 READ 5300 Teaching Reading to Intermediate (Gr. 3-6) Grade Learners (3)

**Must be taken in the final semester for the initial licensure program. Can be taken with ELED 5400.*

***May substitute ELED 6255 for ELED 5301*

Clinical Field Experiences

All courses require students to develop their knowledge, skills, and dispositions in public school/agency settings. *During the Graduate Certificate in Elementary Education program, all*

students are expected to complete clinical experiences in at least three significantly different settings.

Clinical field experiences provide opportunities for helping all students learn, including children with exceptionalities and students from diverse ethnic/racial, linguistic, gender, and socioeconomic groups. During clinical experiences, students apply theories and understandings gained in coursework, analyze K-6 student learning, and develop the ability to positively impact all learners. Each course in the program requires 20 clinical hours. These structured experiences can take place in multiple settings such as neighboring schools or districts, after-school programs, or in the schools and classrooms in which the candidates work.

Candidates who are lateral entry teachers and teacher assistants must move beyond their own classrooms and schools for at least two clinical experiences. Alternative settings must be approved by the instructor. A limited number of clinical experiences may be approved in *significantly different* classrooms within their school of employment. Employed candidates are encouraged to seek assistance and support from their administrators.

Internship/Student Teaching

The graduate-level student teaching/internship is the culminating experience of the Graduate Certificate program, offering students the opportunity to demonstrate their readiness for the initial Standard Professional I teaching license. A GPA of 3.0 or above in the graduate certificate coursework is required to be eligible for the student teaching/internship. Students are assigned to an appropriate classroom for a full-time, semester-long experience under the supervision of the classroom teacher and University faculty. Lateral entry teachers and teacher assistants must contact the Office of Field Experiences to determine the appropriateness of their classroom for the student teaching/internship experience and licensure requirements. This contact should take place at least one semester before student teaching. The prerequisite for the student teaching/internship is completion of all program coursework, a GPA of 3.0 or above, an application for the course by the established deadline, and approval of the department.

Advising

All students are assigned an advisor upon formal admission to the program. Students should consult with their advisors at least once each semester.

Licensure

Upon successful completion of the Phase I/Graduate Certificate, students will be recommended for the

North Carolina Standard Professional I teaching license. For this license, students are required to complete an electronic licensure portfolio that is created during coursework and student teaching.

Program Approval

All teacher education programs at UNC Charlotte are accredited by the National Council for Accreditation of Teacher Education. The Graduate Certificate in Elementary Education has been approved by North Carolina State Board of Education.

GRADUATE CERTIFICATE IN ELEMENTARY MATHEMATICS EDUCATION

The Graduate Certificate in Elementary Mathematics Education is an 18 credit hour program designed for students who hold a North Carolina Teaching License with either certification in Elementary Education (Grades K-6) **OR** Middle Grades Education (Grades 6-8) and certified in Middle Grades Mathematics.

Upon successful completion of the Graduate Certificate, students are eligible for the North Carolina Add-on License in Elementary School Mathematics.

Upon completion of the Graduate Certificate, qualified students have the option of applying to the M.Ed. in Elementary Education program. Admission to the Graduate Certificate program is separate and distinct from admission to a graduate degree program and not an indication of automatic admission to the M.Ed. degree program. For more information on this option, refer to the M.Ed. section above.

All courses for the Graduate Certificate must be completed within four years.

General Requirements for Admission to the Graduate School

Please refer to the information found in The Graduate School section of this *Catalog*.

Admission Requirements for all Graduate Certificate programs

- 7) An undergraduate degree from a regionally accredited four-year institution
- 8) A cumulative undergraduate GPA of 3.0. [For alternative ways to demonstrate academic competence, contact the Office of Teacher Education Advising, Licensure, and Recruitment (TEALR)]
- 9) A North Carolina teaching license in Elementary Education (Grades K-6) **OR** Middle Grades

Education (Grades 6-8) and certified in Middle Grades Mathematics.

- 10) Three recommendations from persons knowledgeable of your interaction with children or youth, including a current administrator at the school in which you work.
- 11) Clear criminal background check
- 12) Apply online at <http://graduateschool.uncc.edu>

Program Requirements

- ELED 6311 Number Systems and Operations: K-5 Mathematical Tasks
- ELED 6312 Geometry and Spatial Visualization: K-5 Assessment
- ELED 6313 Algebraic Reasoning: K-5 Discourse and Questioning
- ELED 6314 Rational Numbers and Operations: K-5 Learning Trajectories
- ELED 6315 Data Analysis and Measurement: K-5 Classroom Interactions
- ELED 6316 Mathematical Modeling: K-5 Leadership

Clinical Field Experiences

Most courses require students to develop their knowledge, skills, and dispositions in public school/agency settings. *During the Graduate Certificate in Elementary Mathematics Education program, all students are expected to complete clinical experiences in elementary school settings.*

Clinical field experiences provide opportunities for helping all students learn, including children with exceptionalities and students from diverse ethnic/racial, linguistic, gender, and socioeconomic groups. During clinical experiences, students apply theories and understandings gained in coursework, analyze P-12 student learning, and develop the ability to positively impact all learners. Each course in the program requires 20 clinical hours. These structured experiences can take place in multiple settings such as neighboring schools or districts, after-school programs, or in the schools and classrooms in which the candidates work.

Candidates who are lateral entry teachers and teacher assistants must move beyond their own classrooms and schools for at least two clinical experiences. Alternative settings must be approved by the instructor. A limited number of clinical experiences may be approved in *significantly different* classrooms within their school of employment. Employed candidates are encouraged to seek assistance and support from their administrators.

Advising

All students are assigned an advisor upon formal admission to the program. Students should consult with their advisors at least once each semester.

Licensure

Upon successful completion of the Graduate Certificate, students will be recommended for the North Carolina Standard Professional I teaching license. For this license, students are required to complete an electronic licensure portfolio that is created during coursework and student teaching.

Program Approval

All teacher education programs at UNC Charlotte are accredited by the National Council for Accreditation of Teacher Education. The Graduate Certificate in Elementary Education has been approved by North Carolina State Board of Education.

COURSES IN ELEMENTARY EDUCATION (ELED)

ELED 5101. Child Development and Instructional Design for Elementary School Learners. (3)

Prerequisite: Admittance into Elementary Education Graduate Certificate in Teaching program. Models of child development and learning theories with application for the design of instruction for elementary education learner. *Requires extensive clinical experiences.*

ELED 5201. Teaching Mathematics. (3) Basic methodology in teaching mathematics from a constructivist perspective, with examination of other perspectives related to major models of teaching. Examination of the K-6 mathematics curriculum and instructional materials with reference to curriculum integration and to developmental stages of learning and the impact of diversity in mathematics instruction. Emphasis on basic, effective teaching strategies and organizational patterns expected to be used in the schools. Includes attention to prospective teachers' mathematical knowledge. *Requires extensive clinical experiences.*

ELED 5202. Integrating Curriculum for Diverse Elementary School Learners. (3) Prerequisite: ELED 5101. Examination of models, approaches, and best practices for effective curriculum integration for all students, including children identified with special needs, second language learners, and students performing above or below the general classroom population.

ELED 5301. Assessing, Modifying, and Integrating Mathematics Instruction. (3) Application, refinement, and expansion of pedagogical knowledge gained in the first mathematics pedagogy course, with focus upon assessment of student learning, evaluation of effectiveness of instruction, and modification of methods

and materials for diverse learners. Closer examination of performance expectations by grade level, EOG testing, and effective instruction for struggling learners. Continued expectation for curriculum integration and use of models of teaching as an organizer for understanding instruction, assessment, and modifications. Applications of technology in mathematics instruction. Design, implementation, and evaluation of math lessons and brief mathematics-centered integrated unit. *Requires extensive clinical experiences.*

ELED 5400. Teaching and Integrating Science. (3)

Examines the K-6 science curriculum and instructional materials with reference to curriculum integration, developmental stages of learning, and the impact of diversity in science instruction. Emphasis on basic, effective teaching strategies and organizational patterns expected to be used in the schools. Includes attention to prospective teachers' background knowledge as well as teaching competencies in all aspects of the K-6 NC science curriculum. Applications of technology in science instruction. Design, implementation, and evaluation of science lessons and brief science-centered integrated unit. Evaluation of student learning and strategies for instructional modifications for diverse learners. *Requires extensive clinical experiences.*

ELED 5401. Teaching and Integrating Social Studies. (3)

Examines the K-6 social studies curriculum and instructional materials with reference to curriculum integration and to developmental stages of learning and the impact of diversity in social studies instruction. Emphasis on basic, effective teaching strategies and organizational patterns expected to be used in the schools. Includes attention to prospective teachers' background knowledge as well as teaching competencies in all aspects of the K-6 NC social studies curriculum. Applications of technology in social studies instruction. Design, implementation, and evaluation of social studies lessons and brief social studies-focused integrated unit. Evaluation of student learning and strategies for instructional modifications for diverse learners. *Requires extensive clinical experiences.*

ELED 6000. Topics in Elementary Education. (1-6)

May include classroom and/or clinic experiences in the content area. *May be repeated for credit with permission of department.*

ELED 6101. Applications of Theories of Human Development and Learning. (3) Review of paradigms of human development theory as a basis for identifying and clarifying teachers' beliefs about development and learning. Analysis and subsequent improvement of alignment of teachers' instructional practices to their chosen theoretical paradigms.

ELED 6111. Critical Issues in Elementary Education.

(3) Three categories of instructor-and student-selected issues: government, governance, and the elementary schools; changing educational roles of professional educators, parents, and children; and the evolving missions of elementary schools. Focus on the self as learner and the re-examination of one's beliefs, teaching practices, and learning in multiple contexts.

ELED 6200. Current Issues in Global and Urban Elementary Schools.

(3) Prerequisite: Admission to M.Ed. in Elementary Education program. Candidates demonstrate an understanding of global, civic, and urban issues that impact local teaching and learning ideals. The course is reading and writing intensive, as candidates are required to reflect on and analyze instruction for diverse learners using a variety of flexible and adaptable instructional methods appropriate for learning in a globalized educational context.

ELED 6201. Theories of Human Development and Learning in Cultural Contexts.

(3) Prerequisites: Admission to M.Ed. in Elementary Education program. Requires candidates to critically analyze child, adolescent, and cognitive development to determine developmental needs in an effort to design relevant yet rigorous instruction. Candidates are also required to critically examine paradigms and theories of development, conceptual relationships between education and developmental paradigms, the concepts of learning and development, and the roles and responsibilities of school staff for meeting children's developmental and cultural needs.

ELED 6202. Classroom Management and Leadership for Diverse Learners.

(3) Prerequisite: Completion of Graduate Certificate in Teaching: Elementary Education; admission to the M.A.T or M.Ed. in Elementary Education program; and employment as an elementary teacher. Examination of theory, models, and best practices in classroom management, with focus on management of special populations of students. Emphasis on demonstrating best practices of classroom management models of instruction through professional development leadership.

ELED 6203. Instructional Differentiation and Leadership for 21st Century Learners.

(3) Prerequisite: Admission to the M.A.T or M.Ed. in Elementary Education program; and employment as an elementary teacher. Examination of models, approaches, and best practices for effective instructional differentiation for diverse learning needs of elementary school students.

ELED 6210. Current Issues in STEM Education.

(3) Examination of current issues related to Science, Technology, Engineering, and Mathematics (STEM)

Education. Requires approximately 8-9 hours each week. Out-of-class work may include, but is not limited to: required reading, critical analysis of literature, research papers, and projects related to STEM issues related to elementary school learners.

ELED 6211. Integrating Engineering into the Elementary School Curriculum.

(3) An analysis of engineering concepts related to the science standards taught in Grades K-6 in North Carolina Public Schools. The Engineering is Elementary curriculum and other related resources is examined in depth. Analysis of how science, technology, and mathematics can be integrated with engineering is emphasized.

ELED 6212. Integrating Digital Learning and STEM with Elementary School Learners.

(3) Examination of digital learning (e.g., web-based tools, digital videos) to support the teaching of STEM education. Students analyze a real-world problem, analyze digital learning tools, plan and implement a lesson around the real-world problem using digital learning tools.

ELED 6213. Global Awareness in STEM Education.

(3) Examination of global awareness, humanities, and the environment in the context of STEM Education. Students research, reflect on, and apply knowledge related to Earth and the environment in relationship to issues and trends related to STEM.

ELED 6214. Designing and Developing STEM Curricula.

(3) Analysis of critical components of designing, developing, and implementing a multi-lesson unit related to a real-world issue in STEM education. Students design, teach, and assess the impact of STEM curricula that they develop. Students also design professional development around the curricula they develop.

ELED 6221. Teaching and Learning K-6 Science.

(3) Prerequisite: Completion of Phase One. Critical reading and use of the literature in science education, examination of science content taught in the elementary school, multiple models and approaches for teaching and assessing learning in science, required action research project.

ELED 6241. Teaching and Learning K-6 Social Studies.

(3) Prerequisite: Completion of Phase One. Critical reading and use of the literature in social studies education, examination of social studies content taught in the elementary school, multiple models and approaches for teaching and assessing learning in social studies, required action research project.

ELED 6251. Teaching and Learning Mathematics.

(3) Prerequisite: Core requirements. Examination of the

K-6 mathematics curriculum, including a critical analysis of research literature related to problem solving processes and mathematics learning.

ELED 6252. Teaching and Learning K-6 Mathematics.

(3) Prerequisite: Completion of Phase One. Critical reading and use of the literature in mathematics education, examination of mathematics content taught in the elementary school, multiple models and approaches for teaching and assessing learning in mathematics, required action research project.

ELED 6255. Math CAMMP. (3) CAMMP stands for Computer Applications and Manipulative Mathematics Program. Examination of constructivism in K-8 mathematics teaching, with emphasis on concrete, representational, and symbolic manipulatives; developmentally appropriate computer software; developmentally appropriate instructional tactics; and preparing a thematic instructional module. The course culminates in a week long practicum with elementary students.

ELED 6303. Teacher Inquiry and Data Analysis in the Elementary Classroom. (3) Prerequisite: Admission to the M.A.T. or M.Ed. in Elementary Education program; and employment as an elementary teacher. This is the capstone experience in the M.A.T. and M.Ed. programs and, thus, must be taken in the final semester of the program. The examination of data-driven instructional decision making and the use of research to improve student learning. Requires application of advanced content knowledge, instructional planning, and student assessment data in the creation of a capstone experience.

ELED 6311. Number Systems and Operations: K-5 Mathematical Tasks. (3) Prerequisite: Admission to the Elementary School Mathematics Add-on Licensure or M.Ed. in Elementary Education program. Analysis and construction of effective mathematical tasks in teaching number systems and operations at the K-5 level. Attention is also given to the expansion of content knowledge.

ELED 6312. Geometry and Spatial Visualization: K-5 Assessment. (3) Prerequisites: ELED 6311 and admission to the Elementary School Mathematics Add-on Licensure or M.Ed. in Elementary Education program. Formative and summative assessment strategies of students' geometric thinking in elementary grades; concept development of 2- and 3-dimensional geometry. Attention also given to diagnosis of student errors.

ELED 6313. Algebraic Reasoning: K-5 Discourse and Questioning. (3) Prerequisites: ELED 6311 and admission to the Elementary School Mathematics

Add-on Licensure or M.Ed. in Elementary Education program. Focus on the early algebra concepts of functional thinking and generalized arithmetic in relationship to pedagogical practices centered on questioning in the mathematics classroom.

ELED 6314. Rational Numbers and Operations: K-5 Learning Trajectories. (3) Prerequisites: ELED 6311 and admission to the Elementary School Mathematics Add-on Licensure or M.Ed. in Elementary Education program. Focus on rational number concepts through learning trajectories at the K-5 level. Attention also given to problem solving and content knowledge.

ELED 6315. Data Analysis and Measurement: K-5 Classroom Interactions. (3) Prerequisites: ELED 6311 and admission to the Elementary School Mathematics Add-on Licensure or M.Ed. in Elementary Education program. Focus on statistical literacy of elementary teachers and the teaching of data analysis and measurement to K-5 students. Attention is also given to learning methods which facilitate appropriate classroom interactions.

ELED 6316. Mathematical Modeling: K-5 Leadership. (3) Prerequisites: ELED 6311, 6312, 6313, 6314, and 6315; and admission to the Elementary School Mathematics Add-on Licensure or M.Ed. in Elementary Education program. Generating mathematical representations and making explicit connections between concepts. Pedagogy designed to equip elementary teachers to become mathematics teacher-leaders in school settings. Focus given to topics integrated within mathematical strands.

ELED 6470. Graduate Student Teaching/Internship in Elementary Education. (3) Prerequisite: Completion of all program coursework required for eligibility to student teach, an application for the course by the established deadline, and approval of the department. Requires a full-time, semester-long graduate student teaching experience in an elementary education classroom. Includes formal observations in the intern's classroom by University faculty and/or school-based supervisors and face-to-face seminars.

ELED 6800. Individual Study in Elementary Education. (1-6) Prerequisite: Permission of the student's advisor. Independent study under the supervision of an appropriate faculty member. *May be repeated for credit.*

COURSES IN READING, LANGUAGE, AND LITERACY (READ)

See the Reading Education heading within this section for READ course descriptions.

Foreign Language Education

- **Master of Arts in Teaching (M.A.T.) in Foreign Language Education**
- **Graduate Certificate in Teaching in Foreign Language Education**

Department of Middle, Secondary, and K-12 Education

mdsk.uncc.edu

Graduate Director

Dr. Scott Kissau

Graduate Faculty

Middle, Secondary, and K-12 Education

Dr. Hilary Dack, Assistant Professor

Dr. Charles Hutchison, Professor

Dr. Jeanneine Jones, Professor

Dr. Scott Kissau, Associate Professor and Department Chair

Dr. Lan Kolano, Professor

Dr. Joan Lachance, Assistant Professor

Dr. Teresa Petty, Associate Professor

Dr. Spencer Salas, Associate Professor

Dr. Michelle Stephan, Associate Professor

Languages and Culture Studies

Dr. Anabel Aliaga-Buchenu, Associate Professor

Dr. José Manuel Batista, Associate Professor

Dr. Michèle Bissière, Associate Professor

Dr. Carlos Coria-Sánchez, Associate Professor

Dr. Michael Scott Doyle, Professor

Dr. Concepción deGodev, Associate Professor

Dr. Jeffrey Killman, Assistant Professor

Dr. Maryrica Ortiz Lottman, Associate Professor

Dr. Samuel Monder, Associate Professor

Dr. Anton Pujol, Associate Professor

Dr. Allison Stedman, Associate Professor

Dr. Katherine Stephenson, Associate Professor

MASTER OF ARTS IN TEACHING (M.A.T.) IN FOREIGN LANGUAGE EDUCATION

The Master of Arts in Teaching (M.A.T.) in Foreign Language Education (French, German, or Spanish) program is designed for individuals with a Bachelor's degree and one of the following requirements: 1) a major in French, German, or Spanish; 2) the

equivalent of a major in French, German, or Spanish via the completion of 24 credit hours of instruction in the foreign language (note: at least two courses must have been taken at the 4000 level); or 3) be a native speaker of the foreign language and obtain passing scores on the corresponding Praxis II exam. The M.A.T. program is a 39 credit hour program composed of two phases: the Graduate Certificate in Teaching phase (Phase I) and the Master's degree completion phase (Phase II). Completion of Phase I of the M.A.T. leads to the initial Standard Professional I teaching license in French, German, or Spanish. Phase I requires 21 credit hours of coursework, including the graduate student teaching/internship experience. Upon completion of Phase I, qualified candidates may apply to continue into Phase II to complete the remaining requirements for the Master's degree and qualify for the advanced Standard Professional II teaching license. For more information on the M.A.T. at UNC Charlotte, please visit pathwaytoteaching.com.

All courses for both phases of the M.A.T. must be completed within six years. Coursework within Phase I/Graduate Certificate must be completed within four years.

General Requirements for Admission to the Graduate School

Please refer to admission information in the Graduate School section of this Catalog.

Admission Requirements for all M.A.T. programs

- 1) Completion of the Graduate Certificate in Teaching
- 2) A minimum graduate GPA of 3.5 in the Graduate Certificate in Teaching
- 3) One recommendation from a full-time faculty member who has taught you in the Graduate Certificate in Teaching program
- 4) A statement of purpose

The admission process includes the Application for Graduation from the Graduate Certificate program. Interested applicants may apply online at graduateschool.uncc.edu.

Students with a GPA below 3.5 in the Graduate Certificate phase may be considered for admission to the M.A.T. program with scores above the 30th percentile on either the GRE or Miller Analogies Test.

License in K-12 French, German, or Spanish

Degree Requirements

Phase I/ Graduate Certificate in Teaching Required Courses (21 credit hours)

MDSK 6162 Planning for K-12 Instruction (3)

Diversity Course

Select one of the following:

EDUC 5100 Diverse Learners (3) or

TESL 6204 Multicultural Education (3)

Methods Courses

FLED 5200 Secondary Methods - Foreign Languages (3)

FLED 5201 K-8 Methods - Foreign Languages (3)

Reading Course

Select one of the following:

READ 5255 Integrating Reading and Writing in the Content Areas (3) or

READ 6204 Teaching Reading to English Language Learners (3)

Advanced Level (5000-6999) Foreign Language Literature or Foreign Language Culture Course

Select one of the following:

FREN 5XXX One graduate level French literature or French culture course (3) or

GERM 5XXX One graduate level German literature or German culture course (3) or

SPAN 5XXX-6XXX One graduate level Spanish literature or Spanish culture course (3)

Internship

FLED 6470 Graduate Student Teaching Internship (3)*

**FLED 6470 is a full time internship requiring employment as a French, German, or Spanish teacher in an approved school or a non-paid placement with a licensed French, German, or Spanish teacher in a public school. It requires application and approval during the semester prior to the internship. Prior to applying for the internship, teacher-candidates must demonstrate advanced foreign language skills by obtaining a minimum score of Advanced Low on the Oral Proficiency Interview (OPI).*

Phase II/ Completion of the M.A.T. Required Courses (18 credit hours)

Specialized Pedagogy Course

Select one of the following:

TESL 6206 Globalization, Communities, and Schools (3)

MDSK 6220 Adolescence and Learning (3)

Advanced Level (5000-6000) Foreign Language Literature or Foreign Language Culture Course

Select one of the following:

FREN 5XXX One graduate level French course (3)

GERM 5XXX One graduate level German course (3)

SPAN 5XXX-6XXX One graduate level Spanish course (3)

Methods Courses

RSCH 6101 Research Methods (3)

FLED 6200 Advanced Methods of Teaching Foreign Languages (3)

Final Courses to be Taken in Phase II

MDSK 6260 Principles of Teacher Leadership (3)

MDSK 6691 Seminar in Professional Development (3)

Electives or Content Background Requirements

To be accepted into Phase I of the M.A.T in French, German, or Spanish Program, candidates must fulfill one of the following content background requirements:

- 1) Have completed a bachelor's degree majoring in French, German, or Spanish
- 2) Have completed a bachelor's degree and the equivalent of a major in French, German, or Spanish via the completion of 24 credit hours of instruction in the foreign language (note: at least two courses must have been taken at the 4000 level)
- 3) Be a native speaker of French, German, or Spanish and obtain a passing score on the corresponding Praxis II exam

Capstone Requirements

The capstone experience for the M.A.T. will be fulfilled by completing the Comprehensive Electronic Portfolio project. In addition, candidates for the M.A.T will complete an electronic licensure portfolio during coursework that demonstrates their readiness for the advanced Standard Professional II teaching license.

Clinical Field Experiences

Most courses require students to develop their knowledge, skills, and dispositions in public school/agency settings. All students are expected to complete clinical experiences in at least two significantly different settings. Clinical field experiences provide opportunities for helping all students learn, including children with exceptionalities and students from diverse ethnic/racial, linguistic, gender, and socioeconomic groups. During clinical experiences, students apply theories and understandings gained in coursework,

analyze P-12 student learning, and develop the ability to positively impact all learners. All students are expected to complete clinical experiences in at least two different settings. These structured experiences can take place in multiple settings such as neighboring schools or districts, day care centers and after-school programs, alternate youth centers, or in the schools and classrooms in which the candidates work.

Candidates who are lateral entry teachers and teacher assistants must move beyond their own classrooms and schools for at least two clinical experiences. Alternative settings must be approved by the instructor. A limited number of clinical experiences may be approved in significantly different classrooms within their school of employment. Employed candidates are encouraged to seek assistance and support from their administrators.

Internship/Student Teaching

The graduate-level student teaching/internship is the culminating experience in Phase I of the M.A.T., offering students the opportunity to demonstrate their readiness for the initial Standard Professional I teaching license. Students are assigned to an appropriate classroom for a full-time, semester-long experience under the supervision of the classroom teacher and University faculty. Lateral entry teachers and teacher assistants must contact the Office of Field Experiences to determine the appropriateness of their classroom for the student teaching/internship experience and licensure requirements. This contact should take place at least one semester before student teaching.

There is no required internship for Phase II of the M.A.T.

Advising

All students are assigned an advisor upon formal admission to the program. Students should consult with their advisors at least once each semester.

Licensure

Upon successful completion of the Phase I/Graduate Certificate, students will be recommended for the North Carolina initial Standard Professional I teaching license. For this initial license, students are required to complete an electronic licensure portfolio that is created during coursework and student teaching. Upon successful completion of Phase II, students will be recommended for the North Carolina advanced Standard Professional II teaching license. For the advanced license, students are required to complete an advanced electronic licensure portfolio during coursework.

Program Approval

All teacher education programs at UNC Charlotte are accredited by the National Council for Accreditation of Teacher Education and approved by the North Carolina State Board of Education.

GRADUATE CERTIFICATE IN TEACHING IN FOREIGN LANGUAGE EDUCATION

The Graduate Certificate in Teaching in Foreign Language Education (French, German, or Spanish) is a 21 credit hour program. Upon successful completion of the Graduate Certificate, students are eligible for the North Carolina initial Standard Professional I teaching license. All courses for the Graduate Certificate in Teaching must be completed within four years.

General Requirements for Admission to the Graduate School

Please refer to admission information in the Graduate School section of this Catalog.

Admission Requirements for all Graduate Certificates in Teaching Programs

- 1) An undergraduate degree from a regionally accredited four-year institution
- 2) A cumulative undergraduate GPA of 3.0. [For alternative ways to demonstrate academic competence, contact the Office of Teacher Education Advising, Licensure, and Recruitment (TEALR).]
- 3) Three recommendations from persons knowledgeable of your interaction with children or youth
- 4) Statement of purpose
- 5) Clear criminal background check
- 6) Apply online at graduateschool.uncc.edu

Admission Requirements for Foreign Language Education

To be accepted into the Graduate Certificate in Teaching French, German, or Spanish program candidates must hold a bachelor's degree and fulfill one of the following content background requirements:

- 1) Major in French, German, or Spanish
- 2) Equivalent of a major in French, German, or Spanish via the completion of 24 credit hours of instruction in the foreign language (note: at least two courses must have been taken at the 4000 level)

- 3) Be a native speaker of French, German, or Spanish and obtain a passing score on the corresponding Praxis II exam

Certificate Requirements

Phase I/Graduate Certificate in Teaching Required Courses (21 credit hours)
MDSK 6162 Planning for K-12 Instruction (3)

Diversity Course

Select one of the following:
EDUC 5100 Diverse Learners (3)
TESL 6204 Multicultural Education (3)

Methods Courses

FLED 5200 Secondary Methods - Foreign Languages (3)
FLED 5201 K-8 Methods - Foreign Languages (3)

Reading Course

Select one of the following:
READ 5255 Integrating Reading and Writing in the Content Areas (3)
READ 6204 Teaching Reading to English Language Learners (3)

Advanced Level (5000-6999) Foreign Language Literature or Foreign Language Culture Course

Select one of the following:
FREN 5XXX One graduate level French literature or French culture course (3)
GERM 5XXX One graduate level German literature or German culture course (3)
SPAN 5XXX-6XXX One graduate level Spanish literature or Spanish culture course (3)

Internship

This course is a full-time internship requiring employment as a French, German, or Spanish teacher in an approved school or a non-paid placement with a licensed French, German, or Spanish teacher in a public school. It requires application and approval during the semester prior to the internship. Prior to applying for the internship, teacher-candidates must demonstrate advanced foreign language skills by obtaining a minimum score of Advanced Low on the Oral Proficiency Interview (OPI).

FLED 6470 Graduate Student Teaching and Internship - Foreign Language Education (3)

Clinical Field Experiences

Most courses require students to develop their knowledge, skills, and dispositions in public school settings. These experiences broaden their ability to help all students learn, including children with exceptionalities and students from diverse ethnic/racial, linguistic, gender, and socioeconomic

groups. During clinical experiences, students apply theories and understandings gained in coursework, analyze P-12 student learning, and develop the ability to positively impact all learners. All students are expected to complete clinical experiences in at least two significantly different settings.

Candidates who are lateral entry teachers and teacher assistants must move beyond their own classrooms and schools for at least two clinical experiences. Alternative settings must be approved by the instructor and may include schools on different schedules, after-school and summer programs, Saturday programs, private, and charter schools. A limited number of clinical experiences may be approved in significantly different classrooms within their school of employment. Employed candidates are encouraged to seek assistance and support from their administrators.

Internship/Student Teaching

The graduate-level student teaching/internship is the culminating experience of the Graduate Certificate program, offering students the opportunity to demonstrate their readiness for the initial Standard Professional I teaching license. Students are assigned to an appropriate classroom for a full-time, semester-long experience under the supervision of the classroom teacher and University faculty. Lateral entry teachers and teacher assistants must contact the Office of Field Experiences to determine the appropriateness of their classroom for the student teaching/internship experience and licensure requirements. This contact should take place at least one semester before student teaching. Prior to student teaching, foreign language education teacher-candidates must demonstrate advanced French, German, or Spanish language skills by obtaining a minimum score of Advanced-low on the related Oral Proficiency Interview (OPI).

Advising

All students are assigned an advisor upon formal admission to the program. Students should consult with their advisors at least once each semester.

Licensure

Upon successful completion of the Phase I/Graduate Certificate, students will be recommended for the North Carolina initial Standard Professional I teaching license. For this license, students are required to complete an electronic licensure portfolio that is created during coursework and student teaching.

Program Approval

All teacher education programs at UNC Charlotte are accredited by the National Council for Accreditation

of Teacher Education and approved by the North Carolina State Board of Education.

COURSES IN FOREIGN LANGUAGE EDUCATION (FLED)

FLED 5200. Secondary Methods – Foreign Languages.

(3) Prerequisites: Admission to the Graduate Certificate in Teaching and permission of department. Current trends and practices in teaching foreign languages in high school, with emphasis on practical applications. Addresses state mandated competencies. Required for licensure in the teaching of French, German, or Spanish (K-12).

FLED 5201. K-8 Methods – Foreign Languages. (3)

Prerequisites: Admission to the Graduate Certificate in Teaching and permission of department. Current trends and practices in teaching foreign languages in the elementary school and the middle school (K-8), with emphasis on practical applications. Addresses state mandated competencies. Required for licensure in the teaching of French, German, or Spanish (K-12).

FLED 6200. Advanced Methods of Teaching Foreign Languages. (3)

Cross-listed as TESL 6476. Prerequisites: Admission to the M.A.T. in Foreign Language Education and completion of Phase I of the program. A variety of topics will be addressed in order to prepare experienced second language teachers to be critical thinkers, second language researchers, and instructional and program leaders. Exemplar topics include the analysis of instructional methods and teaching strategies, curriculum design, research-based practices, multicultural education, and the mentoring and/or professional development of novice ESL teachers.

FLED 6470. Graduate Student Teaching and Internship – Foreign Language Education. (3)

Prerequisite: completion of all education coursework required for the “A” license, background requirements, minimum score of Advanced-Low on the Oral Proficiency Interview (OPI), and an application for the course by the established deadline; and approval of the department. Requires a full-time, semester-long graduate student teaching experience of teaching in the appropriate area of licensure (French, German, or Spanish). Includes formal observations in the intern’s classroom by University faculty and/or school-based supervisors. Includes seminars. Application required.

Instructional Systems Technology

- **M.Ed. in Instructional Systems Technology**
- **Graduate Certificate in Instructional Systems Technology**

Department of Educational Leadership

edld.uncc.edu

Graduate Director

Dr. Florence Martin

Graduate Faculty

Dr. Florence Martin, Associate Professor

Dr. Patti Wilkins, Clinical Assistant Professor

MASTER OF EDUCATION IN INSTRUCTIONAL SYSTEMS TECHNOLOGY

The M.Ed. in Instructional Systems Technology is a 36 credit hour program that prepares instructional design professionals to analyze, create, use, integrate, implement, evaluate and manage instructional and performance solutions. When students graduate, they hold instructional design and technology positions in education (P-12 and higher education), corporate, government, or military organizations. The program develops professionals who are solidly grounded in instructional technology foundations, principles, theories, applications, and current trends and provides opportunities for them to integrate different forms of technology to enhance teaching and learning.

Online Program

This M.Ed. program is offered 100% online through the Office of Distance Education. For more information, visit distanceed.uncc.edu.

Program Objectives

Aligned with the Association for Educational Communications and Technology (AECT), International Society for Technology in Education (ISTE), and North Carolina Department of Public Instruction (NCDPI) standards, the program prepares graduates to:

- 1) Create, use, assess, and manage theoretical and practical applications of educational technologies and processes.

- 2) Demonstrate effective analysis, integration, and implementation of educational technologies and processes based on contemporary content and pedagogy.
- 3) Facilitate learning by creating, using, evaluating, and managing effective learning environments.
- 4) Design, develop, implement, and evaluate technology-rich learning environments within a supportive community of practice.
- 5) Explore, evaluate, synthesize, and apply methods of inquiry to enhance learning and improve performance.

Concentrations

The M.Ed. Instructional Systems Technology program has three concentrations:

- 1) School Specialist
- 2) Training and Development
- 3) Online Learning and Teaching

School Specialist Concentration

This concentration is for those who work in the P-12 system and who already hold either an "A" or "G" level teaching license from the North Carolina Department of Public Instruction (or from another state) for the new Masters/Advanced "M" license in Instructional Technology Specialists.

Training and Development Concentration

This concentration is for instructional technology personnel who wish to do training and development in corporate, higher education, government, and military.

Online Learning and Teaching Concentration

This concentration is for those interested in designing, developing, or managing online learning and teaching.

Degree Requirements

The M.Ed. Program in Instructional Systems Technology requires a total of 36 credit hours comprising foundations courses in a selected concentration (18 credit hours), elective coursework (12 credit hours), and internship and Capstone project (6 credit hours).

Foundation Courses (18 credit hours)

School Specialist Concentration

- EIST 5100 Technology Integration in Education (3)
- EIST 6100 Foundations in Instructional Systems Technology (3)
- EIST 6101 Learning Principles in Instructional Systems Technology (3)
- EIST 6110 Instructional Design (3)
- EIST 6130 Instructional Multimedia Development (3)

RSCH 6101 Research Methods (3)

Training and Development Concentration

- EIST 6100 Foundations in Instructional Systems Technology (3)
- EIST 6101 Learning Principles in Instructional Systems Technology (3)
- EIST 6110 Instructional Design (3)
- EIST 6130 Instructional Multimedia Development (3)
- EIST 6170 Human Performance Technology (3)
- RSCH 6101 Research Methods (3)

Online Learning and Teaching Concentration

- EIST 6100 Foundations in Instructional Systems Technology (3)
- EIST 6101 Learning Principles in Instructional Systems Technology (3)
- EIST 6110 Instructional Design (3)
- EIST 6130 Instructional Multimedia Development (3)
- EIST 6150 Design, Development, and Evaluation of Online Learning Systems (3)
- RSCH 6101 Research Methods (3)

Elective Courses (12 credit hours)

Recommended electives include:

- EIST 6000 Topics in Instructional Systems Technology (3)
- EIST 6120 Current Trends in Instructional Systems Technology (3)
- EIST 6121 Advanced Instructional Design (3)
- EIST 6135 Learning, Resources, and Technology (3)
- EIST 6140 Instructional Video Development (3)
- EIST 6150 Design, Development, and Evaluation of Online Learning Systems (3)
- EIST 6160 Designing Learning Systems with Simulation and Game Technology (3)
- RSCH 7196 Program Evaluation Methods (3)

Students should work with an advisor to determine the related coursework that works best in their program of study. For the most current approved courses, visit the Instructional Systems Technology Program website online at edld.uncc.edu/programs/instructional-systems-technology-program.

Internship and IST Capstone Project (6 hours)

Students must complete an internship and a Capstone Project as part of the Capstone experience.

- EIST 6491 Internship in Instructional Systems Technology (3)
- EIST 6492 Capstone Project in Instructional Systems Technology (3)

For more specific information regarding the Master's Capstone Project, students should contact their advisor.

Licensure – Instructional Technology Specialist (North Carolina 077)

The M.Ed. Program in Instructional Systems Technology with a School Specialist concentration also qualifies graduates who already hold either an “A” or “G” level teaching license from the North Carolina Department of Public Instruction (or from another state) for the new Masters/Advanced “M” license in Instructional Technology Specialists: Computers (NC 077) license. Students should work with an advisor to complete these requirements. Students in the other concentrations earn the M.Ed. degree, but not the 077 license.

Program Certification/Accreditations

- National Council for the Accreditation of Teacher Education (NCATE)
- Association for Educational Communications and Technology (AECT) (with National Recognition)
- North Carolina Department of Public Instruction (NCDPI)

Admission Requirements

Interested applicants may Apply online at gradadmissions.uncc.edu. Applications are accepted for Fall, Spring, and Summer admissions. Check the program website for application deadlines.

The admission process is competitive and determined by the following application components:

- 1) Applicants are required to have a minimum of a B.A. or B.S. Degree from an accredited college or university.
- 2) Official transcripts
- 3) GRE or MAT scores
- 4) Three letters of recommendation from professionals who are able to judge the quality of the applicant as a future student in this program
- 5) Statement of Purpose of no more than 750 words in 12-point font and double-spaced, written definitively, coherently, and incorporating thoughtful expression in response to:
 - a. What skills and knowledge do you hope to acquire and develop as a result of this program?
 - b. Characterize what you would contribute to the collective learning experiences of your fellow students.
- 6) Additional items required for those using this program to satisfy the North Carolina Department of Public Instruction (NCDPI) Instructional Technology Specialists: Computers (10877). This requirement is only for those who wish to earn the 077 license. Those who wish to work in other instructional technology settings (higher

education, corporate, military, government) do not have to fulfill this requirement.

- a. A valid appropriate North Carolina teaching license A or G level (or equivalent from another state). In the online admission application, there is a field in which to specify the type of teaching license. Rather than uploading a copy of the teaching license into the application system, scan the license and email a copy to the Program Director
- b. A minimum of 2 to 3 years teaching experience

GRADUATE CERTIFICATE IN INSTRUCTIONAL SYSTEMS TECHNOLOGY

This 18 credit hour graduate certificate program prepares instructional design professionals to create, analyze, use, integrate, implement, assess, evaluate and manage instructional and performance solutions. When students graduate, they hold instructional design and technology positions in education (P-12 and higher education), corporate, government, or military organizations. The program develops professionals who are solidly grounded in instructional technology foundations, principles, theories, applications, and current trends, and provides opportunities for them to integrate different forms of technology to enhance teaching and learning.

Online Program

This Graduate Certificate program is offered 100% online through the Office of Distance Education. For more information, visit distanceed.uncc.edu.

Program Objectives

Aligned with the Association for Educational Communications and Technology (AECT), International Society for Technology in Education (ISTE), and North Carolina Department of Public Instruction (NCDPI) standards, this program prepares graduates to:

- Create, use, assess, and manage theoretical and practical applications of educational technologies and processes.
- Demonstrate effective analysis, integration, and implementation of educational technologies and processes based on contemporary content and pedagogy.
- Facilitate learning by creating, using, evaluating, and managing effective learning environments.

- Design, develop, implement, and evaluate technology-rich learning environments within a supportive community of practice.
- Explore, evaluate, synthesize, and apply methods of inquiry to enhance learning and improve performance.

Concentrations

The Instructional Systems Technology graduate certificate has three concentrations:

- 1) School Specialist
- 2) Training and Development
- 3) Online Learning and Teaching

School Specialist Concentration

This concentration is for those who work in the P-12 system and who already hold either an "A" or "G" level teaching license from the North Carolina Department of Public Instruction (or from another state). School system personnel who currently hold a valid "A" or "M" level teaching license and are eligible for the Special Endorsement in Computer Education (079 License) by the North Carolina Department of Public Instruction at the end of this graduate certificate.

Training and Development Concentration

This concentration is for those who wish to do training and development in corporate, higher education, government, and military.

Online Teaching and Learning Concentration

This concentration is for those interested in designing, developing, or managing online learning and teaching.

Certificate Requirements (18 credit hours)

School Specialist Concentration

EIST 5100 Technology Integration in Education (3)
 EIST 6100 Foundations of Instructional Systems Technology (3)
 EIST 6110 Instructional Design (3)
 EIST 6120 Current Trends in Instructional System Technology (3)
 EIST 6130 Instructional Multimedia Development (3)
 EIST 6135 Learning, Media, Resources, and Technology (3)

Training and Development Concentration

EIST 6100 Foundations of Instructional Systems Technology (3)
 EIST 6110 Instructional Design (3)
 EIST 6120 Current Trends in Instructional System Technology (3)
 EIST 6130 Instructional Multimedia Development (3)

EIST 6160 Designing Learning Systems with Simulation and Game Technology (3)
 EIST 6170 Human Performance Technology (3)

Online Learning and Teaching Concentration

EIST 6100 Foundations of Instructional Systems Technology (3)
 EIST 6101 Learning Principles in Instructional Systems Technology (3)
 EIST 6110 Instructional Design (3)
 EIST 6120 Current Trends in Instructional System Technology (3)
 EIST 6130 Instructional Multimedia Development (3)
 EIST 6150 Design, Development, and Evaluation of Online Learning Systems (3)

Licensure (079 Endorsement)

School system personnel who currently hold a valid "A" or "M" level teaching license and who complete the School Specialist concentration of the Graduate Certificate in Instructional Systems Technology are eligible to earn the Special Endorsement in Computer Education (079) by the North Carolina Department of Public Instruction. Professionals in the other concentrations will receive the Graduate Certificate only and not the 079 endorsement.

Admission Requirements

Interested applicants may Apply online at gradadmissions.uncc.edu. Applications are accepted for Fall, Spring, and Summer admissions. Check the program website for application deadlines.

- B.A. or B.S. degree in an appropriate field of study from a regionally accredited institution
- Official transcripts
- An undergraduate GPA of 3.0 or higher for the last two years of coursework
- Evidence of strong written and oral communication skills
- For those seeking the 079 endorsement, the following additional documents are required:
 - o A valid North Carolina teacher's license
 - o A minimum of 2 to 3 years teaching or other professional experience
- Statement of Purpose of no more than 750 words in 12-point font and double-spaced, written definitively, coherently, and incorporating thoughtful expression in response to:
 - o How will this program help you to achieve your professional goals?
 - o What skills and knowledge do you hope to acquire and develop as a result of this program?
 - o Characterize what you would contribute to the collective learning experiences of your fellow students.

- o Develop your narrative so that it clearly responds to the prompts and provides the reader with definitive, coherent, and thoughtful expression.

COURSES IN INSTRUCTIONAL SYSTEMS TECHNOLOGY (EIST)

EIST 5100. Technology Integration in Education. (3)

Computer systems and software for enhancing teaching, learning, and educational management; examining issues related to the appropriate selection, integration, and evaluation of technology in educational contexts.

EIST 6000. Topics in Instructional Systems Technology. (1-6)

Variable topics in instructional systems technology. *May be repeated for credit with change of topic and permission of department.*

EIST 6100. Foundations of Instructional Systems Technology. (3)

Contemporary issues and historical development of instructional systems technology. An overview of learning theory, instructional systems analysis and design, instructional design models, technology innovations, and factors affecting the use of technology for learning.

EIST 6101. Learning Principles in Instructional Systems Technology. (3)

The examination of how people learn in a variety of instructional settings. Characteristics of the different learners are examined. Students investigate several learning theories to inform better instructional design decisions.

EIST 6102. Research in Instructional Systems Technology. (3)

Current issues and trends in instructional systems technology research including instructional systems design, requirements for instruction, task and needs analysis, learning situations and instructional models, learner characteristics, hardware and software innovations, assessing instructional outcomes, and factors affecting utilization.

EIST 6110. Instructional Design. (3)

Cross-listed as EIST 8110. Instructional analysis, design and evaluation principles and practices; gaining practical experience applying theoretical understandings of instructional design principles and processes such as goal and task analysis, learner and context analysis, instructional strategies, selection and development of instructional materials, and formative and summative evaluation.

EIST 6120. Current Trends in Instructional Systems Technology. (3)

Examination of current and future trends in instructional systems technology. Students

also examine the most current literature in the field and instructional technology professional organization trends and recommendations.

EIST 6121. Advanced Instructional Design. (3)

Prerequisite: EIST 6110. Advanced instructional design techniques; students create instructional materials and learning environments using a variety of systems approaches.

EIST 6130. Instructional Multimedia Development. (3)

Cross-listed as EIST 8130. Planning, developing, and evaluating instructional multimedia products based on learning principles and research-based best practices.

EIST 6135. Learning Media, Resources, and Technology. (3)

Cross-listed as EIST 8135. Selection, use, and evaluation of technological innovations in instructional media. Students learn to make professionally sound decisions in selecting appropriate processes and resources to provide optimal conditions for learning based on principles, theories, and effective practices.

EIST 6140. Instructional Video Development. (3)

Planning, developing, and evaluating instructional video products based on learning principles and research-based best practices.

EIST 6150. Design, Development, and Evaluation of Online Learning Systems. (3)

Fundamentals of creating effective online teaching and learning systems will be covered. Topics will include research-based best practices in the design, development, and evaluation of online instruction, technological applications available to support online teaching and learning, characteristics of virtual students, instructional methodologies for online teaching and learning, and future directions of online teaching and learning research. Differentiated assignments will be provided for doctoral students.

EIST 6160. Designing Learning Systems with Simulation and Game Technology. (3)

Educational game and simulation technology learning systems. Students examine principles of game and simulation design, and current research addressing the integration and use of games and simulations in education settings. Emphasis placed on the use of instructional design principles to identify quality characteristics of digital games and simulations, and direct the design and development of these technologies for integration in to instructional content. Differentiated assignments provided for doctoral students.

EIST 6170. Human Performance Technology. (3)

Cross-listed as EIST 8170. An introduction to the field

of human performance technology. Examines basic concepts and principles of human performance technology, human performance system models, and various approaches to solving human performance problems. In-depth analysis of performance improvement interventions and their implementation within organizations is emphasized.

EIST 6491. Internship in Instructional Systems Technology. (3) Application of knowledge and skills in instructional systems technology so as to create appropriate applications of processes and technologies to improve learning and performance.

EIST 6492. Capstone Project in Instructional Systems Technology. (3) Prerequisites: EIST 6100, EIST 6101, EIST 6110, EIST 6130, and EIST 6491. Continued application of knowledge and skills in instructional systems technology and development of the capstone project to create appropriate applications of processes and technologies to improve learning and performance.

EIST 6800. Individual Study in Instructional Systems Technology. (1-6) Prerequisite: Permission of the student's advisor. Independent study under the supervision of an appropriate faculty member. *May be repeated for credit.*

EIST 8000. Topics in Instructional Systems Technology. (1-6) Variable topics in instructional systems technology. As a doctoral course, emphasis is placed on the theories that ground instructional systems technology and how the theories inform research and practice in the field. Differentiated activities and assignments are provided for doctoral students. *May be repeated for credit with change of topic and permission of department.*

EIST 8100. Foundations of Instructional Systems Technology. (3) Contemporary issues and historical development of instructional systems technology. An overview of learning theory, instructional systems analysis and design, instructional design models, technology innovations and factors affecting the use of technology for learning. As a doctoral course, emphasis are placed on the theories that ground instructional systems technology and how the theories inform research and practice in the field. Differentiated activities and assignments are provided for doctoral students.

EIST 8102. Research in Instructional Systems Technology. (3) Current issues and trends in instructional systems technology research including instructional systems design, requirements for instruction, task and needs analysis, learning situations and instructional models, learner characteristics, hardware and software innovations,

assessing instructional outcomes, and factors affecting utilization. As a doctoral course, emphasis is placed on the theories that ground instructional systems technology and how the theories inform research and practice in the field. Differentiated activities and assignments are provided for doctoral students.

EIST 8110. Instructional Design. (3) Cross-listed as EIST 6110. Instructional analysis, design and evaluation principles and practices; gaining practical experience applying theoretical understandings of instructional design principles and processes such as goal and task analysis, learner and context analysis, instructional strategies, selection and development of instructional materials, and formative and summative evaluation. Differentiated assignment on research in instructional multimedia development is provided for doctoral students.

EIST 8120. Current Trends in Instructional Systems Technology. (3) The examination of current and future trends in instructional systems technology. Students also examine the most current literature in the field and instructional technology professional organization trends and recommendations. As a doctoral course, emphasis is placed on the theories that ground instructional systems technology and how the theories inform research and practice in the field. Differentiated activities and assignments are provided for doctoral students.

EIST 8121. Advanced Instructional Design. (3) Advanced instructional design techniques; systems development; task analysis; sequencing and delivery systems.

EIST 8130. Instructional Multimedia Development. (3) Cross-listed as EIST 6130. Planning, developing, and evaluating instructional multimedia products based on learning principles and research-based best practices. Differentiated assignment on research in instructional multimedia development provided for doctoral students.

EIST 8135. Learning Media, Resources and Technology. (3) Cross-listed as EIST 6135. Selection, use, and evaluation of technological innovations in instructional media. Students learn to make professionally sound decisions in selecting appropriate processes and resources to provide optimal conditions for learning based on principles, theories, and effective practices. Differentiated assignment on research in learning media, resources and technology provided for doctoral students.

EIST 8150. Design, Development, and Evaluation of Online Learning Systems. (3) Fundamentals of creating effective online teaching and learning systems will be covered. Topics include: research-

based best practices in the design, development, and evaluation of online instruction, technological applications available to support online teaching and learning, characteristics of virtual students, instructional methodologies for online teaching and learning, and future directions of online teaching and learning research. Differentiated assignments are provided for doctoral students.

EIST 8160. Designing Learning Systems with Simulation and Game Technology. (3) Educational game and simulation technology learning systems. Students examine principles of game and simulation design, and current research addressing the integration and use of games and simulations in education settings. Emphasis is placed on the use of instructional design principles to identify quality characteristics of digital games and simulations, and direct the design and development of these technologies for integration in to instructional content. Differentiated assignments are provided for doctoral students.

EIST 8170. Human Performance Technology. (3) Cross-listed as EIST 6170. An introduction to the field of human performance technology. Examines basic concepts and principles of human performance technology, human performance system models, and various approaches to solving human performance problems. In-depth analysis of performance improvement interventions and their implementation within organizations is emphasized. Differentiated assignment on research in Human Performance Technology provided for doctoral students.

EIST 8800. Individual Study in Instructional Systems Technology. (1-6) Prerequisite: Permission of advisor. Independent study under the supervision of an appropriate faculty member. *May be repeated for credit.*

Middle Grades and Secondary Education

- **Master of Education (M.Ed.)**
- **Master of Arts in Teaching (M.A.T.)**
- **Graduate Certificate in Teaching**

Department of Middle Grades, Secondary, and K-12 Education

mdsk.uncc.edu

Graduate Directors

Dr. Jeanneine Jones, M.Ed. Program – Middle Grades
Dr. Tina L. Heafner, M.Ed. Program – Secondary
Dr. Teresa Petty, MAT Program

Graduate Faculty

Dr. Joyce Brigman, Clinical Assistant Professor
Dr. Bettie Ray Butler, Assistant Professor
Dr. Heather Coffey, Associate Professor
Dr. Warren DiBiase, Associate Professor
Dr. Paul Fitchett, Associate Professor
Dr. Tina Heafner, Professor
Dr. Charles Hutchison, Professor
Dr. Jeanneine Jones, Professor
Dr. Scott Kissau, Associate Professor and Department Chair
Dr. Lan Quach Kolano, Professor
Dr. Joan Lachance, Assistant Professor
Dr. Chance Lewis, Professor
Dr. Adam Myers, Clinical Assistant Professor
Dr. Teresa Petty, Associate Professor
Dr. David Pugalee, Professor
Dr. Spencer Salas, Associate Professor
Dr. Michelle Stephan, Associate Professor
Dr. Greg Wiggan, Associate Professor

MASTER OF EDUCATION IN MIDDLE AND SECONDARY GRADES

The Master of Education in Middle and Secondary Grades has been developed specifically for experienced licensed teachers in middle and secondary schools who desire advanced study in content and pedagogy, and seek an opportunity to integrate advanced study with their teaching experiences. In addition, candidates acquire the skills, knowledge, dispositions, and abilities required to assume a leadership role. For example, candidates are required to take Teacher Leadership within their

final two semesters, a course that better prepares them to become content department chairs, interdisciplinary team leaders, or staff development specialists. Furthermore, by admitting only experienced teachers, candidates serve as resources for one another and become active members in a community of professionals who are knowledgeable, effective, and committed practitioners. At the conclusion of the program, graduates become teacher leaders who understand and establish respectful educational environments, demonstrate content and curriculum expertise, effectively support student learning through evidence-based research, and exhibit systematic, critical analysis of learning through purposeful and meaningful reflection. Finally, because this degree focuses on a teacher's professional growth, it requires completion of a comprehensive portfolio or capstone research project, which is determined by the individual program's requirements.

Program Goals

Successful graduates possess a comprehensive pedagogical, conceptual, and reflective knowledge base that can be applied to their classrooms through effective instruction, responsiveness, and collaboration. This developed and applied knowledge is, in turn, shared with other professionals through a variety of leadership opportunities. Both the College's Conceptual Framework and the following goals provide structure for the entire program.

Program graduates are able to:

- 1) Self-direct their personal and professional growth
- 2) Respond effectively to adolescent differences, equity and diversity, and global learning communities
- 3) Demonstrate advanced pedagogical content knowledge of the curriculum, as well as apply 21st knowledge, skills, and technical expertise
- 4) Improve educational practice through critical self-reflection, self-assessment, and applied research
- 5) Work collaboratively with colleagues, professionals, parents, guardians, families and individuals charged with the well-being of learners
- 6) Assume a leadership role at the local, district, regional, state, or national level

National Board for Professional Teaching Standards Connections

A unique feature of this program is its strategic alignment with core propositions, skill sets, academic language, and concepts from the National Board for Professional Teaching Standards (NBPTS). Activities are designed to provide information and support to potential and current candidates. They also account

for recent certification program changes by the NBPTS.

Admission Requirements

- 1) A Bachelor's degree from a regionally accredited college or university
- 2) A North Carolina "A" license (Standard Professional 1 [SP1] Professional Educator's License) in Middle Grades (6-9) or Secondary Education (9-12), or the equivalent from another state in both the concentration and content field of the program to which the candidate is making application
- 3) Teaching experience in a middle grades or secondary classroom
- 4) An undergraduate GPA of 2.75 overall and 3.0 in the Junior/Senior years
- 5) An acceptable score on the GRE or MAT
- 6) A written narrative providing a statement of purpose for Master's degree study
- 7) Satisfactory recommendations from three professional educators

Degree Requirements

The M.Ed. in Middle and Secondary Grades degree requires a total of 33 credit hours of coursework. Candidates must select one of two concentrations, Middle Grades Education or Secondary Education, and fulfill the requirements. The selected concentration must match the candidate's initial A license, as issued by the state of North Carolina.

Middle Grades Education Concentration

Core Courses (18 credit hours)

MDSK 6156 Curriculum, Teaching, and Contemporary Issues in Education (3)
 MDSK 6220 Adolescence and Learning (3)
 MDSK 6260 Teacher Leadership (3)
 MDSK 6691 Seminar in Professional Development (3)
 RSCH 6101 Research Methods (3)
 TESL 6206 Globalization, Communities, and Schools (3)

Middle Grades Course (3 credit hours)

MDLG 6225 Issues in Middle Grades Education (3)

Advanced Content Specialization and Advanced Methods Courses (9 credit hours)

Advanced Methods Course (3 credit hours)

Students select one from their content concentration:

ENGL 6274 Contexts and Issues in the Teaching of English (3)
 MAED 6252 Advanced Methods in Middle and Secondary Mathematics Education (3)
 MDSK 6351 Advanced Methods in Middle and Secondary Science (3)
 MDSK 6354 Advanced Methods in Middle and

Secondary Social Studies (3)

Advanced Content Specialization Courses (6 credit hours)

Students select two courses from the following options in their content area:

English

ENGL 5000-6999 (3)

READ 5000-6999 (3)

MDSK 5000-6999 (3) *(topics course that is content specific)*

READ 6265 Multiliteracies in a Global World: Reading and Writing Texts in New Times (3)
or EDCI 8265 Multiliteracies in a Global World: Reading and Writing Texts in New Times (3)

Mathematics

MAED 5000-6999 (3)

MATH 5000-6999 (3)

STAT 5000-6999 (3)

MDSK 5000-6999 (3) *(topics course that is content specific)*

MDSK 6251 Issues in 6-12 Mathematics Education (3)

Science

BIOL 5000-6999 (3)

CHEM 5000-6999 (3)

ESCI 5000-6999 (3)

GEOG 5000-6999 (3)

PHYS 5000-6999 (3)

MDSK 5000-6999 (3) *(topics course that is content specific)*

MDSK 6250 Issues in 6-12 Science Education (3)

Social Studies

AFRS 5000-6999 (3)

GEOG 5000-6999 (3)

HIST 5000-6999 (3)

MDSK 5000-6999 (3) *(topics course that is content specific)*

POLS 5000-6999 (3)

RELS 5000-6999 (3)

WGST 5000-6999 (3)

MDSK 6254 Issues in 6-12 Social Studies Education (3)

Advanced Specialization Pedagogy Course (3 credit hours)

A graduate-level pedagogy course should be chosen in consultation with student's advisor. Possible elective options include, and are limited to one of, the following:

EDUC 6102 Person and School in Urban Society (3)

EDUC 6144 Introduction to National Board Certification (3)

EDUC 7126 Comparative Education (3)

EIST 5100 Technology Integration in Education (3)

EIST 6110 Instructional Design (3)

MDLG 6800 Individual Study in Middle Grades Education (1-6)

MDSK 6142 Readings in Assessment, Measurement, and Student Achievement (3)

READ 6265/EDCI 8265 Multiliteracies in a Global World: Reading and Writing Texts in New Times (3)

RSCH 6109 Assessment and Evaluation Methods (3)

RSCH 6110 Descriptive and Inferential Statistics in Education (3)

TESL 5103 Methods in Teaching English as a Second Language (3)

Secondary Education Concentration

Core Courses (18 credit hours)

MDSK 6156 Curriculum, Teaching, and Contemporary Issues in Education (3)

MDSK 6220 Adolescence and Learning (3)

MDSK 6260 Teacher Leadership (3)

MDSK 6691 Seminar in Professional Development (3)

RSCH 6101 Research Methods (3)

TESL 6206 Globalization, Communities, and Schools (3)

Advanced Content Specialization and Advanced Methods Courses (12 credit hours)

Advanced Methods Course (3 credit hours)

Students select one from their content concentration:

ENGL 6274 Contexts and Issues in the Teaching of English (3)

MAED 6252 Advanced Methods in Middle and Secondary Mathematics Education (3)

MDSK 6351 Advanced Methods in Middle and Secondary Science (3)

MDSK 6354 Advanced Methods in Middle and Secondary Social Studies (3)

Advanced Content Specialization Courses (9 credit hours)

Students select three courses from the following options in their content area:

English

ENGL 5000-6999 (3)

READ 5000-6999 (3)

MDSK 5000-6999 (3) *(topics course that is content specific)*

READ 6265 Multiliteracies in a Global World: Reading and Writing Texts in New Times (3)
or EDCI 8265 Multiliteracies in a Global World: Reading and Writing Texts in New Times (3)

Mathematics

MAED 5000-6999 (3)

MATH 5000-6999 (3)

STAT 5000-6999 (3)

MDSK 5000-6999 (3) *(topics course that is content specific)*

MDSK 6251 Issues in 6-12 Mathematics Education (3)

Science

BIOL 5000-6999 (3)

CHEM 5000-6999 (3)

ESCI 5000-6999 (3)

GEOG 5000-6999 (3)

PHYS 5000-6999 (3)

MDSK 5000-6999 (3) *(topics course that is content specific)*

MDSK 6250 Issues in 6-12 Science Education (3)

Social Studies

AFRS 5000-6999 (3)

GEOG 5000-6999 (3)

HIST 5000-6999 (3)

MDSK 5000-6999 (3) *(topics course that is content specific)*

POLS 5000-6999 (3)

RELS 5000-6999 (3)

WGST 5000-6999 (3)

MDSK 6254 Issues in 6-12 Social Studies Education (3)

Note: For students interested in teaching at the community college level, Master's degrees with concentrations in Mathematics Education and English Education are offered through the Departments of Mathematics & Statistics and English, respectively. Please see the individual M.S. in Mathematics and M.A. in English sections of the Graduate Catalog for details.

Advanced Specialized Pedagogy Course (3 credit hours)

Select a pedagogy course with advisor consultation. Possible elective options include, and are limited to, one of the following:

EDCI 8265 Multiliteracies in a Global World:

Reading and Writing Texts in New Times (3)

EDUC 6102 The Person and School in Urban Society (3)

EDUC 6144 Introduction to National Board Certification (3)

EDUC 7126 Comparative Education (3)

EIST 5100 Technology Integration in Education (3)

EIST 6110 Instructional Design (3)

MDSK 6142 Readings in Assessment, Measurement, and Student Achievement (3)

READ 6265 Multiliteracies in a Global World:

Reading and Writing Texts in New Times (3)

RSCH 6109 Assessment and Evaluation Methods (3)

RSCH 6110 Descriptive and Inferential Statistics in Education (3)

SECD 6800 Individual Study in Secondary Education (1-6)

TESL 5103 Methods in Teaching English as a Second Language (3)

Capstone Experience

Candidates in both the Middle Grades Education and Secondary Education concentration must complete a capstone experience. They complete either a comprehensive portfolio or research project, as assigned by their program advisor.

Advising

Each candidate will have an assigned advisor within the Department of Middle Grades, Secondary, and K-12 Education.

Licensure

Graduates of the M.Ed. will be eligible to receive an Advanced Competency "M" license (Standard Professional 2 [SP2] Professional Educator's License) in either middle grades (6-9) or secondary (9-12) from the state of North Carolina in addition to their Master's Degree.

Note: Standard Professional 2 (SP2) Professional Educator's Licenses are intended for teachers with 3 or more years of teaching experience, and are valid for five years. Teachers who are fully licensed and "Highly Qualified" in another state who have three or more years of teaching experience in another state AND who meet NC's Praxis testing requirements OR have National Board Certification are issued the SP2 Professional Educator's license.

Committees

Candidates convene a committee of three graduate faculty members whom they select with assistance from their department advisor if a research project is required as the capstone experience. The primary role of this committee is to assess the research project. All other candidates complete the comprehensive portfolio which is guided by the course instructor for MDSK 6691.

Research Opportunities and Experiences

There are many opportunities for candidates to participate in research studies on either an independent or collaborative basis. These opportunities are available with Department faculty members, through assigned coursework, and through the research project.

Program Certifications/Accreditation

Programs are accredited by both NCATE and NCDPI.

MASTER OF ARTS IN TEACHING (M.A.T.) IN MIDDLE GRADES AND SECONDARY EDUCATION

The Master of Arts in Teaching (M.A.T.) in Middle Grades or Secondary Education program is designed for individuals with a bachelor's degree and a major in English, Mathematics, History, Biology, Chemistry, Earth Sciences, Physics, or a related field. The M.A.T. program is a 39-hour program composed of two phases: the Graduate Certificate phase (Phase I) and the Master's degree completion phase (Phase II). Completion of Phase I of the M.A.T. leads to the initial Standard Professional I teaching license in the related content area. Phase I requires 18 credit hours of coursework, including the graduate student teaching/internship experience. Upon completion of Phase I, qualified candidates may continue into Phase II upon acceptance into the program to complete the remaining requirements for the Master's degree and qualify for the advanced Standard Professional II teaching license. For more information on the M.A.T., visit pathwaytoteaching.com.

All courses for both phases of the M.A.T. must be completed within six years. Coursework within Phase I/Graduate Certificate must be completed within four years.

General Requirements for Admission to the Graduate School

Please refer to admission information in the Graduate School section of this *Catalog*.

Admission Requirements for all M.A.T. (Phase II) programs

- 1) Completion of the Graduate Certificate in Teaching
- 2) A minimum graduate GPA of 3.5 in the Graduate Certificate in Teaching
- 3) One recommendation from a full-time faculty member who has taught you in the Graduate Certificate in Teaching program
- 4) A statement of purpose
- 5) Official transcripts
- 6) Apply online at gradadmissions.uncc.edu

The admission process includes timely completion of the Application for Graduation from the Graduate Certificate program.

Students with a GPA below 3.5 in the Graduate Certificate Phase I may be considered for admission to the M.A.T. program with scores above the 30th percentile on either the GRE or Miller Analogies Test.

Degree Requirements

Phase I/Graduate Certificate

Core Courses (15 credit hours)

- MDSK 6162 Planning for K-12 Instruction (3)
- READ 5255 Integrating Reading and Writing in the Content Areas (3)
- EDUC 5100 Diverse Learners (3)
- MDLG 5130 The Middle Grades Experience (3) or SECD 5140 The Secondary School Experience (3)
- MDSK 6470 Graduate Student Teaching and Internship (3)

Content Methods Course (3 credit hours)

Select the one related content methods area:

- ENGL 5254 Teaching English/Communications to Middle/Secondary School Learners (3)
- MAED 5232 Teaching Mathematics to Middle School Learners (3)
- MAED 5252 Teaching Mathematics to Secondary School Learners (3)
- MDSK 5251 Teaching Science to Middle and Secondary School Learners (3)
- MDSK 5253 Teaching Social Studies to Middle and Secondary School Learners (3)

Phase II/Completion of M.A.T.

Core Courses (12 credit hours)

- MDSK 6220 Adolescence and Learning (3)
- MDSK 6260 Teacher Leadership (3)
- MDSK 6691 Seminar in Professional Development (3)
- RSCH 6101 Research Methods (3)

Advanced Content Specialization Courses (6 credit hours)

Select one of the following areas:

Middle Grades Education

- MDLG 6225 Issues in Middle Grades Education (3)

Plus one from the following in the content area:

Mathematics

- MAED 5000-6999
- MATH 5000-6999
- STAT 5000-6999

English

- ENGL 5000-6999
- READ 5000-6999
- MDSK 5000-6999 (*topics course that is content specific*)

Science

- BIOL 5000-6999
- CHEM 5000-6999
- ESCI 5000-6999

GEOG 5000-6999

PHYS 5000-6999

Social Studies

AFRS 5000-6999

GEOG 5000-6999

HIST 5000-6999

MDSK 5000-6999 (*topics course that is content specific*)

POLS 5000-6999

RELS 5000-6999

WGST 5000-6999

Secondary Education

Students select two from the following in their content area:

Mathematics

MAED 5000-6999

MATH 5000-6999

STAT 5000-6999

English

ENGL 5000-6999

READ 5000-6999

MDSK 5000-6999 (*topics course that is content specific*)

Science

BIOL 5000-6999

CHEM 5000-6999

ESCI 5000-6999

GEOG 5000-6999

PHYS 5000-6999

Social Studies

AFRS 5000-6999

GEOG 5000-6999

HIST 5000-6999

MDSK 5000-6999 (*topics course that is content specific*)

POLS 5000-6999

RELS 5000-6999

WGST 5000-6999

Advanced Methods Course (3-4 credit hours)

Select the one related advanced methods area:

ENGL 6274 Context and Issues in the Teaching of English (4)

MAED 6252 Advanced Methods in Middle and Secondary Mathematics (3)

MDSK 6351 Advanced Methods in Middle and Secondary Science (3)

MDSK 6354 Advanced Methods in Middle and Secondary Social Studies (3)

Clinical Field Experiences

Most courses require students to develop their knowledge, skills, and dispositions in public school/agency settings. All students are expected to

complete clinical experiences in at least two significantly different settings. Clinical field experiences provide opportunities for helping all students learn, including children with exceptionalities and students from diverse ethnic/racial, linguistic, gender, and socioeconomic groups. During clinical experiences, students apply theories and understandings gained in coursework, analyze P-12 student learning, and develop the ability to positively impact all learners. These structured experiences can take place in multiple settings such as neighboring schools or districts, day care centers and after-school programs, alternate youth centers, or in the schools and classrooms in which the candidates work.

Candidates who are lateral entry teachers and teacher assistants must move beyond their own classrooms and schools for at least two clinical experiences. Alternative settings must be approved by the instructor. A limited number of clinical experiences may be approved in significantly different classrooms within their school of employment. Employed candidates are encouraged to seek assistance and support from their administrators.

Internship/Student Teaching

The graduate-level student teaching/internship is the culminating experience in Phase I of the M.A.T., offering students the opportunity to demonstrate their readiness for the initial Standard Professional I teaching license. Students are assigned to an appropriate classroom for a full-time, semester-long experience under the supervision of the classroom teacher and University faculty. Lateral entry teachers and teacher assistants must contact the Office of Field Experiences to determine the appropriateness of their classroom for the student teaching/internship experience and licensure requirements. This contact should take place at least one semester before student teaching.

There is no required internship for Phase II of the M.A.T.

Capstone Requirements

The capstone experience for the M.A.T. will be fulfilled by completing a Comprehensive Portfolio.

Advising

All students are assigned an advisor upon formal admission to the program. Students should consult with their advisors at least once each semester.

Licensure

Upon successful completion of the Phase I/Graduate Certificate, students will be recommended for the North Carolina initial Standard Professional I teaching

license. For this initial license, students are required to complete an electronic licensure portfolio that is created during coursework and student teaching. Upon successful completion of Phase II, students will be recommended for the North Carolina advanced Standard Professional II teaching license. For the advanced license, students are required to complete an advanced electronic licensure portfolio during coursework.

Program Approval

All teacher education programs at UNC Charlotte are accredited by the National Council for Accreditation of Teacher Education. The M.A.T. in Middle Grades and Secondary Education has been approved by North Carolina State Board of Education.

GRADUATE CERTIFICATE IN TEACHING - MIDDLE GRADES AND SECONDARY EDUCATION

The Graduate Certificate in Teaching - Middle Grades and Secondary Education is an 18 credit hour program, including the graduate student teaching/internship experience plus any background content deficiency courses, designed for students who hold a bachelor's degree. Upon successful completion of the Graduate Certificate, students are eligible for the North Carolina Standard Professional 1 (SP1) Professional Educator's License.

The required courses for the Graduate Certificate are identical to Phase I of the M.A.T. Upon completion of the Graduate Certificate, qualified students have the option of continuing into Phase II to complete the M.A.T. Admission to the Graduate Certificate is separate and distinct from admission to a graduate degree program and not an indication of automatic admission to the M.A.T. degree program. For more information on this option, refer to the M.A.T. in Middle Grades and Secondary Education.

All courses for the Graduate Certificate must be completed within four years.

General Requirements for Admission to the Graduate School

Please refer to admission information in the Graduate School section of this Catalog.

Admission Requirements for the Graduate Certificate in Teaching program

- 1) An undergraduate degree from a regionally accredited four-year institution
- 2) A minimum undergraduate GPA of 3.0 [For alternate ways to demonstrate academic

competence, contact the Teacher Education Advising, Licensure, and Recruitment (TEALR) Office]

- 3) One of the following:
 - a) Hold a relevant undergraduate degree
 - b) Obtain or already possess 24 hours of coursework in the content area for which licensure is sought
- 4) Three recommendations from persons knowledgeable of your interaction with children or youth
- 5) A statement of purpose
- 6) Clear criminal background check
- 7) Apply online at graduateschool.uncc.edu

Phase I/Graduate Certificate Requirements Required Courses (15 credit hours)

MDSK 6162 Planning for K-12 Instruction (3)

READ 5255 Integrating Reading and Writing in the Content Areas (3)

EDUC 5100 Diverse Learners (3)

MDLG 5130 The Middle Grades Experience (3)

or SECD 5140 The Secondary School Experience (3)

MDSK 6470 Graduate Student Teaching and Internship (3)

Elective Course (3 credit hours)

Select the one related content methods area:

ENGL 5254 Teaching English/Communications to Middle/Secondary School Learners (3)

MAED 5232 Teaching Mathematics to Middle School Learners (3)

MAED 5252 Teaching Mathematics to Secondary School Learners (3)

MDSK 5251 Teaching Science to Middle and Secondary School Learners (3)

MDSK 5253 Teaching Social Studies to Middle and Secondary School Learners (3)

Clinical Field Experiences

Most courses require students to develop their knowledge, skills, and dispositions in public school/agency settings. All students are expected to complete clinical experiences in at least two significantly different settings. Clinical field experiences provide opportunities for helping all students learn, including children with exceptionalities and students from diverse ethnic/racial, linguistic, gender, and socioeconomic groups. During clinical experiences, students apply theories and understandings gained in coursework, analyze 6-12 student learning, and develop the ability to positively impact all learners. Arrangements for the clinical field experience are made through the Office of Field Experiences.

Candidates who are lateral entry teachers and teacher assistants must move beyond their own classrooms and schools for at least two clinical experiences. Alternative settings must be approved by the instructor. A limited number of clinical experiences may be approved in significantly different classrooms within their school of employment. Employed candidates are encouraged to seek assistance and support from their administrators.

Internship/Student Teaching

The graduate-level student teaching/internship is the culminating experience in the Graduate Certificate program, offering students the opportunity to demonstrate their readiness for the initial Standard Professional I teaching license. Students are assigned to an appropriate classroom for a full-time, semester-long experience under the supervision of the classroom teacher and University faculty. Lateral entry teachers and teacher assistants must contact the Office of Field Experiences to determine the appropriateness of their classroom for the student teaching/internship experience and licensure requirements. This contact should take place at least one semester before student teaching.

Advising

All students are assigned an advisor upon formal admission to the program. Students should consult with their advisors at least once each semester.

Licensure

Upon successful completion of the Phase I/Graduate Certificate, students will be recommended for the North Carolina Standard Professional 1 (SP1) Professional Educator's License. For this initial license, students are required to complete an electronic licensure portfolio that is created during coursework and student teaching.

Program Approval

All teacher education programs at UNC Charlotte are accredited by the National Council for Accreditation of Teacher Education. The Graduate Certificate in Middle Grades and Secondary Education has been approved by North Carolina State Board of Education.

COURSES IN MIDDLE GRADES EDUCATION AND SECONDARY EDUCATION

General Education (EDUC)

See the "General Graduate Courses in Education" heading at the beginning of this section for EDUC course descriptions.

English Education (ENGL)

See the "English" heading within the College of Liberal Arts & Sciences section of this *Catalog* for ENGL course descriptions.

Math Education (MAED)

See the "Mathematics and Statistics" heading within the College of Liberal Arts & Sciences section of this *Catalog* for MAED course descriptions.

Middle Grades Education (MDLG)

MDLG 5130. The Middle Grades Experience. (3) Current curricular and instructional programs and their impact on the learning of contemporary adolescents. Reform efforts currently underway in American schools that attempt to address issues surrounding these and other current practices. Developmental characteristics of the early adolescent learner. Extensive clinical experience required.

MDLG 6225. Issues in Middle Grades Education. (3) Examination of educational practices in the middle grades (6-9) including trends and issues unique to that philosophy. Emphasis on broadening understanding of foundational components, organizational patterns, instructional programs and management techniques.

MDLG 6800. Individual Study in Middle Grades Education. (1-6) Prerequisite: Permission of advisor. Independent study under the supervision of an appropriate faculty member. *May be repeated for credit.*

Middle, Secondary, and K-12 Education (MDSK)

MDSK 5000. Topics in Middle and Secondary Education. (1-6) May include classroom and/or clinical experiences in the content area. With department approval, *May be repeated for credit with change of topic.*

MDSK 5251. Teaching Science to Middle and Secondary School Learners. (3) Comprehensive overview of both science education and the nature of science. Planning and implementing effective learning experiences and assessment for both the number and the diversity of learners in a middle or secondary science classroom. Extensive clinical experience required.

MDSK 5253. Teaching Social Studies to Middle and Secondary School Learners. (3) Comprehensive

overview of history and social studies education with an emphasis on providing opportunities for history and social studies teachers to create relevant, stimulating, content specific lessons for the diversity of students in middle or secondary schools. Extensive clinical experience required.

MDSK 6142. Readings in Assessment, Measurement, and Student Achievement. (3) An examination of research-based assessment strategies for the 6-12 classroom. Practitioners construct appropriate assessment items with a focus on reliability and validity. Interpretation and utilization of student outcomes to improve classroom practice is emphasized. No clinical experience required.

MDSK 6150. Models of Teaching. (3) Learning theory associated with information processing, personal, social, and behavioral models; current trends in instructional methodology for a variety of content areas.

MDSK 6156. Curriculum, Teaching, and Contemporary Issues in Education. (3) A consolidated examination of curriculum and learning theory with emphasis on educational reform and the origins of contemporary issues in education. Merges curriculum and learning theory to examine contemporary issues in education. Drawing from the field of curriculum studies, attention is given to historical roots of curriculum and important theorists, educational reform and the change process, as well as global comparisons among American and international educational systems. Approaches learning theory associated with information processing, personal, social, and behavior models as a foundation of current content area instructional methodology.

MDSK 6162. Planning for K-12 Instruction. (3) Introduction to the systematic process of planning for effective classroom instruction and assessment. Special attention is given to the related use of technology in the development of effective and systematic learning environments. Recommended as a prerequisite for EDUC 5100 and most of the methods courses, as students need lesson planning skills to be successful in most other courses. Extensive clinical experience required.

MDSK 6220. Adolescence and Learning. (3) Study of adolescence as a phase of development and its relationship to the learning process.

MDSK 6250. Issues in 6-12 Science Education. (3) Orientation to content, curriculum and methods appropriate for teaching science. Emphasis is on a critical examination of current trends and practices in the teaching of science.

MDSK 6251. Issues in 6-12 Mathematics Education. (3) Orientation to content, curriculum and methods appropriate for teaching mathematics. Emphasis is on critical examination of current trends and practices in the teaching of mathematics.

MDSK 6254. Issues in 6-12 Social Studies Education. (3) Current issues in teaching and learning social studies. Emphasis on current trends in curriculum, advanced instructional methods, and research.

MDSK 6260. Teacher Leadership. (3) An examination of the current research on adult learning and development, expert knowledge, and the professionalization of the field of teaching. Students develop skills to direct other educational professionals.

MDSK 6351. Advanced Methods in Middle and Secondary Science. (3) Examination of current research and scholarship on the teaching of science in middle and secondary schools. Particular emphasis on the development of advanced instructional expertise and leadership.

MDSK 6354. Advanced Methods in Middle and Secondary Social Studies. (3) Examination of current research and scholarship on the teaching of social studies in middle and secondary schools. Particular emphasis on the development of advanced instructional expertise and leadership.

MDSK 6356. Curriculum Studies. (3) Examination of the field of curriculum study with particular emphasis on the change process.

MDSK 6464. Primary and Secondary Source Analysis. (3) Advanced content course for middle and secondary social studies teachers seeking advanced social studies licensure. Provides a focused study of primary and secondary sources that effectively support middle and secondary student understanding of social studies content. Emphases include increased content knowledge of social studies, extensive content research and reading, development of content resources, application of advanced instructional methods through the integration of content resources to support student learning of social studies content, and experience in curriculum evaluation.

MDSK 6470. Graduate Student Teaching and Internship. (3) Prerequisites: completion of all coursework required for the "A" license completion of an application for the course by the established deadline, and approval of the department. Requires a full-time, semester-long graduate student teaching experience of teaching in the appropriate area of licensure. Includes formal observations in the intern's

classroom by university faculty and/or school-based supervisors. Includes seminars. Application required.

MDSK 6691. Seminar in Professional Development.

(3) Seminar focused on the self-direction and professional development of teachers. Emphasis placed on the design, development, and completion of the candidate's comprehensive portfolio, thesis, or research project.

Reading, Language, and Literacy (READ)

See the "Reading Education" heading within this section for READ course descriptions.

Secondary Education (SECD)

SECD 5140. The Secondary School Experience. (3)

Overview of the developmental characteristics of the adolescent learner and their relationship to instruction. Context of American High Schools and the effects of those schools on the learning of contemporary adolescents. Reform efforts currently underway in American high schools that attempt to address some of the problems with current practice. Extensive clinical experience required.

SECD 6800. Individual Study in Secondary Education. (1-6) Prerequisite: Permission of the student's advisor. Independent study under the supervision of an appropriate faculty member. *May be repeated for credit.*

Reading Education

- **Ph.D. in Curriculum and Instruction***
- **M.Ed. in Reading Education**

**The Ph.D. in Curriculum and Instruction offers a specialization in literacy education. Information about this related program can be found under the "Curriculum and Instruction" section of the Graduate Catalog.*

Department of Reading and Elementary Education

reel.uncc.edu

Graduate Program Director

Dr. Adriana L. Medina

Graduate Faculty

Dr. Brian T. Kissel, Associate Professor
 Dr. Adriana L. Medina, Associate Professor
 Dr. Maryann Mraz, Professor
 Dr. Zoi Philippakos, Assistant Professor
 Dr. Paola Pilonieta, Associate Professor
 Dr. Robert J. Rickelman, Professor
 Dr. D. Bruce Taylor, Professor
 Dr. Jean Vintinner, Clinical Assistant Professor
 Dr. Karen D. Wood, Professor

MASTER OF EDUCATION IN READING EDUCATION

Designed for experienced teachers, the M.Ed. in Reading Education program qualifies graduates for the North Carolina Advanced Standard Professional II teaching license in K-12 reading education. Relevant to all areas of the K-12 curriculum, this program is designed for classroom teachers and aspiring literacy specialists who are interested in improving instructional programs and practices that promote literacy among all learners.

Program Objectives

Based on professional standards published by the International Reading Association and the N.C. State Department of Education, the program prepares graduates who: 1) understand the theoretical and evidence-based foundations of reading and writing processes and instruction; 2) use instructional approaches, materials and an integrated, comprehensive, balanced curriculum to support student learning in reading and writing; 3) use a variety of assessment tools and practices to plan and

evaluate effective reading and writing instruction; 4) create and engage their students in literacy practices that develop awareness, understanding, respect, and a valuing of differences and diversity in our society; and 5) demonstrate and facilitate professional learning and leadership as a career-long effort and responsibility by serving as a resource to educate teachers, administrators, and the community.

General Requirements for Admission to the Graduate School

Please refer to admission information in the Graduate School section of this Catalog.

Additional Admission Requirements

In addition to the general requirements for admission to the Graduate School, applicants must hold an A level license in any teaching field from the North Carolina Department of Public Instruction (or its equivalent from another state).

Degree Requirements

The M.Ed. Program in Reading, Language, and Literacy Education requires a total of 33 credit hours of courses in four phases:

Phase I: Foundations of Reading and Technology (12 credit hours)

READ 6100 Current Issues and Practices in Literacy (3)

READ 6252 K-12 Writing Development and Instruction (3)

READ 6265 Multiliteracies in a Global World: Reading and Writing Texts in New Times (3)

RSCH 6101 Research Methods (3)

Phase II: Expanding Content and Pedagogical Knowledge (9 credit hours)

READ 6250 Emergent and Elementary Literacy (3)

READ 6255 Middle/Secondary Reading and Writing (3)

ENGL XXXX (e.g., ENGL 6070 or any advisor-approved graduate course in children's/juvenile literature) (3)

Phase III: Developmentally Appropriate Assessment and Instruction (6 credit hours)

EDUC 6254 Individualizing Instruction for Diverse Learners (3)

READ 6204 Teaching Reading to English Language Learners (3)

Phase IV: Reflective Leadership (6 credit hours)

READ 6260 Diagnostic Assessment and Instruction in Reading (3)

READ 6474 Collaborative Leadership in Literacy Education (3)

Online Master's Degree Program

At the time of Catalog printing, the M.Ed. in Reading Education program is offered fully online. The program is designed as a cohort model. Students can complete the degree within two years/five semesters (Fall, Spring, Summer, Fall, Spring).

Clinical Field Experiences

Students in the M.Ed. in Reading Education program participate in clinical field experiences that require them to apply coursework in classroom settings, analyze P-12 student learning, and reflect on their practice in the context of theories on teaching and learning. Students deepen their understanding of the knowledge, skills, and professional dispositions that foster student learning. These experiences broaden their ability to help all students learn, including children with exceptionalities and students from diverse ethnic/racial, linguistic, gender, and socioeconomic groups. These structured field experiences can take place in multiple settings such as neighboring schools or districts, day care centers and after-school programs, alternate youth centers, or in the schools and classrooms in which the student works.

Capstone Experience

Students demonstrate leadership to other teachers, administrators, and the community by making a presentation to attendees of the leading reading organization in the State, the North Carolina Council of the International Literacy Association. They become the voice, the leaders, and the experts who are sharing their knowledge of research and best practices with the professional community. Preparation for this begins in the first course of the program and continues throughout all of the courses as students develop a proposal, assess the needs of teachers and students, and then work collaboratively to plan their mode of dissemination.

Assistantships

The Department typically has a limited number of Graduate Assistantships, pending resources. Applications are available from the Department of Reading and Elementary Education.

Program Approval

All teacher education programs at UNC Charlotte are accredited by the National Council for Accreditation of Teacher Education and approved by North Carolina State Board of Education.

COURSES IN READING, LANGUAGE, AND LITERACY (READ)

READ 5000. Topics in Reading, Language, and Literacy. (1-6) May include classroom and/or clinical experiences in the content areas. *May be repeated for credit with change of topic and permission of department.*

READ 5200. Teaching Reading to Primary Level Learners. (3) Prerequisite: ELED 5101. Research, theory, and instructional practice related to the reading process and reading instruction Grades K-2 with a focus on assessment of emergent reading behaviors; language development and reading; phonics and phonemic awareness; balanced literacy; and meeting the needs of diverse learners. Requires 20 hours of clinical experiences.

READ 5255. Integrating Reading and Writing in the Content Areas. (3) Critical role of reading in learning course content in almost every subject area in the curriculum. Further, it is often the vehicle for assessing students across subjects. Methods for helping students become better readers. Extensive clinical experience required.

READ 5300. Teaching Reading to Intermediate Grade Learners. (3) Prerequisite: READ 5200. Research, theory, and instructional practice related to integrating the communication processes in Grades 3-6. Topics include: vocabulary, comprehension, study skills, authentic, reading in the content areas, assessment-based instruction, addressing the needs of diverse and struggling readers. Requires 20 hours of clinical experiences.

READ 6000. Topics in Reading, Language, and Literacy. (1-6) Cross-listed as EDCI 8040. May include classroom and/or clinic experiences in the content areas. *May be repeated for credit with permission of department.*

READ 6100. Current Issues and Practices in Literacy Education. (3) Cross-listed as EDCI 8140. Theories, research, and instructional methods associated with reading and language arts, preschool through high school; questions of effectiveness related to instructional approaches and materials; related topics such as multicultural literacy, the role of phonics, and assessment.

READ 6204. Teaching Reading to English Language Learners (3) Research, theory, and instructional practices related to the reading process and reading instruction for English Language Learners in K-12 classrooms; relationship between language development and reading; examination of

instructional materials; and field-based application of course content.

READ 6250. Emergent and Elementary Literacy. (3) Cross-listed as EDCI 8250. Prerequisite: Completion of Phase I. Critical reading and use of the literature in literacy education, examination of literacy content taught in the K-6 curriculum with an emphasis on pre-K and beginning reading instruction research, theory and practice, multiple models and approaches for teaching and assessing learning in literacy development, required action research project.

READ 6252. K-12 Writing Development and Instruction. (3) Cross-listed as EDCI 8252. Theories, research, and critical issues related to students' writing development and effective writing instruction. Field experience required.

READ 6255. Middle/Secondary Reading and Writing. (3) Cross-listed as EDCI 8255. Prerequisite: Completion of Phase I. Theories, research, and instructional methods associated with reading and writing in the content areas, with a special emphasis on grades 6-12. Field experience and action research project are required.

READ 6260. Diagnostic Assessment and Instruction in Reading. (3) Cross-listed as EDCI 8256. Prerequisites: Completion of Phases I and II. Examination, uses, and critique of theories and research about literacy processes and problems; diagnosis and correction of reading disabilities; instructional strategies designed to improve reading proficiency.

READ 6265. Multiliteracies in a Global World: Reading and Writing Texts in New Times. (3) Cross-listed as EDCI 8265. Immerses students in both the theory and practice of multiliteracies and considers how globalization has created a more complex environment for teachers and students. Focus goes beyond traditional print-based literacy to multiple forms of knowing, including print, images, video, combinations of forms in digital contexts, which are represented in inter-related and complex ways.

READ 6474. Collaborative Leadership in Literacy Education. (3) Cross-listed as EDCI 8254. Prerequisites: Completion of Phases I, II, and III; READ 6260. Investigates models and strategies for assuming the leadership responsibilities of a literacy specialist, including mentoring, staff development, school-wide literacy program development and assessment, supporting the action research of teachers, and developing partnerships with parents and community volunteers.

READ 6800. Individual Study in Reading, Language, and Literacy. (1-6) Cross-listed as EDCI 8840.
Prerequisite: Permission of the student's advisor.
Independent study under the supervision of an appropriate faculty member. *May be repeated for credit.*

School Administration

- **Master of School Administration (MSA)**
- **Graduate Certificate in School Administration**

Department of Educational Leadership
edld.uncc.edu

Graduate Program Director
Dr. Debra S. Morris

Graduate Faculty

Dr. Lynn Ahlgrim-Delzell, Associate Professor
Dr. Bob Algozzine, Professor
Dr. Jim Bird, Associate Professor
Dr. Mark D'Amico, Associate Professor
Dr. Sandra Dika, Associate Professor
Dr. Mickey Dunaway, Associate Professor
Dr. Claudia Flowers, Professor
Dr. Do-Hong Kim, Associate Professor
Dr. Richard Lambert, Professor
Dr. Jae Hoon Lim, Associate Professor
Dr. Florence Martin, Associate Professor
Dr. Brenda McMahon, Associate Professor
Dr. Lisa Merriweather, Associate Professor
Dr. Debra S. Morris, Clinical Assistant Professor
Dr. Rebecca Shore, Associate Professor
Dr. Chuang Wang, Professor
Dr. Jim Watson, Clinical Associate Professor
Dr. Patti Wilkins, Clinical Assistant Professor

MASTER OF SCHOOL ADMINISTRATION (MSA)

The mission of the Master of School Administration (M.S.A.) program is to prepare innovative, collaborative, effective, and reflective leaders who are prepared to develop school environments that ensure equitable and quality learning opportunities for a rapidly changing and increasingly diverse population and that focus on improving the learning for all students in the 21st century. Program graduates qualify for a PreK-12, Level 1 School Administrator's license (Principal).

Program Objectives

Program objectives are aligned with the approved national standards of the Educational Leaders Constituent Consortium, the North Carolina Department of Public Instruction, the National Council for Accrediting Teacher Education, and the State Board of Education's Standards for School

Executives. In particular, there are six basic standards that serve as core curriculum components:

- 1) visioning for school improvement
- 2) creating a positive school culture, providing an effective instructional program, and designing comprehensive professional growth plans
- 3) managing the organization
- 4) collaborating with families and community, responding to diverse interests and needs
- 5) acting with integrity, fairly, and equitably
- 6) interacting and influencing the larger political, social, economic, legal, and cultural context

Admission Requirements

In addition to the general requirements for admission to the Graduate School, applicants must:

- Have a minimum of three years of successful teaching or other professional education experience
- Hold a Class A North Carolina educator license or equivalent
- Submit an acceptable GRE or MAT test score
- Submit a 1-2 page personal statement that addresses professional experiences, future goals, and an understanding that school administrators must possess a comprehensive conceptual, pedagogical, and reflective knowledge base
- Submit a complete résumé showing evidence of leadership
- Submit a copy of the educator license
- Submit three letters of recommendation from school administrators (must include principal) who can attest to your potential success as a school principal

Application deadline is January 1 for applicants applying to the North Carolina Principal Fellows Program. Application deadline is April 1 for enrollment in the master's degree program and the graduate certificate program.

Admission decisions are based on an analysis of applicant profiles made by program faculty and clinical instructors. Applicants with the highest profile rankings are invited to participate in interviews. Program faculty, clinical faculty, school district central office personnel, acting principals/assistant principals, and program graduates serve on interview teams. These interviews are designed to provide the applicant an opportunity to show evidence of academic strengths, leadership potential, and personal characteristics. After the interview, the applicant will provide a writing sample from a given prompt.

The Master of School Administration Program faculty is committed to achieving diversity among the

students admitted in each year's cohort group. The Graduate School will notify applicants of their admission status.

Degree Requirements

The M.S.A. program requires a total of 39 credit hours in a combination of courses in educational leadership, research, technology, curriculum, and instruction. All students must complete the required academic year-long internship under the direction of a principal-mentor and a University supervisor. The internship challenges students to demonstrate a thorough and well-integrated understanding of the basic principles, research findings, and theories covered in their coursework and apply these to educational practice and leadership situations.

ADMN 6100 Fundamentals of Educational Leadership (3)
 ADMN 6105 Legal Aspects of Schooling (3)
 ADMN 6110 School Leadership and Management (3)
 ADMN 6120 Instructional Leadership (3)
 ADMN 6130 Supervision of Instruction (3)
 ADMN 6140 Curriculum Leadership (3)
 ADMN 6161 The Principalship (3)
 ADMN 6410 Internship and Seminar Part I (3)
 ADMN 6420 Internship and Seminar Part II (3)
 ADMN 6490 Internship and Seminar: Administration(3)
 ADMN 6491 Internship and Seminar: Supervision (3)
 EIST 5100 Technology Integration in Education (3)
 RSCH 6101 Research Methods (3)

Capstone Experiences

The year-long internship requires the productive application of knowledge, skills, and dispositions, to the problems of practice. The experience provides a multitude of opportunities for the intern to progressively develop administrative competence. Interns are guided through their experience by their school-site mentor and University clinical supervisor.

Additionally, the M.S.A. and the graduate certificate program completers seeking a North Carolina principal level I license must successfully prepare an electronic portfolio housing appropriate artifacts and evidences demonstrating their proficiency in all seven standards for school executives. As of 2010, candidates seeking a North Carolina Principal's license will no longer take the SLLA (School Leaders Licensure Assessment) from ETS. The assessment to determine licensure has been replaced with the E-Portfolio.

Principal Fellows

Each year a limited number of scholarship/loans for persons seeking an M.S.A. as full-time students are available from the North Carolina Principal Fellows

Program (www.ncpfp.org). The program is funded by the North Carolina General Assembly to help highly qualified persons study school administration on a full-time basis.

GRADUATE CERTIFICATE IN SCHOOL ADMINISTRATION

Students seeking to “add-on” the *Certificate in School Administration* to a previous master’s degree must complete 21 credit hours, of which a portion is a supervised year-long internship.

Admission Requirements

To be eligible and to apply for this program, applicants must:

- Hold a master’s degree from a regionally accredited institution
- Have a cumulative grade point average of at least 3.2 in all previously completed graduate degree coursework
- Have three years of successful teaching experience or other professional education experience
- Submit a complete résumé
- Submit a valid NC educator license or equivalent
- Submit three letters of reference from current or past supervisors (must include principal) that document leadership and administrative experiences and potential for success as a site-based school administrator
- Submit a 1-2 page personal statement that addresses professional experiences, future goals, and an understanding that school administrators must possess a comprehensive conceptual, pedagogical, and reflective knowledge base
- Follow all admission guidelines established by UNC Charlotte’s Graduate School

Certificate Requirements

Required Courses (21 credit hours)

ADMN 6100 Fundamentals of Educational Leadership (3)
 ADMN 6105 Legal Aspects of Schooling (3)
 ADMN 6110 School Leadership and Management (3)
 ADMN 6120 Instructional Leadership (3)
 ADMN 6161 Principalship (3)
 ADMN 6410 Internship and Seminar Part I (1-9)
 ADMN 6420 Internship and Seminar Part II (1-9)

Optional Courses (these do not count toward certificate completion)

ADMN 6490 Internship and Seminar: Administration (3-6)
 ADMN 6491 Internship and Seminar: Supervision (3-6)

COURSES IN SCHOOL ADMINISTRATION (ADMN)

ADMN 6000. Topics in Educational Administration. (1-6) May include classroom and/or clinic experiences in the content area. *May be repeated for credit with permission of department.*

ADMN 6100. Fundamentals of Educational Leadership. (3) The developing role of educational organizations in the United States and the societal and cultural influences that affect the delivery of schooling. Structure and organization of American schools, administrative and organizational theory, legal, moral, and ethical dimensions of schooling within the context of restructuring and reform.

ADMN 6105. Legal Aspects of Schooling. (3) Education law for education professionals which focuses on the legal rights and responsibilities of students, teachers, and administrators and how these legal provisions affect educational policy and practice.

ADMN 6106. Legal Issues in Special Education. (3) Survey of federal and state statutory and administrative provisions governing the delivery of education and related services to exceptional students.

ADMN 6107. School Law for Counselors and Related Professionals. (3) Legal issues and problems of special relevance to school counselors, psychologists, social workers, and related professionals who work with school-age children.

ADMN 6110. School Leadership and Management. (3) Examination of school leadership and administration, focusing on the role, tasks, and responsibilities that accompany school-based leadership.

ADMN 6120. Instructional Leadership. (3) Examination of research-based teaching/learning models and the relationship between instructional decisions and curriculum experiences. Dynamics of group development and problems/practices related to providing instructional assistance to teachers.

ADMN 6130. Supervision of Instruction. (3) Introduction to clinical supervision and development of skills in classroom observation, analysis, evaluation, and assistance. Systems of observation, principles of adult development in school settings, techniques for conducting classroom observations and conferences, and development of staff development programs to remedy assessed weaknesses.

ADMN 6140. Curriculum Leadership. (3)

Examination of internal and external influences on curriculum formation and development at the building level with emphasis on development of administrative strategies for curriculum decision-making which are driven by staff involvement.

ADMN 6161. The Principalship. (3) Examination of school administration focusing on the role, task and responsibilities associated with the principalship with special attention to the conceptual, human and technical skills associated with the principal.

ADMN 6166. Educational Leadership. (3)

Examination of leadership in formal organizations and social and behavioral science research concerning leadership ability with emphasis on educational organizations and the role of the leader in the accomplishment of organizational goals.

ADMN 6410. Internship and Seminar Part I. (1-9)

An academic year internship in educational administration designed to allow theoretical and course-based practical learning to be translated and interwoven into a supervised field-based experience.

ADMN 6420. Internship and Seminar Part II. (1-9)

A continuation of the internship experiences and seminar begun in ADMN 6410.

ADMN 6490. Internship and Seminar:

Administration. (3-6) Prerequisite: Permission of the department. Internship under the supervision of University and on-site personnel in a setting consistent with the student's professional goals in which the student will be involved in the diverse activities expected of the professional administrator. Seminars are held concurrently.

ADMN 6491. Internship and Seminar: Supervision.

(3-6) Prerequisite: Permission of the department. Internship under the supervision of University and on-site personnel in a setting consistent with the student's professional goals in which the student is involved in the diverse activities expected of the curriculum-instructional specialist. Seminars are held concurrently.

ADMN 6601. Seminar in Administration and

Supervision. (1-3) Prerequisite: Permission of the department. Examination of selected areas of interest in educational administration and supervision. *May be repeated for credit.*

ADMN 6800. Individual Study in Educational

Administration. (1-6) Prerequisite: Permission of the student's advisor. Independent study under the

supervision of an appropriate faculty member. *May be repeated for credit.*

Special Education

- **Ph.D. in Special Education**
- **M.Ed. in Special Education**
- **M.A.T. in Special Education**
- **Graduate Certificate in Academically or Intellectually Gifted (AIG)**
- **Graduate Certificate in Autism Spectrum Disorders (ASD)**
- **Graduate Certificate in Special Education: Adapted Curriculum**
- **Graduate Certificate in Special Education: General Curriculum**

Department of Special Education and Child Development

spcd.uncc.edu

Graduate Program Directors

Dr. Diane Browder, Ph.D. in Special Education
 Dr. Wendy Wood, M.Ed. in Special Education
 Dr. Michael Matthews, M.Ed. in Academically or Intellectually Gifted
 Dr. Wendy Wood, M.A.T. in Special Education and Graduate Certificate in ASD
 Dr. Michael Matthews, Graduate Certificate in AIG
 Dr. LuAnn Jordan, Coordinator for Graduate Certificate in Special Education

Graduate Faculty

Dr. Kelly Anderson, Associate Professor
 Dr. Janet Baxter, Clinical Associate Professor
 Dr. Kristen Beach, Assistant Professor
 Dr. John Beattie, Assistant Professor
 Dr. Diane Browder, Distinguished Professor
 Dr. Gloria Campbell-Whatley, Associate Professor
 Dr. Belva Collins, Professor and Department Chair
 Dr. Cindy Gilson, Assistant Professor
 Dr. LuAnn Jordan, Associate Professor
 Dr. Ya-yu Lo, Professor
 Dr. Michael Matthews, Professor
 Dr. Christopher O'Brien, Associate Professor
 Dr. JaneDiane Smith, Associate Professor
 Dr. Fred Spooner, Professor
 Dr. David Test, Professor
 Dr. Shawnee Wakeman, Clinical Associate Professor
 Dr. Charles Wood, Professor
 Dr. Wendy Wood, Associate Professor

PH.D. IN SPECIAL EDUCATION

The doctoral program at UNC Charlotte prepares special educators as collaborators, teachers, leaders, and researchers whose work contributes to enhancing the quality of life of individuals who are exceptional learners and their families. Students specialize in high or low incidence disabilities or in the Academically or Intellectually Gifted (AIG). This program offers graduates the widest array of career options and provides the solid research foundation needed for the rapidly changing field of special education. Potential employment for program graduates includes leadership positions in schools and agencies and faculty positions in higher education as teacher trainers/researchers.

The program builds on the Master of Education in Special Education or a comparable program. Applicants who wish to focus on AIG may have a Master's degree in other areas of education with additional coursework in gifted education. The 59-credit Ph.D. program includes 14 credit hours in doctoral seminars in special education, 12 credit hours in research and practice (field work and writing courses), 15 credit hours in research, 15 credit hours of an individually designed specialty, and a dissertation. Additional coursework may be required for students who do not have a Master's degree or licensure in Special Education or AIG; whose master's program was not comparable to UNC Charlotte's; or whose Master's coursework is outdated.

The program will accept up to two courses as transfer from a regionally accredited doctoral granting institution, providing the Special Education Doctoral Committee determines that the course or courses to be transferred are equivalent to similar courses required in the UNC Charlotte Special Education Ph.D. program or fit the specialty area. The grade in these transfer courses must be an A or B. Transfer credits cannot replace the four core doctoral seminars in special education, and all of the dissertation work must be completed at UNC Charlotte.

Timelines

Students are admitted for either full-time study or intensive part-time study and begin in the Fall semester. Students must complete their degree, including the dissertation, within 8 years. The minimum time for completion for a full-time student is 3 years. Full-time students must meet benchmark requirements each year to maintain their status as a doctoral student. Part-time students also must meet benchmark requirements that occur approximately every two years. These benchmarks are intended to help students achieve their goal of completing the doctorate in a timely manner.

Additional Admission Requirements

Applications for admission will be accepted once a year to begin doctoral studies in the fall semester and must be submitted to the Graduate Admissions Office by December 1.

The following documents must be submitted in support of the application:

- 1) One official transcript of all academic work attempted since high school indicating a GPA of 3.5 (on a scale of 4.0) in a graduate degree program.*
- 2) Official report of score on the GRE or MAT that is no more than 5 years old.*
- 3) At least three references* of someone who knows the applicant's current work and/or academic achievements in previous degree work.
- 4) A two page essay describing prior experiences with individuals with exceptionalities and objectives for pursuing doctoral studies.*
- 5) A current resume or vita.
- 6) A professional writing sample (e.g., published article, manuscript submitted for publication, term paper submitted in prior coursework, abstract of thesis, teaching manual).
- 7) Documentation of teaching and other field experience (e.g., copy of teaching evaluation or letter of recommendation from supervisor and licensure in special education or AIG certificate)
- 8) An interview with the program faculty.
- 9) International students must submit official and acceptable English language proficiency test scores on the Test of English as a Foreign Language (TOEFL), the Michigan English Language Assessment Battery (MELAB), or the International English Language Testing System (IELTS). All tests must have been taken within the past two years.**

**These items are required of applicants to any of UNC Charlotte's doctoral programs.*

***See the Graduate School's website for minimum acceptable scores.*

Degree Requirements

Doctoral Seminars in Special Education (14 credit hours)

- SPED 8671 Doctoral Seminar in Special Education Research (3)
- SPED 8672 Doctoral Seminar in Leadership in Special Education (3)
- SPED 8673 Doctoral Seminar in Diversity and Collaboration (3)
- SPED 8674 Doctoral Seminar in Teaching in Special Education (3)
- SPED 8699 Dissertation Proposal Seminar in Special Education (2)

Research and Practice in Special Education (12 credit hours)

Note: The following courses are used in the development of portfolios I and II.

- SPED 8471 Professional Writing in Special Education (2)
- SPED 8472 Research Implementation in Special Education (2)
- SPED 8473 Grant Writing in Special Education (2)
- SPED 8474 Supervision of Student Teachers in Special Education (3)
- SPED 8475 College Teaching in Special Education (3)

Research Courses (15 credit hours + Doctoral Seminar in Research and Dissertation Seminar)

- RSCH 8110 Descriptive and Inferential Statistics (3)
- RSCH 8113 Single-Case Research (3)
- RSCH 8120 Advanced Statistics (3)

Plus select 2 of the following:

- RSCH 6130 Presentation and Computer Analysis of Data (3)
- RSCH 8111 Qualitative Research Methods (3)
- RSCH 8112 Survey Research Methods (3)
- RSCH 8140 Multivariate Statistics (3)
- RSCH 8196 Program Evaluation Methods (3)
- SPED 8800 Independent Study in Special Education (3)

Specialty Courses (15 credit hours)

An individually designed specialty of graduate courses developed by student and advisor. This specialty is typically related to the student's licensure area and may include the following components:

Required Courses (6 credit hours)

- SPED 8475 College Teaching in Special Education (3)
(Co-teaching in three licensure or other courses related to student's specialty) (May be repeated for credit)
- SPED 8675 Special Education Doctoral Seminar in Applied Behavioral Analysis (3)

Elective Courses (9 credit hours)

Select from the following:

- SPED 8475 College Teaching in Special Education (3)
(May be repeated once for credit)
- SPED 8477 Teacher Preparation in Online Settings (3)
- SPED 8800 Independent Study in Special Education (1-6)

Dissertation (3+ credit hours)

- SPED 8999 Dissertation Credits (3, 6, or 9)

Additional Degree Requirements

In addition to coursework and the dissertation, students complete a portfolio of achievements related to the four focus areas: leadership, collaboration and

diversity, teaching, and research. This portfolio must receive satisfactory ratings from the Portfolio Review Committee at two critical junctures known as Benchmark One and Benchmark Two. The first benchmark serves as a Qualifying Examination and includes demonstration of writing, teaching, and research skills. The second benchmark is comparable to the comprehensive exams required by some Ph.D. programs in Special Education and includes the development of a grant. Students receive opportunities to build this portfolio through the Research and Practice coursework. The following are some of the products in the portfolio: research based paper, journal article review, conference presentation, advocacy project, grant proposal, team study, and research report.

Dissertation Requirements

The purpose of the dissertation is for doctoral students to demonstrate their ability to synthesize the professional literature and generate new knowledge for the profession through using well-established research tools. For the Ph.D. in Special Education, the dissertation may be quantitative (group or single subject) or qualitative research. Whatever type of design, it must adhere to current standards for quality as reflected in professional writing on the chosen method of research design and reflected in the current literature. Students must be continuously enrolled for dissertation research credits through the semester of graduation. Defense of the dissertation is conducted in a final oral examination that is open to the University community.

Application for Degree

Students must submit an online Application for Degree during the semester in which they successfully defend their dissertation proposal. Adherence to Graduate School deadlines is expected. Degree requirements are completed when students successfully defend their dissertation and file the final copy of the dissertation in the Graduate School.

MASTER OF EDUCATION (M.Ed.) IN SPECIAL EDUCATION

The Master of Education (M.Ed.) in Special Education is a professional graduate degree that serves experienced teachers who have obtained an undergraduate degree and a Standard Professional 1 (SP1) Professional Educator's License and who wish to be collaborative instructional leaders who are knowledgeable, effective, reflective, and responsive to equity and diversity. Upon completion of the 33 credit hour program, graduates will qualify for the North Carolina Standard Professional 2 (SP2) Professional Educator's License.

There are two majors for the M.Ed. in Special Education: (1) Special Education or (2) Academically or Intellectually Gifted. For the Major in Special Education, a bachelor's degree with a Major in Special Education and a Standard Professional 1 (SP1) Professional Educator's License in Special Education from the North Carolina Department of Public Instruction (or its equivalent from another state) are required. For the Major in Academically or Intellectually Gifted (AIG), a bachelor's degree and a Standard Professional 1 (SP1) Professional Educator's License in any content area from North Carolina or its equivalent from another state is required.

Additional Admission Requirements

- 1) Official transcripts of all previous work beyond high school documenting an overall grade point average of at least 3.0 (based on a 4.0 scale)
- 2) Official agency reports of satisfactory GRE or MAT test scores (30th percentile or above). Potential students who are applying directly for admission to the M.Ed. in Special Education – Academically or Intellectually Gifted (AIG) should provide official agency reports of satisfactory GRE or MAT test scores (30th percentile or above). Applicants who previously have received a grade of A in three (if the fourth course is in progress at the time of application) or all four of the 4 Graduate Certificate courses in AIG at UNC Charlotte may waive the GRE/MAT score requirement. Students who have received one or more course grades below A in UNC Charlotte graduate certificate courses in AIG are not eligible for this waiver and must provide GRE or MAT scores with their application to the M.Ed. *Note: Waiver requests should be sent to the AIG Graduate Program Director.*
- 3) At least three evaluations from professional educators familiar with the applicant's personal and professional qualifications
- 4) An essay of one to two pages describing the applicant's experience and objective in undertaking graduate study
- 5) Apply online at gradadmissions.uncc.edu

Degree Requirements: Major in Special Education

Required Core Courses (9 credit hours)

EDUC 6254 Individualizing Instruction for Diverse Learners (3)
SPED 6502 Advanced Classroom Management (3)
SPED 6503 Instructional Design in Special Education (3)

Required Research Courses (12 credit hours)

RSCH 6101 Research Methods (3)
RSCH 7113 Single-Case Research (3)

SPED 6692 Research Proposal (2)
 SPED 6693 Research Implementation (2)
 SPED 6694 Research Dissemination and Leadership
 (2)

Concentration Courses (12 credit hours)

Select elective courses within a single concentration:

Adapted Curriculum (add-on license)
 Autism Spectrum Disorders (graduate certificate)
 Educational Leadership (add-on license)
 General Curriculum (add-on license)
 Other, as developed with approval of advisor

Degree Requirements: Major in Academically or Intellectually Gifted (AIG)

Phase I: Developing Perspective (18 credit hours)

RSCH 6101 Research Methods (3)
 SPED 5211 Nature and Needs of Gifted Students (3)
 SPED 6124 Methods of Instructing Gifted Students (3)
 SPED 6161 Social and Emotional Needs of Gifted
 Students (3)
 SPED 6224 Adapting Curriculum Materials and
 Classroom Differentiation (3)
 RSCH 7111 Qualitative Research Methods (3)
 --OR-- another 3-credit RSCH course as approved
 by advisor

Phase II: Content and Pedagogy (15 credit hours)

SPED 6241 Advanced Curriculum for Gifted Students
 (3)
 SPED 6270 Gifted Assessment and Program
 Evaluation (3)
 SPED 6637 Theory and Development of Creativity (3)
 SPED 6695 Research Proposal in AIG (3)
 SPED 6696 Research Implementation in AIG (3)

Clinical Field Experiences

Most courses require students to apply the knowledge learned in classes to public/private school classrooms.

Capstone Experiences

The capstone experience is fulfilled by completing a Master's Research Project.

Elective Courses

The Major in Special Education includes 12 elective credit hours in a Concentration. These hours enable students to add on an additional North Carolina teaching license in Adapted Curriculum or General Curriculum, or students may select an individualized set of courses for their Concentration requirements with approval by their advisor. The Major in Academically or Intellectually Gifted has no elective credit hours.

Advising

Upon acceptance into the program all students are assigned an advisor. Students are expected to meet with their advisor each semester to discuss their coursework.

Licensure

Successful completion leads to the North Carolina Standard Professional 2 (SP2) Professional Educator's License in Special Education or in Special Education: Academically or Intellectually Gifted, as appropriate to the major.

Committees

Each student will have a committee of two graduate faculty members who will provide guidance through their research project.

Research Opportunities/Experiences

The Special Education faculty continuously achieves regional, state, and national recognition in scholarship, teaching, and research. As a result students will have the opportunity to become involved in an applied research project.

Program Accreditation/Approval

All teacher education programs at UNC Charlotte are accredited by the National Council for Accreditation of Teacher Education. Both the M.Ed. in Special Education, Major in Special Education, and the M.Ed. in Special Education, Major in Academically or Intellectually Gifted, have been approved by the North Carolina State Board of Education.

MASTER OF ARTS IN TEACHING (M.A.T.) IN SPECIAL EDUCATION

The Master of Arts in Teaching (M.A.T.) program is designed for individuals who do not already hold a bachelor's degree and/or professional teaching license in Special Education. The M.A.T. program is a 39 credit hour program composed of two phases, the Graduate Certificate phase (Phase I) and the Master's degree completion phase (Phase II). Completion of Phase I of the M.A.T. leads to the North Carolina Standard Professional 1 (SP1) Professional Educator's License in Special Education. Phase I requires 27 credit hours of coursework, including the graduate internship experience. Upon completion of Phase I, qualified candidates may apply for Phase II to complete the remaining requirements for the Master's degree and qualify for the North Carolina Standard Professional 2 (SP2) Professional Educator's License. For more information on the M.A.T., please visit pathwaytoteaching.com.

All courses for both phases of the M.A.T. must be completed within six years. Coursework within Phase I/Graduate Certificate must be completed within four years.

General Requirements for Admission to the Graduate School

Please refer to admission information in the "Graduate School" section of this *Catalog*.

Admission Requirements

Graduate Certificate in Teaching (M.A.T. Phase I Initial licensure only)

- 1) An undergraduate degree from a regionally accredited four-year institution
- 2) A cumulative undergraduate GPA of 3.0 (*For alternative ways to demonstrate academic competence, applicants may contact the Office of Teacher Education Advising, Licensure, and Recruitment (TEALR)*)
- 3) Three recommendations from persons knowledgeable of the applicant's interaction with children or youth
- 4) A statement of purpose
- 5) A clear criminal background check
- 6) Apply online at gradadmissions.uncc.edu

M.A.T. (Phase II) Program

- 1) Completion of the Graduate Certificate in Teaching
- 2) A minimum graduate GPA of 3.5 in the Graduate Certificate in Teaching
- 3) Students with a GPA below 3.5 in the Graduate Certificate may be considered for admission to the M.A.T. program with scores above the 30th percentile on either the GRE or Millers Analogies Test
- 4) One recommendation from a full-time faculty member who has taught the applicant in the Graduate Certificate in Teaching program
- 5) A statement of purpose
- 6) Apply online at gradadmissions.uncc.edu

Additional Admission Requirements

In addition to the required application materials, candidates must be currently employed as a teacher, teacher assistant, or have taught within the last two years. Candidates must submit proof of employment along with the required application materials.

Degree Requirements: General Curriculum Phase I/Graduate Certificate Required Courses (27 credit hours)

SPED 5100 Introduction to Special Education (3)
 SPED 5173 Diagnostic Assessment (3)
 SPED 5175 Instructional Planning in Special Education (3)
 SPED 5270 Classroom Management (3)

SPED 5272 Teaching Mathematics to Learners with Special Needs (3)
 SPED 5277 Teaching Written Expression to Learners with Special Needs (3)
 SPED 5279 Content-Area Instruction for Students with Special Needs (3)
 SPED 6475 Internship/Seminar: Special Education K-12 - General Curriculum (3)
 SPED 5275 Teaching Reading to Elementary Learners with Special Needs (3)
 or SPED 5276 Teaching Reading to Middle and Secondary Learners with Special Needs (3)

Phase II/Completion of the M.A.T. Required Courses (12 credit hours)

RSCH 7113 Single-Case Research (3)
 SPED 6502 Advanced Classroom Management (3)
 SPED 6503 Instructional Design in Special Education (3)
 SPED 6690 Consultation and Collaboration (2)
 SPED 6691 Seminar in Professional and Leadership Development (1)

Degree Requirements: Adapted Curriculum Phase I/Graduate Certificate Required Courses (27 credit hours)

SPED 5100 Introduction to Special Education (3)
 SPED 5173 Diagnostic Assessment (3)
 SPED 5270 Classroom Management (3)
 SPED 5271 Systematic Instruction (3)
 SPED 5274 General Curriculum Access and Adaptations (3)
 SPED 5278 Instructional Planning for Students in the Adapted Curriculum (3)
 SPED 5280 Multiple Disabilities (3)
 SPED 5316 Transition Planning and Service Delivery (3)
 SPED 6476 Internship/Seminar: Special Education K-12 - Adapted Curriculum (3)

Phase II/Completion of the M.A.T. Required Courses (12 credit hours)

RSCH 7113 Single-Case Research (3)
 SPED 6502 Advanced Classroom Management (3)
 SPED 6503 Instructional Design in Special Education (3)
 SPED 6690 Consultation and Collaboration (2)
 SPED 6691 Seminar in Professional and Leadership Development (1)

Clinical Field Experiences

Most courses require students to develop their knowledge, skills, and dispositions in public school settings. These experiences broaden their ability to help all students learn, including children with exceptionalities and students from diverse ethnic/racial, linguistic, gender, and socioeconomic groups. During clinical experiences, students apply

research and/or evidence-based practices gained in coursework, analyze P-12 student learning, and develop the ability to positively impact all learners. All students are expected to complete clinical experiences in at least two significantly different settings.

Candidates who are lateral entry teachers and teacher assistants must move beyond their own classrooms and schools for at least two clinical experiences. Alternative settings must be approved by the instructor and may include schools on different schedules, after-school and summer programs, Saturday programs, and private and charter schools. A limited number of clinical experiences may be approved in significantly different classrooms within their school of employment. Employed candidates are encouraged to seek assistance and support from their administrators.

Capstone Experiences

The capstone experience for the M.A.T. will be fulfilled by completing the SPED 6691 (Seminar in Professional and Leadership Development) evidence project (Data-based Decision Project).

Advising

Upon acceptance into the program, all students are assigned an advisor. Students are expected to meet with their advisor each semester to discuss their coursework.

Licensure

Upon successful completion of the M.A.T. Phase I/Graduate Certificate, students are recommended for the North Carolina Standard Professional 1 (SP1) Professional Educator's License. For this initial license, students are required to complete an electronic licensure portfolio that is created during coursework and the internship. Upon successful completion of the M.A.T. Phase II, students are recommended for the North Carolina Standard Professional 2 (SP2) Professional Educator's License. For the Professional 2 license, students are required to complete an advanced electronic licensure portfolio during coursework.

Committees

The instructor of SPED 6691 (Seminar in Professional and Leadership Development) and one other assigned faculty, serving as a second reviewer, serve as members of the candidate's culminating committee in completion of the capstone evidence project (Data-based Decision Project).

Program Accreditation/Approval

All teacher education programs at UNC Charlotte are accredited by the National Council for Accreditation

of Teacher Education. The M.A.T. in Special Education has been approved by the North Carolina State Board of Education.

GRADUATE CERTIFICATE IN ACADEMICALLY OR INTELLECTUALLY GIFTED (AIG)

The Graduate Certificate in AIG provides a consistent, cohesive structure for teachers seeking to add on the North Carolina Standard Professional 1 (SP1) AIG Professional Educator's license. To be considered for admission to the Graduate Certificate (AIG licensure) Program, applicants must hold or be eligible for a North Carolina teaching license or its equivalent from another state. Applicants will need to hold a teaching position before enrolling in SPED 6124 and SPED 6224 in order to meet course requirements.

Certificate Admission Requirements

- 1) A bachelor's degree from a regionally accredited college/university
- 2) An Application for Admission to the Graduate School
- 3) Original transcripts that indicate a minimum overall GPA of at least 3.0
- 4) A teaching license from North Carolina or its equivalent from another state
- 5) Recommendation letters and GRE or MAT scores are not required for applications to the Graduate Certificate in AIG, but are required for admission to the M.Ed. program

Notes: If accepted into the master's degree program, a maximum of twelve (12) Graduate Certificate hours may be applied toward the M.Ed. AIG degree, to elective requirements in other Special Education M.Ed. majors, or to other UNC Charlotte M.Ed. programs, with the permission of the program's Graduate Program Director and the student's academic advisor. Admission to the Graduate Certificate program does not ensure admission into a master's degree program. Applicants must take the GRE or MAT before applying to the Special Education master's degree program in AIG. Applicants who previously have received a grade of A in three (if the fourth course is in progress at the time of application) or all four of the 4 Graduate Certificate courses in AIG at UNC Charlotte may waive the GRE/MAT requirement. Students who have received one or more course grades below A in UNC Charlotte graduate certificate courses in AIG are not eligible for this waiver and must provide GRE or MAT scores with their application to the M.Ed.

Certificate Requirements

The Graduate Certificate Program in Academically or Intellectually Gifted requires a 12 credit hour sequence of courses.

- SPED 5211 Nature and Needs of Gifted Students (3)
- SPED 6124 Methods of Instructing Gifted Students (3)
- SPED 6161 Social and Emotional Needs of Gifted Students (3)
- SPED 6224 Adapting Curriculum Materials and Classroom Differentiation (3)

GRADUATE CERTIFICATE IN AUTISM SPECTRUM DISORDERS (ASD)

The Graduate Certificate in Autism Spectrum Disorders is a 12 credit hour web-based program. It serves two groups of professionals: (1) those who work in school districts and are responsible for teaching students with Autism Spectrum Disorders and for developing appropriate individualized education plans that include academic instruction, and effective intervention practices in the areas of communication, daily living, and social skills; and (2) those who work in human service agencies that also provide intervention practices in the areas of communication, daily living, and social skills as well as prepare students with Autism Spectrum Disorders to live, work, and learn as adults.

Program Objectives

As specialists in public schools and human service agencies in the area of autism spectrum disorders, completers of the program are prepared to:

- Work as public school teachers in a broad range of educational settings including the general education classroom and special education programs
- Work as human service agency personnel implementing research-validated intervention strategies for children, youth, and adults in community agencies
- Implement research-validated instruction/intervention strategies for children, youth, and young adults with autism spectrum disorders
- Assess the effectiveness of individualized instruction/intervention programs for individuals with autism spectrum disorders.

Certificate Admission Requirements

- 1) A bachelor's degree from a regionally accredited college/university in education or a related field of study
- 2) An Application for Admission to the Graduate School

- 3) Original transcripts that indicate a minimum overall GPA of at least 3.0

Notes: Applicants to the Graduate Certificate in ASD are not required to take the GRE or MAT. However, individuals who are interested in completing the ASD Graduate Certificate as part of the M.Ed. in Special Education degree must take the GRE or MAT to meet the admissions requirements for the M.Ed. in Special Education. If accepted into the master's degree program, a maximum of twelve (12) Graduate Certificate hours may be applied toward the M.Ed. degree program in Special Education with the permission of the Graduate Program Director. Admission to the Graduate Certificate program does not ensure admission into a master's degree program.

Certificate Requirements

The Graduate Certificate Program in Autism Spectrum Disorders requires a 12 credit hour sequence of courses. No transfer credit is accepted. Students must earn grades of B or above in each of the courses in the 12 credit hour program of study.

- SPED 6115 Nature and Needs of Autism Spectrum Disorders (3)
- SPED 6225 Communication, Daily Living and Social Skills for Autism Spectrum Disorders (3)
- SPED 6272 Program Design and Development for Autism Spectrum Disorders (3)
- SPED 6277 Program Assessment for Autism Spectrum Disorders (3)

GRADUATE CERTIFICATE IN SPECIAL EDUCATION – ADAPTED CURRICULUM AND GENERAL CURRICULUM

The Graduate Certificate in Special Education is a 27 credit hour program designed for students who do not hold a bachelor's degree in Special Education. Upon successful completion of the Graduate Certificate, students are eligible for the North Carolina Standard Professional 1 (SP1) Professional Educator's License in Adapted or General Curriculum.

The required courses for the Graduate Certificate are identical to Phase I of the M.A.T. Upon completion of the Graduate Certificate, qualified students have the option of continuing into Phase II to complete the M.A.T. Admission to the Graduate Certificate is separate and distinct from admission to a graduate degree program and not an indication of automatic admission to the M.A.T. degree program. For more information on this option, refer to the M.A.T. in Special Education.

All courses for the Graduate Certificate must be completed within four years.

General Requirements for Admission to the Graduate School

Please refer to admission information in the "Graduate School" section of this *Catalog*.

Admission Requirements for Graduate Certificate in Teaching Programs

- 1) An undergraduate degree from a regionally accredited four-year institution
- 2) A cumulative undergraduate GPA of 3.0 (*For alternative ways to demonstrate academic competence, applicants may contact the Office of Teacher Education Advising, Licensure, and Recruitment (TEALR)*)
- 3) Three recommendations from persons knowledgeable of the applicant's interaction with children or youth
- 4) A statement of purpose
- 5) A clear criminal background check
- 6) Apply online at graduateschool.uncc.edu

Certificate Requirements: General Curriculum

Required Courses (27 credit hours)

- SPED 5100 Introduction to Special Education (3)
- SPED 5173 Diagnostic Assessment (3)
- SPED 5175 Instructional Planning in Special Education (3)
- SPED 5270 Classroom Management (3)
- SPED 5272 Teaching Mathematics to Learners with Special Needs (3)
- SPED 5277 Teaching Written Expression to Learners with Special Needs (3)
- SPED 5279 Content-Area Instruction for Students with Special Needs (3)
- SPED 6475 Internship/Seminar: Special Education K-12 General Curriculum (3)
- SPED 5275 Teaching Reading to Elementary Learners with Special Needs (3)
or SPED 5276 Teaching Reading to Middle and Secondary Learners with Special Needs (3)

Certificate Requirements: Adapted Curriculum

Required Courses (27 credit hours)

- SPED 5100 Introduction to Special Education (3)
- SPED 5173 Diagnostic Assessment (3)
- SPED 5270 Classroom Management (3)
- SPED 5271 Systematic Instruction (3)
- SPED 5274 General Curriculum Access and Adaptations (3)
- SPED 5278 Instructional Planning for Students in the Adapted Curriculum (3)

- SPED 5280 Multiple Disabilities (3)
- SPED 5316 Transition Planning and Service Delivery (3)
- SPED 6476 Internship/Seminar: Special Education K-12 - Adapted Curriculum (3)

Internship

An internship is required for Graduate Certificate students. The graduate-level internship is the culminating experience of the Graduate Certificate program, offering students the opportunity to demonstrate their readiness for the North Carolina Standard Professional 1 (SP1) Professional Educator's License. Students are assigned to an appropriate classroom for a full-time semester-long experience under the supervision of the classroom teacher and university faculty. This internship can be done in a student's place of employment or the University can find placement for the student. Lateral entry teachers and teacher assistants must contact the Office of Field Experiences to determine the appropriateness of their classroom for the internship experience and licensure requirements. This contact should take place at least one semester before the internship.

Clinical Field Experiences

Most courses require students to develop their knowledge, skills, and dispositions in public school settings. These experiences broaden their ability to help all students learn, including children with exceptionalities and students from diverse ethnic/racial, linguistic, gender, and socioeconomic groups. During clinical experiences, students apply research and/or evidence-based practices gained in coursework, analyze P-12 student learning, and develop the ability to positively impact all learners. All students are expected to complete clinical experiences in at least two significantly different settings.

Candidates who are lateral entry teachers and teacher assistants must move beyond their own classrooms and schools for at least two clinical experiences. Alternative settings must be approved by the instructor and may include schools on different schedules, after-school and summer programs, Saturday programs, and private and charter schools. A limited number of clinical experiences may be approved in significantly different classrooms within their school of employment. Employed candidates are encouraged to seek assistance and support from their administrators.

Advising

All students are assigned an advisor upon formal admission to the program. Students should consult with their advisor at least once each semester.

Licensure

Upon successful completion of the Phase I/Graduate Certificate, students are recommended for the North Carolina Standard Professional 1 (SP1) Professional Educator's License. For this license, students are required to complete an electronic licensure portfolio that is created during coursework and the internship. Students apply for the North Carolina Standard Professional 1 (SP1) Professional Educator's License in the TEALR Office.

Program Accreditation/Approval

All teacher education programs at UNC Charlotte are accredited by the National Council for Accreditation of Teacher Education. Both the Graduate Certificate in Adapted Curriculum and the Graduate Certificate in General Curriculum have been approved by the North Carolina State Board of Education.

COURSES IN SPECIAL EDUCATION (SPED)

SPED 5000. Topics in Special Education. (1-6) May include classroom and/or clinical experiences in the content area. *May be repeated for credit with permission of department.*

SPED 5100. Introduction to Special Education. (3). Prerequisite: Admission to Teacher Education. Examines legislation and litigation that governs and/or influences services for individuals with disabilities. Scrutinizes the IEP process and investigates IEP objectives that reflect the general curriculum standards. Examines one's personal philosophy of education, which reflects the diversity of students with disabilities. Identifies services, networks, organizations, and publications that serve or are relevant to individuals with disabilities. Identifies and critiques instructional implications of published research.

SPED 5111. Issues in Early Intervention for Young Children with Disabilities. (3) Prerequisites: Admission to Teacher Education, and a GPA of 2.5 or above. Explores issues and evidence-based practices for young children with disabilities and their families in home, school, and community settings.

SPED 5112. Authentic Approaches to the Assessment of Young Children with Disabilities: Birth-Kindergarten. (3) Prerequisite: Admission to Teacher Education, GPA of at least 2.5, and SPED 5111. Develops competence in evaluation, design, implementation, and interpretation of culturally appropriate, interdisciplinary assessment approaches within the context of the young child's natural environments and in partnership with families that

lead to appropriate intervention plans for children with disabilities. A field-based clinical assignment of approximately 20 hours is required.

SPED 5173. Diagnostic Assessment. (3) Prerequisite: Admission to Teacher Education. Provides an overview of the principles and practice of educational problem solving with an emphasis on formal/standardized assessment, including curriculum-based assessment and curriculum-based measurement; special education eligibility; linkages between assessment and instruction; and concepts in educational assessment of students with exceptional learning needs (ELN). Topical paper required.

SPED 5175. Instructional Planning in Special Education. (3) Prerequisite: Admission to Teacher Education. This introductory course addresses strategies for the development, implementation, and monitoring of Individualized Education Programs (IEPs) and related instructional planning for P-12 students with disabilities within the general curriculum (high incidence disabilities) or adapted curriculum (low incidence disabilities). Through this course, students are expected to demonstrate proficiency in using the general education curriculum to develop appropriate IEPs and lesson plans for instruction.

SPED 5210. Developmental Interventions for Young Children with Disabilities: Birth through Kindergarten. (3) Prerequisites: Admission to Teacher Education; GPA of at least 2.5 overall; SPED 5111; and SPED 5112. Focuses on developing, facilitating, and evaluating incidental learning and play, and routines-based interventions with young children with disabilities and their families. A field-based clinical assignment of approximately 20 hours is required.

SPED 5211. Nature and Needs of Gifted Students. (3) Examination of the historical and philosophical perspectives of education for gifted and talented learners with emphasis on answering the question "What is giftedness?" Issues explored in the course include identification procedures, instructional options, the nature of intelligence and creativity, laws/policies, psychological and emotional correlates of talent, and current research findings.

SPED 5270. Classroom Management. (3) Prerequisite: Admission to Teacher Education. Equips students with the knowledge and skills of applied behavior analysis (ABA) as an approach for programming effective interventions for children and youths with disabilities. It focuses specifically on "positive behavior support" (PBS), a research-validated approach to interventions designed to prevent problem behavior, encourage environmental management, and promote students' positive and

appropriate behavior. Prepares students to conduct a functional behavioral assessment (FBA) in order to more efficiently and effectively identify the interventions to address the students' behavioral needs. The desired outcomes of this course are for students to have a basic understanding of ABA, FBA, and PBS as well as to apply these principles in a classroom setting for students with disabilities.

SPED 5271. Systematic Instruction. (3) Prerequisites: Admission to Teacher Education and Special Education Graduate Certificate Program; SPED 5100; SPED 5173; and SPED 5270. Principles and procedures used to program instruction for persons with severe disabilities are presented and evaluated as to their effectiveness. Students are required to design and implement an instructional program for students with severe disabilities.

SPED 5272. Teaching Mathematics to Learners with Special Needs. (3) Prerequisites: Admission to Teacher Education and Special Education Graduate Certificate Program; SPED 5100; SPED 5173; and SPED 5175. Effective teaching strategies and materials in math for learners with special needs for teacher licensure in Special Education: General Curriculum as stipulated by the North Carolina Department of Public Instruction. A 12-hour field-based clinical experience is a required component of the course. Assessment and application of instructional techniques are included.

SPED 5274. General Curriculum Access and Adaptations. (3) Prerequisites: Admission to Teacher Education and Special Education Graduate Certificate Program; SPED 5100; SPED 5173; and SPED 5270. Strategies for developing curricular priorities for students who need adaptations to the general curriculum including ways to link to state standards in reading, math, writing, science, and other content areas. This is a clinical intensive course requiring 12 hours classroom experience.

SPED 5275. Teaching Reading to Elementary Learners with Special Needs. (3) Prerequisites: Admission to Teacher Education and Special Education Graduate Certificate Program; SPED 5100; SPED 5173; and SPED 5175. Effective prevention and intervention strategies for addressing the needs of elementary students with disabilities and diverse learning needs. Assessment and application of instructional strategies are included in the course. A semester long 12-hour field experience is a required component.

SPED 5276. Teaching Reading to Middle and Secondary Learners with Special Needs. (3) Prerequisites: Admission to Teacher Education and Special Education Graduate Certificate Program, SPED

5100, SPED 5173, SPED 5175, and SPED 5270. Provides effective remedial and intervention strategies for addressing the needs of middle and secondary students with disabilities and diverse learning needs. Assessment and application of instructional strategies are included in the course. Clinical field experience hours required.

SPED 5277. Teaching Written Expression to Learners with Special Needs. (3) Prerequisites: Admission to Teacher Education and Special Education Graduate Certificate Program; SPED 5100; SPED 5173; and SPED 5175. Provides students with effective teaching strategies and materials in written expression to learners with special needs. A 12-hour field experience is a required component of the course. The field experience includes assessment and application of instructional techniques with students identified as receiving special education services. Designed to address core and specific competencies in teaching written expression to students with special needs for teacher licensure in Special Education: General Curriculum as stipulated by the North Carolina Department of Public Instruction.

SPED 5278. Instructional Planning for Students in the Adapted Curriculum. (3) Prerequisites: Admission to Teacher Education and Special Education Graduate Certificate Program; SPED 5100; SPED 5173; and SPED 5270. Addresses strategies for the development, implementation, and monitoring of Individualized Education Programs (IEPs) and related instructional planning for P-12 students with disabilities within the adapted curriculum (low incidence disabilities). Through this course, students are expected to demonstrate proficiency in developing appropriate IEPs. Additionally, this course provides strategies for lesson planning that include collaborative instruction, Universal Design for Learning, and instructionally relevant use of computer-based technology. Implementation of at least one lesson plan is included. A 10-hour field experience is a required component.

SPED 5279. Content-Area Instruction for Students with Special Needs. (3) Prerequisites: Admission to Teacher Education and Special Education Graduate Certificate program; SPED 5100; SPED 5173; SPED 5175; SPED 5270; SPED 5272; SPED 5275 or SPED 5276; and SPED 5277. Provides strategies for collaborative instruction, instructionally relevant use of computer-based technology, and strategic instruction to improve access of students with disabilities in the general curriculum with an emphasis on content-area instruction at the middle and secondary levels: English, science, social studies, and mathematics. Application of instructional strategies are included in the course. A semester long 10-hour field experience is a required component.

SPED 5280. Multiple Disabilities. (3) Prerequisites: Admission to Teacher Education and Special Education Graduate Certificate program; SPED 5100; SPED 5173; and SPED 5270. Describes various secondary disabling conditions that sometimes occur in conjunction with intellectual disability such as physical disabilities, sensory disabilities, and other health impairments. Assessment, instructional methods and procedures, and collaborative service delivery with related services personnel are studied. A field-based clinical assignment of approximately 12 hours is required.

SPED 5316. Transition Planning and Service Delivery. (3) Prerequisites: Admission to Teacher Education and Special Education Graduate Certificate Program; SPED 5100; and SPED 5173. Methods and procedures used in preparing students with disabilities for post school adjustment including employment, leisure, residential, and continuing educational opportunities are studied. A field-based clinical assignment is required.

SPED 6000. Topics in Special Education. (1-6) Prerequisites: Admission to Teacher Education and Special Education Graduate Certificate Program. May include classroom and/or clinical experiences in the content area. *May be repeated for credit with permission of department.*

SPED 6111. Advanced Issues in Early Intervention/Early Childhood Special Education (EI/ECSE). (3) In-depth exploration of issues and evidence-based practices for young children with diverse abilities and their families in home, school, and community settings. Emphasis on current research, developmental/educational implications of disabilities, and leadership in early intervention and early childhood special education.

SPED 6115. Nature and Needs of Autism Spectrum Disorders. (3) Prerequisite: A bachelor's degree from an accredited college or university in education or related field of study. Theoretical application and historical background including awareness of federal and state legal guidelines, characteristics, and ethical implications for individuals with autism spectrum disorders. Prepares students to identify research-based practices and promising practices to address needs and supports across the lifespan for individuals with autism spectrum disorders (e.g., Rett Syndrome, Pervasive Developmental Disorders).

SPED 6124. Methods of Instructing Gifted Students. (3) Pre- or corequisite: SPED 5211. An introduction to the basic skills necessary to plan, implement, and evaluate instructional procedures that facilitate learning by gifted students. Specific theories

discussed include those by Bloom, Kaplan, Parnes, Renzulli, and VanTassel-Baska.

SPED 6161. Social and Emotional Needs of Gifted Students. (3) An overview of current theory and practice in understanding gifted students' social and emotional development. Topics range from the social and emotional needs of the general population of gifted students to the unique needs of specific sub-groups of gifted students (e.g., gifted girls, gifted and learning disabled, gifted minority students).

SPED 6224. Adapting Curriculum Materials and Classroom Differentiation. (3) Pre- or corequisites: SPED 5211, SPED 6124, and SPED 6161. Students study methods of making accommodations to meet the gifted student's needs in the regular classroom. Topics include: differentiated lesson plans based on national and state standards as well as methods of adapting the learning environment to support multi-level learning.

SPED 6225. Communication, Daily Living and Social Skills for Autism Spectrum Disorders. (3) Prerequisite: A bachelor's degree from an accredited college or university in education or related field of study. Determine research-based and promising intervention strategies for individuals with autism spectrum disorders and their families. Prepare students with the technical skills necessary to identify effective intervention practices in the areas of communication, daily living, and social skills for individuals with autism spectrum disorders in natural environments, the least restrictive environment and community settings. Develop proficiency in effective collaboration with parents and professionals in the varied contexts associated with autism spectrum disorders across the lifespan.

SPED 6241. Advanced Curriculum for Gifted Students. (3) Models of curriculum design for academically or intellectually gifted students. Emphasis on integrating philosophy of teacher, school, and community with child characteristics to create the appropriate course of study in a variety of school settings.

SPED 6242. Enhancing Communication and Supporting Behaviors in Inclusive Settings: B-K. (3) Pre- or corequisites: CHFD 6102 and CHFD 6210. Provides professionals with in-depth knowledge regarding theories, evidence-based strategies, and best practices to provide effective social-communication interventions and support challenging behaviors of young children in inclusive settings.

SPED 6270. Gifted Assessment and Program Evaluation. (3) Prerequisites: SPED 6161 and SPED 6224, or permission of instructor. This advanced

course introduces the theory and practice behind structuring programs for gifted students, from legal mandates to assessment considerations, program design, and evaluation of students and programs. Evaluation of gifted programming provides experience applying the frameworks presented in current North Carolina and national standards.

SPED 6272. Program Design and Development for Autism Spectrum Disorders. (3) Prerequisites: SPED 6115 and SPED 6225. Prepares students with the technical skills necessary to conduct formal assessments, implement research-based interventions, and evaluate outcomes for individuals with autism spectrum disorders. Identify methods for planning systematic instruction based on learner characteristics based on previous and on-going assessment. Gain knowledge of home environments, family interventions and general curriculum access with an emphasis on appropriate strategies, materials, and supports in program design and development that facilitate the success of students with autism spectrum disorders across the lifespan.

SPED 6277. Program Assessment for Autism Spectrum Disorders. (3) Prerequisites: SPED 6115 and SPED 6225. Prepares students to assess the effectiveness of interventions for students with autism spectrum disorders in accordance to researched-based practices and promising practices. Interpret and apply individualized educational program assessment data to drive program recommendations, services, appropriate interventions, and IEP development for students with autism spectrum disorders.

SPED 6350. Young Children with Disabilities and their Families: Interdisciplinary Collaboration. (3) Pre- or corequisites: CHFD 6102 and CHFD 6220. Explores issues and evidenced based practices specific to forming family-professional partnerships and collaborating across disciplines (e.g., early intervention/early childhood special education (EI/ECSE), early childhood education, occupational therapy, physical therapy, speech and language therapy, social work, nursing, public health, and education) to address the complex needs of young children with disabilities (or at-risk of developmental delays) and their families in natural and/or least restrictive environments (e.g., home, school, community settings, and hospitals).

SPED 6471. Internship: Academically or Intellectually Gifted. (3) Prerequisites: SPED 5211, SPED 6124, SPED 6641, and permission of department. Supervised experiences in observation, instruction, and administration of programs with gifted and talented students. *Graded on a Pass/Unsatisfactory basis.*

SPED 6475. Internship/Seminar: Special Education K-12-General Curriculum. (3) Prerequisites: Admission to Special Education Graduate Certificate Program and grade of C or higher in all licensure courses; Application for SPED internship. The internship is a planned sequence of experiences in the student's area of specialization conducted in an approved school setting under the supervision and coordination of a University supervisor and a cooperating teacher. During internship the student must demonstrate the competencies identified for his/her specific teaching field in an appropriate grade level setting. Supervised, field-based experiences in observation, instruction and administration of programs for students who have special needs. In addition, the student participates in 8-10 seminars scheduled throughout the semester.

SPED 6476. Internship/Seminar: Special Education K-12- Adapted Curriculum. (3) Prerequisites: Admission to Special Education Graduate Certificate Program and grade of C or higher in all licensure courses; Application for internship. The internship is a planned sequence of experiences in the student's area of specialization conducted in an approved school setting under the supervision and coordination of a University supervisor and a cooperating teacher. During internship the student must demonstrate the competencies identified for his/her specific teaching field in an appropriate grade-level setting. Supervised, field-based experiences in observation, instruction and administration of programs for students who have special needs. In addition, the student participates in 8-10 seminars scheduled throughout the semester.

SPED 6502. Advanced Classroom Management. (3) Prerequisites: Admission to the M.A.T. (Phase II) or M.Ed. in Special Education program. Advanced theoretical context, including applied behavior analysis, functional assessments, and positive behavioral supports, and related applied strategies necessary to effectively address the classroom behaviors of individuals or groups of students. A field-based assignment of approximately 15 hours is required.

SPED 6503. Instructional Design in Special Education. (3) Prerequisite: Admission to the M.A.T. (Phase II) or M.Ed. in Special Education program. Advanced instructional design for learners who have significant difficulty in performing academic tasks with typical instruction. Provides students with a unified set of viable instructional design principles for evaluating or modifying curriculum. Application of these principles ensures that the curriculum is accessible to a diverse group of learners. A field-based assignment of approximately 15 hours is required.

SPED 6637. Theory and Development of Creativity.

(3) Prerequisite: SPED 6161 and SPED 6224, or approval of instructor. Provides an exploration of the concept of creativity: its components, its measurement, and its application to education. Topics discussed in class range from the theoretical (what is creativity? what does it look like?) to the practical (what activities can be used to develop creative behaviors in the classroom setting?). Includes opportunities to prepare materials to be used with small groups of children.

SPED 6641. Seminar in Curriculum Development:

Gifted and Talented. (3) Procedures and suggestions for developing programs for academically or intellectually gifted learners; philosophy of the teacher; school and community assumptions of curriculum; child characteristics; parental concerns; teaching styles.

SPED 6690. Consultation and Collaboration.

(2) Prerequisites: Admission to the M.A.T. (Phase II) in Special Education program. Special educators must be able to build effective partnerships with families, general educators, paraeducators, and related service professionals in order to assure comprehensive and quality programs for children with disabilities. Provides special educators with knowledge relating to the role of parents, paraeducators, administrators, other professionals, and students on multi-disciplinary teams, initiatives in building inclusive programs, and the array of services available to children with disabilities. Provides skills in effective communication; promoting family involvement, including families who are culturally diverse; team planning; collaborative instruction; and leadership. Enhances the view of special educators as specialists and a resource to colleagues for instruction, inclusion, transition, and collaboration with outside agencies.

SPED 6691. Seminar in Professional and Leadership Development.

(1) Prerequisites: Admission to the M.A.T. in Special Education program; SPED 6502; SPED 6503; and RSCH 7113. Pre- or corequisite: SPED 6690. Designed to support graduate students in the design, implementation, and write up of their Data-based Decision Project, required for M.A.T. in Special Education candidates. This project involves the candidate implementing (in a school setting) an academic or behavioral intervention with one or more students using a single subject research methodological design and support/mentor a colleague to implement a similar intervention with other students. The resulting product serves as the capstone project for the M.A.T.

SPED 6692 Research Proposal. (2) Prerequisites: An "A" level special education teaching license, admission to the M.Ed. in Special Education, SPED

6502, SPED 6503, and RSCH 7113. Provides evidence that a candidate can conceptualize and design a single subject research study and supports the development of the capstone project required for M.Ed. in Special Education candidates. Candidates must complete the University's Institutional Review Board (IRB) Research with Human Subjects online tutorial, submit a research protocol application, and receive IRB approval prior to implementing the study. This course is not a traditional, instructor-taught course sequence, but is directed by the candidate's academic advisor and supported by another faculty committee member. (*Fall, Spring*)

SPED 6693. Research Implementation.

(2) Prerequisite: SPED 6692. Provides evidence that a candidate can implement a single subject research study and supports the development of the capstone project required for M.Ed. candidates in special education. This course is not a traditional, instructor-taught course sequence, but is directed by the candidate's academic advisor and supported by another faculty committee member.

SPED 6694. Research Dissemination and Leadership.

(2) Prerequisite: SPED 6693. Provides evidence that candidates develop necessary skills and dispositions to assume the roles and responsibilities of collaborative leaders in schools and communities; demonstrate leadership in their classrooms, school, and professional organizations; and advocate for students and effective educational practices and policies. Candidates produce a written report of a research study and deliver a workshop for their school colleagues. The workshop includes a report of the research results and implications for addressing a problem or issue in the school. This course is not a traditional, instructor-taught course sequence, but is directed by the candidate's academic advisor and supported by another faculty committee member.

SPED 6695. Research Proposal in AIG.

(3) Provides evidence that a candidate can conceptualize and design a research study using a recognized research design, and it supports the development of the capstone research project required for M.Ed. candidates in AIG. Candidates complete the University's Institutional Review Board (IRB) Research with Human Subjects online tutorial, develop and submit a research protocol application, and submit their application for IRB approval prior to implementing the study in SPED 6696.

SPED 6696. Research Implementation in AIG.

(3) Candidates implement a research study using a recognized research design that they have designed in SPED 6695 and will produce a written report to disseminate their findings to stakeholders. Allows students to complete the capstone project requirement

for M.Ed. candidates in the area of Academically or Intellectually Gifted.

SPED 6800. Individual Study in Special Education. (1-6) Prerequisite: Permission of the student's advisor. Independent study under the supervision of an appropriate faculty member. *May be repeated for credit.*

SPED 8271. Single Subject and Qualitative Research in Special Education. (3) In-depth study of single-subject and qualitative research methods as they apply to the field of special education including data collection, research designs, data display and analysis, and writing research reports.

SPED 8471. Professional Writing in Special Education. (2) Introduces the forms of professional writing expected of leaders in special education. Emphasis is placed on critical thinking, practice writing, and peer assessment.

SPED 8472. Research Implementation in Special Education. (2) The process of conducting applied research in special education. Students design and implement a research study in collaboration with a faculty member.

SPED 8473. Grant Writing in Special Education. (2) An experiential course in conceptualizing and developing applications for federal, state, local, and private grant funding for research and innovation efforts. A strong emphasis will be placed on applications for federal and state funding with a secondary focus on applications for corporate and private foundation funds.

SPED 8474. Supervision of Student Teachers in Special Education. (3) An internship experience. The course includes seminar sessions and concentrated practice in supervision of special education student teachers under direct faculty supervision.

SPED 8475. College Teaching in Special Education. (3) Issues and concepts in teaching adults and preparing special educators are applied in this college teaching experience. Supports students as they teach and/or co-teach University courses. *May be repeated for credit up to 15 credit hours.*

SPED 8476. Doctoral Internship in Special Education. (3-6) Supplements students' specialty areas through leadership experiences in a field related to or impacting special education (i.e., government, school district, agency). Provides students with an opportunity to explore their leadership skills in a new role within a field-based setting with the supervision of a mentor. *May be repeated for credit up to 6 credit hours.*

SPED 8477. Teacher Preparation in Online Settings. (3) Presents techniques and supervised practice in the supervision and instruction of adult learners in online learning environments in college or school system settings. Also provides applied practice in course construction and development in selected learning management systems.

SPED 8670. Advanced Research Topics in Special Education. (3) In-depth study of a topic(s) in special education research which addresses current issues in the field of special education.

SPED 8671. Doctoral Seminar in Special Education Research. (3) An intensive overview of the major research designs used in Special Education including group designs, single subject designs, survey research, qualitative research, and program evaluation. Introduces students to the research interests of the faculty.

SPED 8672. Doctoral Seminar in Leadership in Special Education. (3) An intense review of the history, landmark events, professional organizations, and seminal articles in the field of special education and related disciplines. Also includes substantial coverage of federal and state policies, IDEA, and special education law. Prepares students to build professional leadership skills in areas such as time management, systematic planning, team leadership, and communication.

SPED 8673. Doctoral Seminar in Diversity and Collaboration. (3) Advanced study of systems change related to educating students with disabilities who are culturally and linguistically diverse including understanding the meaning of diversity, appreciation of cultural values, principles for working with diverse families, and methods for collaboration. Addresses CEC Multicultural Standards and prepares students to develop culturally responsive instruction for schools, community, and college contexts. Enrollment limited to Ph.D. students in Special Education.

SPED 8674. Doctoral Seminar in Teaching in Special Education. (3) Presents techniques used in the supervision and instruction of adult learners in college or school system settings. Also provides an intensive overview of current, empirically supported strategies for the instruction of learners across disability areas as an important knowledge base for leadership and college teaching roles in special education.

SPED 8675. Special Education Doctoral Seminar in Applied Behavioral Analysis. (3) Advanced study of concepts, principles, and strategies in applied behavioral analysis. Prepares students in the

conceptual and technical skills necessary to change socially significant behavior.

SPED 8676. Doctoral Seminar in Policy Analysis. (3)
Advanced study of contemporary and historical issues in federal, state, and local educational policy, with a focus on policy related to high-achieving and academically gifted children. Also prepares students to engage in advocacy efforts and develop effective policy recommendations to meet the needs of children identified as academically or intellectually gifted.

SPED 8699. Dissertation Proposal Seminar in Special Education. (2) Identification and definition of a research area and development of a proposal draft for an original research study appropriate for dissertation requirement.

SPED 8800. Independent Study in Special Education. (1-6) Prerequisite: Permission of the student's advisor. Independent study under the supervision of an appropriate faculty member. *May be repeated for credit.*

SPED 8999. Dissertation Credits. (3, 6, or 9)
Development, implementation, and evaluation of an original research study that addresses the needs of exceptional learners.

Teaching English as a Second Language

- **Ph.D. in Curriculum and Instruction***
- **Master of Education (M.Ed.)**
- **Master of Arts in Teaching (M.A.T.)**
- **Graduate Certificate in Teaching**

**The Ph.D. in Curriculum and Instruction offers a specialization in Teaching English as a Second Language. Information about this related program can be found under the Curriculum and Instruction heading of the Graduate Catalog.*

Department of Middle, Secondary and K-12 Education

mdsk.uncc.edu

Graduate Program Director

Dr. Lan Quach Kolano

Graduate Faculty

Dr. Scott Kissau, Associate Professor and Department Chair

Dr. Joan Lachance, Assistant Professor

Dr. Lan Quach Kolano, Professor

Dr. Spencer Salas, Associate Professor

MASTER OF EDUCATION (M.ED.) IN TEACHING ENGLISH AS A SECOND LANGUAGE

The M.Ed. in Teaching English as a Second Language is designed for aspiring teachers who wish to work with English Language Learners in schools, community organizations, higher education, or in international contexts. The program addresses current trends in the field of second language by providing a balanced emphasis on the communication, cultural and linguistic features of learning English as a second language. Graduates of the program are prepared to teach English as a Second Language at multiple levels. Upon completion of the program, students who currently hold an initial teaching license may qualify for the North Carolina advanced Standard Professional II teaching license in Teaching English as a Second Language.

General Requirements for Admission to the Graduate School

Please refer to general information provided in The Graduate School section of this *Catalog*.

Additional Admission Requirements

- 1) Corequisite requirement: A minimum of 3 undergraduate or graduate hours in foreign language must be completed either prior to admission or by the end of the degree program
- 2) Apply online at graduateschool.uncc.edu

Degree Requirements

Core Courses (18 credit hours)

ENGL 6161 Introduction to Linguistics (3)
 TESL 5103 Methods in Teaching English as a Second Language (3)
 TESL 5104 Authentic Assessment (3)
 TESL 6204 Multicultural Education (3)
 TESL 6476 Advanced Pedagogy in Teaching English as a Second Language (3)
 RSCH 6101 Research Methods (3)

Language Acquisition Course (3 credit hours)

Select one of the following:

ENGL 6163 Language Acquisition (3)
 TESL 6205 Second Language Acquisition in K-12 Schools (3)

Global Course (3 credit hours)

Select one of the following:

TESL 6206 Globalization, Communities and Schools (3)
 An approved Study Abroad Program (3)
 An approved course substitution (3)

Advanced Specialized Elective Course (3 credit hours)

Select from one of the following:

TESL 5000-6999 (3)
 READ 5000-6999 (3)
 ENGL 5000-6999 (3)

Advanced Leadership and Reflection Courses (6 credit hours)

MDSK 6260 Teacher Leadership (3)
 TESL 6691 Seminar in Professional Development (3)
 or MDSK 6691 Seminar in Professional Development (3)

Capstone Requirement

The capstone experience for the M.Ed. in Teaching English as a Second Language is fulfilled by completing the Comprehensive Electronic Portfolio project.

Clinical Field Experiences

Students in the TESL M.Ed. program participate in structured field experiences that require them to apply coursework in classroom settings, analyze P-12 student learning, and reflect on their practice in the context of theories on teaching and learning. Students deepen their understanding of the knowledge, skills, and professional dispositions that foster student learning. These experiences broaden their ability to help all students learn, including children with exceptionalities and students from diverse ethnic/racial, linguistic, gender, and socioeconomic groups. Upon approval from individual course instructors, these structured field experiences can take place in multiple settings such as neighboring schools or districts, day care centers and after-school programs, alternate youth centers, community outreach centers, local non-profit organizations, or in the schools and classrooms in which the candidates work.

Candidates who are lateral entry teachers and teacher assistants must move beyond their own classrooms and schools for at least two clinical experiences. Alternative settings must be approved by the instructor. A limited number of clinical experiences may be approved in significantly different classrooms within their school of employment. Employed candidates are encouraged to seek assistance and support from their administrators.

Advising

Advising for students in the TESL M.Ed. is handled by the graduate program director. Students should consult with their advisor at least once each semester.

Licensure

Upon successful completion of the TESL M.Ed., students who currently hold an initial teaching license may be eligible for the North Carolina advanced Standard Professional II teaching license in TESL.

Program Approval

All teacher education programs at UNC Charlotte are accredited by the National Council for Accreditation of Teacher Education and approved by the North Carolina State Board of Education.

MASTER OF ARTS IN TEACHING (M.A.T.) IN TEACHING ENGLISH AS A SECOND LANGUAGE

The Master of Arts in Teaching (M.A.T.) English as a Second Language (ESL) program is designed for individuals with a bachelor's degree (in any area) interested in teaching English Language Learners (ELL)

in K-12 public schools. The M.A.T. program is a 39 credit hour program comprised of two phases: the Graduate Certificate phase (Phase I) and the Master's degree completion phase (Phase II). Completion of Phase I (Graduate Certificate) leads to the initial Standard Professional I teaching license in Teaching English as a Second Language (TESL). Phase I requires 24 credit hours of coursework, including a required graduate student teaching/internship experience. Upon completion of Phase I and formal acceptance into the M.A.T. program by the Graduate School, qualified candidates may continue into Phase II to complete the remaining requirements for the Master's degree and qualify for the advanced Standard Professional II teaching license. Applications must be submitted to the Graduate School for formal admission to the Graduate Certificate program in TESL (Phase I). Upon completion of Phase I, another application must be submitted for formal admission to the Master's program (Phase II). For more information on the M.A.T., please visit pathwaytoteaching.com.

Note: Admission to the Graduate School is separate and distinct from admission to a graduate certificate degree program and not an indication of automatic admission to the M.A.T. degree program. For more information on this option, refer to the M.A.T. section above.

All courses for both phases of the M.A.T. must be completed within six years. Coursework within Phase I/Graduate Certificate must be completed within four years.

General Requirements for Admission to the Graduate School

Please refer to general information provided in The Graduate School section of this *Catalog*.

Admission Requirements for all M.A.T. Programs

- 1) Successful completion of the Graduate Certificate in Teaching
- 2) A minimum graduate GPA of 3.5 in the Graduate Certificate in Teaching
- 3) Three recommendation letters that include at least one from a full-time faculty member who has taught the student in the Graduate Certificate in Teaching English as a Second Language program
- 4) A statement of purpose (500-1000 words)
- 5) Apply online at graduateschool.uncc.edu

The GRE or Miller Analogies Test may be required for students with GPAs that do not meet minimum requirements. There may be additional requirements (at the discretion of the Graduate Program Director) for admittance to the TESL Master's program.

Degree Requirements

Phase I/Graduate Certificate Required Courses (24 credit hours)

ENGL 6161 Introduction to Linguistics (3)
 MDSK 6162 Planning for K-12 Instruction (3)
 READ 6204 Teaching Reading to English Language Learners (3)
 TESL 5103 Methods in Teaching English as a Second Language (3)
 TESL 5104 Authentic Assessment (3)
 TESL 6204 Multicultural Education (3)
 TESL 6205 Second Language Acquisition in K-12 Schools (3)
 or ENGL 6163 Language Acquisition (3)
 TESL 6470 Internship in Teaching English as a Second Language (3)*

**TESL 6470 is a full-time internship requiring employment as an English as a Second Language teacher in an approved school or a non-paid placement with a licensed ESL teacher in a public school. It requires a formal application and approval during the semester prior to the internship.*

Phase II/Completion of M.A.T. Required Courses (15 credit hours)

Note: All requirements of Phase I must be completed before beginning Phase II.

MDSK 6260 Teacher Leadership (3)
 RSCH 6101 Research Methods (3)
 TESL 6476 Advanced Pedagogy in Teaching English as a Second Language (3)
 TESL 6691 Seminar in Professional Development (3)
 or MDSK 6691 Seminar in Professional Development (3)

Plus one of the following:

TESL 6206 Globalization, Communities, and Schools (3)

An approved Study Abroad Program (3)**

An approved course substitution (3)

***Written approval must be given in advance by the Graduate Program Coordinator.*

Capstone Requirements

The capstone experience for the M.A.T. will be fulfilled by completing the Comprehensive Electronic Portfolio project. In addition, candidates for the M.A.T. will complete an electronic licensure portfolio during coursework that demonstrates their readiness for the advanced Standard Professional II teaching license.

Clinical Field Experiences

Most courses require students to develop their knowledge, skills, and dispositions in public

school/agency settings. All students are expected to complete clinical experiences in at least two significantly diverse settings. Clinical field experiences provide opportunities for helping all students learn, including children with exceptionalities and students from diverse ethnic/racial, linguistic, gender, and socioeconomic groups. During clinical experiences, students apply theories and understandings gained in coursework, analyze P-12 student learning, and develop the ability to positively impact all learners. All students are expected to complete clinical experiences in at least two different settings. Upon approval from course instructors, these structured experiences can take place in multiple settings such as neighboring schools or districts, day care centers and after-school programs, alternate youth centers, community organizations, non-profit organizations, or in the schools and classrooms in which the candidates work.

Candidates who are lateral entry teachers and teacher assistants must move beyond their own classrooms and schools for at least two clinical experiences. Alternative settings must be approved by the instructor. A limited number of clinical experiences may be approved in significantly different classrooms within their school of employment. Employed candidates are encouraged to seek assistance and support from their administrators.

Internship/Student Teaching

The graduate-level student teaching/internship is the culminating experience in Phase I of the M.A.T., offering students the opportunity to demonstrate their readiness for the initial Standard Professional I teaching license. Students are assigned to an appropriate classroom for a full-time, semester-long experience under the supervision of the classroom teacher and university faculty. Lateral entry teachers and teacher assistants must contact the Office of Field Experiences to determine the appropriateness of their classroom for the student teaching/internship experience and licensure requirements. This contact should take place at least one semester before student teaching.

There is no required internship for Phase II of the M.A.T.

Advising

All students are assigned an advisor upon formal admission to the program. Students should consult with their advisors at least once each semester.

Licensure

Upon successful completion of the Phase I/Graduate Certificate, students are recommended for the North Carolina initial Standard Professional I teaching

license. For this initial license, students are required to complete an electronic licensure portfolio that is created during coursework and student teaching. Upon successful completion of Phase 2, students are recommended for the North Carolina advanced Standard Professional II teaching license. For the advanced license, students are required to complete an advanced electronic licensure portfolio during coursework.

Program Approval

All teacher education programs at UNC Charlotte are accredited by the National Council for Accreditation of Teacher Education and approved by North Carolina State Board of Education.

GRADUATE CERTIFICATE IN TEACHING ENGLISH AS A SECOND LANGUAGE

The Graduate Certificate in Teaching English as a Second Language (TESL) is a 24 credit hour program, including a required graduate student teaching/internship experience. The Graduate Certificate is designed for students who hold a bachelor's degree and wish to teach English as a Second Language in K-12 settings. Completion of the Graduate Certificate leads to the initial Standard Professional I teaching license in Teaching English as a Second Language.

The required courses for the Graduate Certificate are identical to Phase I of the M.A.T. Upon completion of Phase I and formal acceptance into the M.A.T. program by the graduate school, qualified candidates may continue into Phase II to complete the remaining requirements for the Master's degree and qualify for the advanced Standard Professional II teaching license. Applications must be submitted to the Graduate School for formal admission to the Graduate Certificate Program in TESL (Phase I). Upon completion of Phase I, another application must be submitted for formal admission to the Master's program. For more information on the M.A.T., please visit pathwaytoteaching.com.

Note: Admission to the Graduate Certificate is separate and distinct from admission to a graduate degree program and not an indication of automatic admission to the M.A.T. degree program. For more information on this option, refer to the M.A.T. in Teaching English as a Second Language.

All courses for the Graduate Certificate must be completed within four years.

General Requirements for Admission to the Graduate School

Please refer to general information provided in The Graduate School section of this *Catalog*.

Admission Requirements for all Graduate Certificates in Teaching programs

- 1) An undergraduate degree from a regionally accredited four-year institution.
- 2) A cumulative undergraduate GPA of 3.0. (For alternative ways to demonstrate academic competence, contact the Office of Teacher Education Advising, Licensure, and Recruitment (TEALR).)
- 3) Three recommendations from persons knowledgeable of your interaction with children or youth
- 4) Statement of purpose (500-1000 words)
- 5) Clear criminal background check
- 6) Apply online at graduateschool.uncc.edu

Certificate Requirements

Phase I/ Graduate Certificate Required Courses (24 hours)

ENGL 6161 Introduction to Linguistics (3)
 MDSK 6162 Planning for K-12 Instruction (3)
 READ 6204 Teaching Reading to English Language Learners (3)
 TESL 6204 Multicultural Education (3)
 TESL 5103 Methods in Teaching English as a Second Language (3)
 TESL 5104 Authentic Assessment (3)

One of the following:

ENGL 6163 Language Acquisition (3) or
 TESL 6205 Second Language Acquisition in K-12 Schools (3)

Internship

TESL 6470 Internship in Teaching English as a Second Language (3)*

**TESL 6470 is a full-time internship requiring employment as an English as a Second Language teacher in an approved school or a non-paid placement with a licensed ESL teacher in a public school. It required application and approval during the semester prior to the internship.*

Clinical Field Experiences

Most courses require students to develop their knowledge, skills, and dispositions in public school settings. These experiences broaden their ability to help all students learn, including children with exceptionalities and students from diverse ethnic/racial, linguistic, gender, and socioeconomic

groups. During clinical experiences, students apply theories and understandings gained in coursework, analyze P-12 student learning, and develop the ability to positively impact all learners. All students are expected to complete clinical experiences in at least two significantly diverse settings.

Candidates who are lateral entry teachers and teacher assistants must move beyond their own classrooms and schools for at least two clinical experiences. Alternative settings must be approved by the instructor and may include schools on different schedules, after-school and summer programs, Saturday programs, private, and charter schools. A limited number of clinical experiences may be approved in significantly different classrooms within their school of employment. Employed candidates are encouraged to seek assistance and support from their administrators.

Internship/Student Teaching

The graduate-level student teaching/internship is the culminating experience of the Graduate Certificate program, offering students the opportunity to demonstrate their readiness for the initial Standard Professional I teaching license. Students are assigned to an appropriate classroom for a full-time, semester-long experience under the supervision of the classroom teacher and university faculty. Lateral entry teachers and teacher assistants must contact the Office of Field Experiences to determine the appropriateness of their classroom for the student teaching/internship experience and licensure requirements. This contact should take place at least one semester before student teaching.

Advising

All students are assigned an advisor upon formal admission to the program. Students should consult with their advisors at least once each semester.

Licensure

Upon successful completion of the Phase I/Graduate Certificate, students will be recommended for the North Carolina initial Standard Professional I teaching license. For this license, students are required to complete an electronic licensure portfolio that is created during coursework and student teaching.

Program Approval

All teacher education programs at UNC Charlotte are accredited by the National Council for Accreditation of Teacher Education. The Graduate Certificate in Teaching English as a Second Language has been approved by North Carolina State Board of Education.

COURSES IN TEACHING ENGLISH AS A SECOND LANGUAGE (TESL)

TESL 5103. Methods in Teaching English as a Second Language. (3) Cross-listed as EDCI 8183. For current and future teachers of English as a Second Language (ESL) to master a variety of approaches, methods and techniques of teaching ESL and other competencies prescribed by the state of North Carolina.

TESL 5104. Authentic Assessment. (3) For current and future teachers of English as a Second Language (ESL) to develop multiple criteria assessment models as TESL diagnosticians and to master other competencies prescribed by the state of North Carolina. (*Spring*)

TESL 6000. Topics in Teaching English as a Second Language. (1-6) May include classroom and/or clinical experiences in the content area. *May be repeated for credit with permission of department.*

TESL 6204. Multicultural Education. (3) Assists teachers and other school personnel in the development of skills in multicultural curriculum, design and delivery. Examines issues of power, race, class, and privilege that affect the educational success of English Language Learners and other diverse student populations in today's public schools. Addresses the need to develop instructional practices that infuse critical multicultural education into the curriculum.

TESL 6205. Second Language Acquisition in K-12 Schools. (3) An examination of concepts, theories, research, and practice related to the language acquisition and literacy development of English Language Learners in U.S. schools. Attention is paid to the physiological, social and psychological variables that influence the academic success of immigrant children and the challenges associated with first language literacy, second language literacy, and second language development in K-12 settings.

TESL 6206. Globalization, Communities, and Schools. (3) An examination of the intersection of globalization and education with specific attention to the experiences of children of immigration in North Carolina K-12 communities and the contemporary phenomenon of transnationalism. Implications for the best K-12 educational practice are emphasized. This course does not carry a fieldwork requirement.

TESL 6470. Internship in Teaching English as a Second Language. (3) Prerequisites: Completion of all education coursework required for the "A" license, background requirements, an application for the course by established deadline, and approval of the

department. Requires a full-time, semester-long graduate student teaching experience of teaching in the appropriate area of licensure (TESL). Includes formal observations in the intern's classroom by university faculty and/or school-based supervisors. Includes seminars. Application required.

TESL 6476. Advanced Pedagogy in Teaching English as a Second Language. (3) Cross-listed as FLED 6200. Prerequisite: Permission of the department. A variety of topics will be addressed in order to prepare experienced second language teachers to be critical thinkers, second language researchers, and instructional and program leaders. Exemplar topics include theories of second language acquisition, the history and trends of second language instructional methods, curriculum design, research-based practices, multicultural education, community partnerships, and mentoring of beginning teachers.

TESL 6691. Seminar in Professional Development. (3) Seminar focused on self-direction and professional development of English as Second Language Specialists (ESL), with an increasing emphasis on becoming instructional leaders, as students plan to meet their own learning needs in instructional expertise; expand their awareness of the role of the ESL specialist; plan their program; use technology in presentations; and develop their Master's Thesis, Master's Research Project or Comprehensive Portfolio. The goal of the course is to help the student demonstrate through a culminating teaching portfolio that the student has obtained the knowledge, skills and dispositions of a master teacher.

TESL 6800. Individual Study in Teaching English as a Second Language. (1-6) Prerequisite: Permission of the student's advisor. Independent study under the supervision of an appropriate faculty member. *May be repeated for credit.*



The William States Lee College of Engineering

enr.uncc.edu

Dean: *Dr. Robert E. Johnson*

Senior Associate Dean: *Dr. Ronald Smelser*

Associate Dean: *Dr. Patricia Tolley*

Assistant Dean: *William Ardern*

The William States Lee College of Engineering at the University of North Carolina at Charlotte is one of the finest engineering colleges in the Southeast.

Emphasizing applied research in its educational programs, the college prepares students for careers in engineering through meaningful hands-on involvement and interactive teamwork. Students and faculty work with government, the private sector, and other universities to develop practical advances in technology. Locally and throughout the world, their efforts effect positive economic and environmental change.

With cross-disciplinary expertise and capabilities, UNC Charlotte's renowned engineering research centers provide the tools to tackle real-world challenges in a strong academic environment. The centers, together with the funded research programs of the faculty, support graduate programs in the Departments of Civil and Environmental Engineering, Electrical and Computer Engineering, Engineering Technology and Construction Management, Mechanical Engineering and Engineering Science, and Systems Engineering and Engineering Management.

Civil and Environmental Engineering

Faculty from the Department of Civil and Environmental Engineering are active participants in the University's Infrastructure, Design, Environment, and Sustainability Center (IDEAS). Its research focus on the environment and developing sustainable solutions enhances the interactions of the built and natural environment and sustainable transportation systems. The Department, in conjunction with the Department of Geography and Earth Sciences, also

assumes a key role in the Infrastructure and Environmental Systems doctoral program.

Electrical and Computer Engineering

The Department of Electrical and Computer Engineering takes great pride in its research in UNC Charlotte's Center for Optoelectronics and Optical Communications. There, researchers exploit the interplay between photons and electrons in quantum confined nanostructures leading to the design, development, and fabrication of next generation optical sources and smart integrated optical devices.

The faculty are also integral to the work of the Energy Production and Infrastructure Center (EPIC). EPIC serves the Charlotte region's energy hub and is interdisciplinary in its approach to meeting the needs of local, national and governmental entities. It provides educational experiences focusing on the regional and national advancement of current and developing energy production and distribution methodologies in state of the art facilities such as the Duke Energy Smart Grid Laboratory.

Engineering Technology and Construction Management

The college offers graduate programs in Applied Energy and Electromechanical Systems, Construction and Facilities Management, and Fire Protection and Administration through the Department of Engineering Technology and Construction Management. These programs focus on applied technology and meet the requirements for expanded education and training in these growing areas of technical importance.

Mechanical Engineering and Engineering Science

The Center for Precision Metrology, under the direction of the Department of Mechanical Engineering and Engineering Science, helps manufacturers in many industries, including automotive, aircraft, and computer manufacturing to produce perfect parts through the aid of state-of-the-art measurement systems. The center's measurement capability ranges from the atomic scale in environmentally controlled laboratories to meter scale parts in the Siemens Energy Large Manufacturing Solutions Laboratory. The department's research programs in computational modeling and the Center for Biomedical Engineering and Science focus on improving the design, control, and manufacturing of engineered and biological systems. The North Carolina Motorsports and Automotive Research Center provides an opportunity to develop systems for the next generation of vehicles as well as providing a platform for development in automotive competition.

Systems Engineering and Engineering Management

The Center for Lean Logistics and Engineered Systems provides industry access to the expertise of the Department of Systems Engineering and Engineering Management faculty assisting them in remaining competitive in global markets. The faculty provide educational opportunities ranging from traditional coursework to continuing education and certificate programs. The offerings span topics from healthcare to energy analytics and industrial systems optimization.

Graduate Degree Programs

- Ph.D. in Electrical Engineering
- Ph.D. in Infrastructure and Environmental Systems
(with the College of Liberal Arts & Sciences)
- Ph.D. in Mechanical Engineering
- Master of Fire Protection and Administration
- Master of Science in Applied Energy and Electromechanical Systems
- Master of Science in Civil Engineering
- Master of Science in Construction and Facilities Management
- Master of Science in Electrical Engineering
- Master of Science in Engineering
- Master of Science in Engineering Management
- Master of Science in Mechanical Engineering
- Graduate Certificate in Applied Energy
- Graduate Certificate in Energy Analytics
- Graduate Certificate in Lean Six Sigma
- Graduate Certificate in Logistics and Supply Chains
- Graduate Certificate in Systems Analytics

GENERAL GRADUATE COURSES IN ENGINEERING (ENGR)

ENGR 5090. Special Topics. (1-4) Directed study of current topics of special interest. *May be repeated for credit.*

Civil and Environmental Engineering

- **M.S. in Civil Engineering**
- **M.S. in Engineering**
- **Ph.D. in Infrastructure and Environmental Systems** (*see the Infrastructure and Environmental Systems heading*)

Department of Civil and Environmental Engineering

cee.uncc.edu

Graduate Program Director

Dr. Srinivas S. Pulugurtha

Graduate Faculty

Dr. James E. Amburgey, Associate Professor
 Dr. James D. Bowen, Associate Professor
 Dr. Nicole Braxton, Assistant Professor
 Dr. Shen-en Chen, P.E., Professor
 Dr. John L. Daniels, P.E., Department Chair and Professor
 Dr. Venkata R. Duddu, Faculty Associate
 Dr. Wei Fan, P.E., Associate Professor
 Dr. Janos I. Gergely, S.E., P.E., Associate Professor
 Dr. Rajaram Janardhanam, Professor
 Dr. Martin R. Kane, P.E., Associate Professor
 Dr. Olya S. Keen, Assistant Professor
 Dr. Milind V. Khire, P.E., Professor
 Dr. Mariya Munir, Assistant Professor
 Dr. David Naylor, P.E., Lecturer
 Dr. Vincent O. Ogunro, Associate Professor
 Dr. Shubhashini Oza, Faculty Associate
 Dr. Miguel A. Pando, Associate Professor
 Dr. Youngjin Park, Faculty Associate
 Dr. Srinivas S. Pulugurtha, P.E., Professor
 Dr. William Saunders, P.E., Lecturer
 Dr. Mei Sun, Assistant Professor
 Dr. Brett Q. Tempest, Associate Professor
 Dr. Kimberly A. Warren, Associate Professor
 Dr. David C. Weggel, P.E., Professor
 Dr. Matthew J. Whelan, Associate Professor
 Dr. Erika Weber, P.E., Lecturer
 Dr. Jy S. Wu, P.E., P.H., Professor
 Dr. David Young, P.E., Professor

P.E. = Professional Engineer

P.H. = Professional Hydrologist

S.E. = Structural Engineer

Programs of Study

The Department of Civil and Environmental Engineering (CEE) provides opportunities for discipline-specific and multidisciplinary graduate-level education in Civil and Environmental Engineering and closely related areas. Advanced coursework and research are used to enhance professional development, improve technical competency, and initiate a life-long learning experience. The Department has ongoing collaborative research and student exchange programs with several international institutions.

The Department offers graduate studies leading to a master's degree (MSCE or MSE) in five areas of concentration:

- 1) Environmental and water resources engineering
- 2) Geo-environmental engineering
- 3) Geotechnical engineering
- 4) Structural engineering
- 5) Transportation engineering

Doctoral studies leading to the Ph.D. in Infrastructure and Environmental Systems (INES) are available in an interdisciplinary, inter-college program. See the *Infrastructure and Environmental Systems* heading for details.

MASTER OF SCIENCE IN CIVIL ENGINEERING (MSCE) OR MASTER OF SCIENCE IN ENGINEERING (MSE)

The M.S.C.E. program requires a baccalaureate degree in Civil and Environmental Engineering. The M.S.E. degree offers a more discipline-specific program of study to students who may not possess a baccalaureate degree in Civil and Environmental Engineering.

Admission Requirements

In addition to the general requirements for admission to the Graduate School, the Department of Civil and Environmental Engineering seeks the following from applicants to the Master's programs in Civil Engineering:

- An earned undergraduate degree in Civil Engineering for the MSCE master's program or a closely related field for the MSE master's program
- An undergraduate GPA of 3.0 or better
- A satisfactory score from the Aptitude Portion of the GRE
- Three letters of recommendation

- An acceptable TOEFL score as required by UNC Charlotte for international students
- And any other appropriate credentials as required by the Graduate School

Additional Admission Requirements

- Admission to the MSE program requires completion of certain deficiencies as specified by each area of concentration
- Admission to the Early Entry Program requires a minimum GPA of 3.2, completion of at least 75 hours toward the BSCE degree, and acceptance by the Graduate School to the MSCE program at UNC Charlotte.

Early Entry Program

Undergraduate students at UNC Charlotte with outstanding academic performance, and satisfying the requirements described above, may be admitted to the Early Entry Program to pursue graduate study while completing the undergraduate degree requirements. Early Entry students are dually enrolled with both undergraduate and graduate status, may request two graduate Civil Engineering (CEGR) courses to be applied to both their graduate and undergraduate programs (double-counting), and may complete up to 15 credits toward their M.S. degree prior to graduating with their BSCE degree.

Application Deadline

Applications for admission must be submitted online directly to the Graduate School. They may be submitted any time prior April 1 for Fall admission, and October 1 for Spring admission. To be considered for assistantships and tuition grants for the following academic year, students should apply by February 15 because the Department makes the first round of award decisions by March 15.

Assistantships

Research and teaching assistantships are available from the Department on a competitive basis to highly qualified applicants/students. Interested students are encouraged to directly contact faculty in their area of interest for research assistantships.

Tuition Grants

Tuition grants including Non-Resident Tuition Differentials and Resident Tuition Aids are available on a competitive basis for both out-of-state and in-state students, respectively.

Degree Requirements

A minimum of 30 approved graduate credit hours is required for graduation. At least half of the approved graduate credit hours must be in courses numbered 6000 or above. A student may fulfill the 30-hour

requirement by pursuing one of the three study options: (a) 24 hours of coursework plus 6 hours of thesis, (b) 27 hours of coursework plus 3 hours of a directed project, or (c) 30 hours of coursework and a comprehensive examination. Each student is limited to one individual study class within the 30 credit hour requirement.

Concentration Courses

Required core courses for the five concentrations are listed below.

Environmental and Water Resources Engineering Concentration

CEGR 6243 Physical Processes in Environmental Systems (3)

CEGR 6245 Chemical and Biological Processes in Environmental Systems (3)

Geo-Environmental Engineering Concentration

CEGR 5145 Groundwater Resources Engineering (3)

CEGR 5264 Landfill Design and Site Remediation (3)

Geotechnical Engineering Concentration

CEGR 5270 Earth Pressures and Retaining Structures (3)

CEGR 6251 Foundation Engineering (3)

CEGR 6254 Experimental Soil Mechanics (3)

CEGR 6255 Slope Stability and Earth Structures (3)

CEGR 6268 Advanced Soil Mechanics (3)

Structural Engineering Concentration

CEGR 5108 Finite Element Analysis and Applications (3)

CEGR 5222 Structural Steel Design II (3)

CEGR 5224 Advanced Structural Analysis (3)

CEGR 5226 Reinforced Concrete Design II (3)

CEGR 6129 Structural Dynamics (3)

Transportation Engineering Concentration

CEGR 5161 Advanced Traffic Engineering (3)

CEGR 5162 Transportation Planning (3)

CEGR 5185 Geometric Design of Highways (3)

CEGR 6161 Traffic Control and Operation (3)

GEOG 6100 Quantitative Methods in Geography (3)

Additional Recommended Courses

Additional recommended courses (excluding CEGR 6892 and CEGR 6991) for each concentration are listed below.

Environmental and Water Resources Engineering Concentration

CEGR 5090 Special Topics in Civil Engineering (1-4)
(*environmental and water resources engineering topic*)

CEGR 5141 Process Engineering (3)

CEGR 5142 Water Treatment Engineering (3)

CEGR 5143 Solid Waste Management (3)
 CEGR 5144 Engineering Hydrology (3)
 CEGR 5145 Groundwater Resources Engineering (3)
 CEGR 5146 Advanced Engineering Hydraulics (3)
 CEGR 5147 Stormwater Management (3)
 CEGR 5234 Hazardous Waste Management (3)
 CEGR 5235 Industrial Pollution Control (3)
 CEGR 5237 Environmental Risk Management (3)
 CEGR 5241 Chemical Processes in Water and Wastewater Treatment (3)
 CEGR 5242 Wastewater Treatment Plant Design (3)
 CEGR 5243 Topics in Environmental Health (3)
 CEGR 5247 Sustainability (3)
 CEGR 6090 Special Topics in Civil Engineering (1-6)
(environmental and water resources engineering topic)
 CEGR 6141 Water Quality Modeling (3)
 CEGR 6142 Bioenvironmental Engineering (3)
 CEGR 6144 Environmental Biotechnology (3)
 CEGR 6145 Waste Incineration (3)
 CEGR 6146 Advanced Groundwater Analysis (3)
 CEGR 6147 Watershed Modeling (3)
 CEGR 6148 Water Conservation (3)
 CEGR 6149 Watershed Analysis (3)
 CEGR 6171 Air Quality Control (3)
 CEGR 6172 Air Dispersion Modeling (3)
 CEGR 6173 Environmental Aquatic Chemistry (3)
 CEGR 6244 Chemical Fate and Transport (3)

Geo-Environmental Engineering Concentration

CEGR 5090 Special Topics in Civil Engineering (1-4)
(geo-environmental engineering topic)
 CEGR 5270 Earth Pressures and Retaining Structures (3)
 CEGR 5271 Pavement Design (3)
 CEGR 5272 Design with Geosynthetics (3)
 CEGR 5273 Soil Improvement (3)
 CEGR 5274 Site Characterization (3)
 CEGR 5278 Geotechnical Engineering II (3)
 CEGR 6146 Advanced Groundwater Analysis (3)
 CEGR 6243 Physical Processes in Environmental Systems (3)
 CEGR 6244 Chemical Fate and Transport (3)
 CEGR 6245 Chemical and Biological Processes in Environmental Systems (3)
 CEGR 6251 Foundation Engineering (3)
 CEGR 6252 Soil Dynamics and Earthquake Engineering (3)
 CEGR 6254 Experimental Soil Mechanics (3)
 CEGR 6255 Slope Stability and Earth Structures (3)
 CEGR 6268 Advanced Soil Mechanics (3)

Geotechnical Engineering Concentration

CEGR 5090 Special Topics in Civil Engineering (1-4)
(geotechnical engineering topic)
 CEGR 5145 Groundwater Resources Engineering (3)
 CEGR 5264 Landfill Design and Site Remediation (3)
 CEGR 5271 Pavement Design (3)
 CEGR 5272 Design with Geosynthetics (3)

CEGR 5273 Soil Improvement (3)
 CEGR 5274 Site Characterization (3)
 CEGR 5278 Geotechnical Engineering II (3)
 CEGR 6252 Soil Dynamics and Earthquake Engineering (3)

Structural Engineering Concentration

CEGR 5090 Special Topics in Civil Engineering (1-4)
(structural engineering topic)
 CEGR 5121 Prestressed Concrete Design (3)
 CEGR 5123 Bridge Design (3)
 CEGR 5125 Forensic Engineering (3)
 CEGR 5126 Codes, Loads, and Nodes (3)
 CEGR 5127 Green Building and Integrative Design (3)
 CEGR 5128 Matrix Methods of Structural Analysis (3)
 CEGR 5223 Timber Design (3)
 CEGR 6090 Special Topics in Civil Engineering (1-6)
(structural engineering topic)
 CEGR 6122 Advanced Topics in Structural Steel (3)
 CEGR 6124 Masonry Design (3)
 CEGR 6125 Structural Strengthening (3)
 CEGR 6126 Analysis of Plates and Shells (3)
 CEGR 6127 Fracture Mechanics and Fatigue (3)
 CEGR 6128 Structural Optimization (3)
 CEGR 6222 Experimental Structural Mechanics and Nondestructive Evaluation (3)
 MEGR 6141 Theory of Elasticity I (3)

Transportation Engineering Concentration

CEGR 5090 Special Topics in Civil Engineering (1-4)
(transportation engineering topic)
 CEGR 5171 Urban Public Transportation (3)
 CEGR 5181 Human Factors in Traffic Engineering (3)
 CEGR 5182 Transportation Environmental Assessment (3)
 CEGR 5183 Traffic Engineering Studies (3)
 CEGR 5184 Highway Safety (3)
 CEGR 5262 Traffic Engineering (3)
 CEGR 5271 Pavement Design (3)
 CEGR 6090 Special Topics in Civil Engineering (1-6)
(transportation engineering topic)
 CEGR 6162 Computer Applications for Transportation Engineers (3)
 CEGR 6163 GIS for Civil Engineers (3)
 CEGR 6164 Traffic Safety (3)
 CEGR 6165 Urban Systems Engineering (3)
 CEGR 6166 Urban Transportation Networks: Operations and Optimization (3)
 CEGR 6181 Traffic Flow Theory (3)
 CEGR 6182 Transportation Systems Analysis (3)
 CEGR 6261 Traffic Signal Control Systems (3)

Note: Undergraduate students who have taken any of the courses listed above, or equivalent material, as part of their undergraduate program need not take the corresponding 5000-level graduate courses. Instead, they may choose other graduate courses as part of their master's degree plan of study. Courses without

designated course numbers are currently being offered as Special Topic classes with appropriate course numbers yet to be provided.

Elective Courses

With advisor and/or Graduate Program Director approval, a maximum of two graduate courses (outside or within CEGR) related to the thesis topic, project topic, or student's concentration may be incorporated into the 30 credit hour requirement. A student with a non-CEGR background is encouraged to fulfill the 30 credit hour requirement by taking all CEGR courses.

Transfer Credit

The Department accepts the transfer of related graduate courses (6 credit hours maximum) taken at another institution or from UNC Charlotte prior to admission to the master's program in Civil Engineering.

Capstone Experiences

Students pursuing a master's degree in Civil and Environmental Engineering have three options to complete the 30 credit hour program:

- 1) 24 credit hours of coursework plus 6 credit hours of thesis (CEGR 6991)
- 2) 27 credit hours of coursework plus 3 credit hours of a directed project (CEGR 6891)
- 3) 30 credit hours of coursework plus a written and/or oral comprehensive examination

All three options require the formation of a program committee as described below. The thesis and project options require students to submit a written thesis or project report, and orally defend their work before their program committee.

A student's comprehensive exam may be taken once all core courses are completed, and at least 18 credit hours of graduate coursework are either completed or in progress. Core courses taken at the graduate level may be included in the 18 credit hours. The student's graduate advisor and the examining committee coordinate the examination (typically offered once in the Fall semester and once in the Spring semester), preparing the exam with the assistance of members of the student's Program Committee. The exam measures the student's mastery of theories and applications in core courses and/or in the selected area of specialization within the discipline. Students have only two attempts to pass the examination. All students passing the written examination are assessed further on their oral communication effectiveness.

Application for Degree

Students preparing to graduate must submit an online Application for Degree by the filing date specified in the University Academic Calendar. If a student does not graduate in the semester identified on the Application for Degree, then the student must submit a new Application for Degree for graduation in a subsequent semester.

Advising

Each student is assigned an initial academic advisor. Upon developing a program of study, the student shall be supervised by his/her graduate advisor and a program committee.

Program Committee

The Program Committee shall consist of at least three UNC Charlotte graduate faculty members. At most one graduate faculty member (CEGR or non-CEGR) from outside the student's concentration may serve as a member of the Program Committee. The student's CEE graduate advisor shall chair the committee.

Research Opportunity/Experience

Students in Civil and Environmental Engineering enjoy a curriculum with opportunities for interdisciplinary research, study abroad, and active participation in a growing research program. Programs of study can be tailored to suit individual needs and interests. The CEE website (cee.uncc.edu) provides current areas of research conducted by the Civil and Environmental Engineering faculty.

Program Learning Outcomes

Students completing master's degree will demonstrate abilities to analyze and evaluate advanced topics in engineering, and to communicate technical information effectively. Achievement of these outcomes will prepare students to function professionally in their chosen careers.

Program learning outcomes for doctoral students are described in the "Infrastructure and Environmental Systems" section of this *Catalog*.

COURSES IN CIVIL AND ENVIRONMENTAL ENGINEERING (CEGR)

CEGR 5090. Special Topics in Civil Engineering. (1-4)

Study of specific new areas emerging in the various fields of civil engineering. *May be repeated for credit.*

CEGR 5108. Finite Element Analysis and

Applications. (3) Prerequisites: CEGR 4224 and permission of department. Finite element method and

its application to engineering problems. Application of displacement method to plane stress, plane strain, plate bending and axisymmetrical bodies. Topics include: dynamics, fluid mechanics, and structural mechanics.

CEGR 5121. Prestressed Concrete Design. (3)

Prerequisites: CEGR 3225, CEGR 4224, and permission of department. Analysis and design of prestressed components and systems, including materials and systems for prestressing, loss of prestress, flexural and shear design in accordance with current building codes, analysis of indeterminate prestressed systems, and control of camber, deflection and cracking.

CEGR 5123. Bridge Design. (3) Prerequisites: CEGR 3221, CEGR 3225, and permission of department. Review of bridge design codes and loadings; superstructure and substructure design of short, intermediate, and long span bridges constructed of steel and concrete; earthquake design; segmental and cable-stayed bridges.

CEGR 5125. Forensic Engineering. (3) Prerequisites: CEGR 3122 and permission of department. Evaluation of structural and construction failures through review of case studies, types and causes of failures, and relevant methods of failure investigation; analysis of failures occurring in a variety of structures, involving a variety of materials, and resulting from a variety of causes; development, expression, and defense of opinions and conclusions, orally and in writing, with an understanding of the impact on the legal process surrounding a failure claim.

CEGR 5126. Codes, Loads, and Nodes. (3)

Prerequisites: CEGR 3122 and permission of department. Building systems and components; code requirements according to the latest ASCE Standard 7 pertaining to buildings and other structures; gravity load analysis including dead, live, roof live and snow loads; lateral load analysis focusing on wind and seismic forces, and applied to the main lateral load resisting systems; software applications using the SAP2000 tool, with 2-D and 3-D models loaded with gravity and lateral loads.

CEGR 5127. Green Building and Integrative Design. (3)

Prerequisites: CEGR 3122 and permission of department. Prepares students to function in multidisciplinary design teams working to produce buildings, sites and coupled environmental-infrastructure systems with resilience and sustainability as design priorities. Focus areas include: civil engineering aspects of energy use, material use, emissions generation and design strategies for integrated design.

CEGR 5128. Matrix Methods of Structural Analysis. (3)

Prerequisite: permission of department. Derivation of the basic equations governing linear structural systems. Application of stiffness and flexibility methods to trusses and frames. Solution techniques utilizing digital computer.

CEGR 5141. Process Engineering. (3)

Prerequisites: CEGR 3141 and permission of department. Applications of material and energy balance principles to the study of chemical, biological and environmental engineering processes. Overview of applied biotechnology, engineering thermodynamics and kinetics.

CEGR 5142. Water Treatment Engineering. (3)

Prerequisites: CEGR 3141 and permission of department. Analysis and design of water and wastewater treatment processes including: physical, chemical and biological treatment. Computer-aided design of treatment systems.

CEGR 5143. Solid Waste Management. (3)

Prerequisites: CEGR 3141 and permission of department. Solid waste management, sources, generation rates, processing and handling, disposal, recycling, landfill closures, and remedial actions for abandoned waste sites.

CEGR 5144. Engineering Hydrology. (3)

Prerequisites: CEGR 3143 and permission of department. A quantitative study of the various components of the water cycle, including precipitation, runoff, ground water flow, evaporation and transpiration, and stream flow. Hydrograph analysis, flood routing, frequency and duration, reservoir design, and computer applications.

CEGR 5145. Groundwater Resources Engineering. (3)

Prerequisites: CEGR 3143 and permission of department. Overview of hydrological cycle. Principles of groundwater flow and well hydraulics. Regional groundwater flow and flow nets. Water chemistry and contamination. Applications of groundwater modeling.

CEGR 5146. Advanced Engineering Hydraulics. (3)

Prerequisites: CEGR 3143 and permission of department. Problems of liquids as applied in civil engineering; open channel flow; dams and spillways; water power; river flow and backwater curves; pipe networks, fire flow, sewage collection, groundwater, computer applications.

CEGR 5147. Stormwater Management. (3)

Prerequisites: CEGR 3143, CEGR 3141, permission of instructor, and graduate standing. Introduction to the impacts and water quality parameters due to urbanization. Develop a numerical model to analyze

water stormwater impacts and evaluate different mitigation methods. Understand and utilize the guiding principles of low impact design (LID) and evaluate the available BMPs and understand their limitations.

CEGR 5161. Advanced Traffic Engineering. (3)

Prerequisites: CEGR 3161 and permission of department. Analysis of basic characteristics of drivers, vehicles and roadway that affect the performance of road systems. Stream flow elements, volume, density, speed. Techniques of traffic engineering measurements, investigations and data analysis, capacity analysis. Intersections, accidents, parking.

CEGR 5162. Transportation Planning. (3)

Prerequisites: CEGR 3161 and permission of department. Urban transportation; travel characteristics of urban transportation systems; analysis of transportation-oriented studies; analytic methods of traffic generation, distribution, modal split and assignment; traffic flow theory.

CEGR 5171. Urban Public Transportation. (3)

Prerequisites: CEGR 3161 and permission of department. Planning, design, and operation of bus, rail, and other public modes. Relationship between particular modes and characteristics of urban areas. Funding, security and other administrative issues.

CEGR 5181. Human Factors in Traffic Engineering. (3)

Prerequisites: CEGR 3161 and permission of department. Study of the driver's and pedestrian's relationship with the traffic system, including roadway, vehicle and environment. Consideration of the driving task, driver and pedestrian characteristics, performance and limitations with regard to traffic facility design and operation.

CEGR 5182. Transportation Environmental Assessment. (3)

Prerequisite: permission of department. A study of the environmental impact analysis and assessment procedures for transportation improvements. Route location decisions. Noise, air quality, socio-economic, and other impacts.

CEGR 5183. Traffic Engineering Studies. (3)

Prerequisites: CEGR 3161 and permission of department. Introduction to the traffic engineering studies most used by traffic engineers including data collection techniques, statistical analysis procedures, report writing and presentation. One hour of lecture and three hours of laboratory per week.

CEGR 5184. Highway Safety. (3) Prerequisites: CEGR 3161 and permission of department. Engineering responses at the state and local levels to the problem of highway safety. Extent of the highway safety

problem, elements of traffic accidents, common accident countermeasures, collection and analysis of accident data, evaluation of safety-related projects and programs, and litigation issues.

CEGR 5185. Geometric Design of Highways. (3)

Prerequisites: CEGR 3161 and permission of department. Theory and practice of geometric design of highways including intersections, interchanges, parking and drainage facilities. Driver ability, vehicle performance, safety and economics are considered. Two hours of lecture and three laboratory hours per week.

CEGR 5222. Structural Steel Design II. (3)

Prerequisites: CEGR 3221 and permission of department. Analysis and design of structural steel components and systems with emphasis on theories necessary for a thorough understanding of the design of complete structures. Compression members affected by local buckling, beams with lateral-torsional buckling, continuous beams and beam columns are covered. Welded and bolted connections. Current AISC Specifications used.

CEGR 5223. Timber Design. (3)

Prerequisites: CEGR 3122 and permission of department. Principles of timber design. Design of simple timber structures subjected to gravity loads and lateral forces. Computation of design loads; formulation of structural systems; design/analyze structural components and connections; structural system analysis of timber structures. Analysis of light commercial and residential structures.

CEGR 5224. Advanced Structural Analysis. (3)

Prerequisites: CEGR 3122 and permission of department. A continuation of CEGR 3122. Methods to determine deflections in structural members, including moment area, conjugate beam, virtual work, and Castigliano's theorem. Analyze statically indeterminate structures, including approximate method, slope deflection, moment distribution, and matrix stiffness methods. Project to compare analysis techniques and introduce use of structural analysis computer programs.

CEGR 5226. Reinforced Concrete Design II. (3)

Prerequisites: CEGR 3225 and permission of department. Analysis and design of reinforced concrete components and systems with emphasis on the fundamental theories necessary for a thorough understanding of concrete structures. Concentrically loaded slender columns, slender columns under compression plus bending. Wall footings and column footings. Analysis of continuous beams and frames. Total design project involving the analysis and design of a concrete structure. Current ACI Specifications used.

CEGR 5234. Hazardous Waste Management. (3)

Prerequisites: CEGR 3141 and permission of department. Integration of scientific and engineering principles with legislation, regulation and technology in the management of hazardous wastes. Study of thermal, chemical, physical and biological systems and processes used in the treatment of hazardous wastes and the remediation of hazardous waste sites.

CEGR 5235. Industrial Pollution Control. (3)

Prerequisite: Permission of department. Source and characterization of industrial wastewaters, fundamentals of chemical and physical treatment processes, biological treatment technologies, waste minimization and reduction technologies, and sludge handling and toxicity reduction. Implementation of field or laboratory treatability study.

CEGR 5237. Environmental Risk Management. (3)

Prerequisite: Permission of department. Review of legislation and requirements pertaining to spills and releases of chemicals to the environment. Fundamentals of fires, explosions, toxic emissions and dispersion, hazardous spills, and other accidents. Study of techniques for accident prevention and spill control, and hazardous and risk assessment.

CEGR 5241. Chemical Processes in Water and Wastewater Treatment. (3)

Prerequisites: CHEM 1252, CEGR 3141, and permission of department. Chemical principles involved in the treatment of water and wastewaters; principles of chemical equilibrium relevant to natural water systems; the nature and effect of chemical interactions of domestic and industrial waste effluents on natural water systems.

CEGR 5242. Wastewater Treatment Plant Design. (3)

Prerequisites: Permission of instructor and graduate standing. The design of treatment processes for municipal wastewater treatment plants. Also discusses the basics of physical, biological, and chemical processes and their applications in wastewater treatment.

CEGR 5243. Topics in Environmental Health. (3)

Prerequisites: CEGR 3141, CEGR 4142, and permission of department. Study of contemporary environmental health problems and practices as they relate to groundwater pollution, food and water-borne diseases, radiological health, occupational health and risk assessment. Provides an introduction to epidemiology and toxicology, and a historical review of federal environmental policy and legislative action.

CEGR 5247. Sustainability. (3) Prerequisites: CEGR 3141 and permission of department. Focuses on sustainability as it applies to civil engineering,

including land development choices, infrastructure planning, material selection and disposal, energy sources, and water supply and treatment. Methods of assessing sustainability and incorporating sustainable features in design are reviewed.

CEGR 5262. Traffic Engineering. (3) Prerequisites: CEGR 3161 and permission of department. Operation and management of street and highway systems. Traffic control systems, traffic flow theory, and highway capacity. Evaluation of traffic engineering alternatives and the conduct of traffic engineering studies.

CEGR 5264. Landfill Design and Site Remediation. (3)

Prerequisites: CEGR 3258, CEGR 3278, and permission of department. Principles of waste disposal and sanitary landfill siting including design, construction, operation and maintenance. Site assessment of underground storage tank leaks; site remediation, and clean up technologies using choice and economic analysis and computer applications.

CEGR 5270. Earth Pressures and Retaining Structures. (3)

Prerequisites: CEGR 3122, CEGR 3278, CEGR 4278, and permission of the department. Corequisite: CEGR 4278 can be a corequisite. Lateral earth pressure theory and the effects of wall friction, external loads, groundwater, and layered soils; design procedures and construction details associated with selected rigid and modular gravity/semi-gravity walls, mechanically stabilized earth walls, and externally supported structural walls.

CEGR 5271. Pavement Design. (3)

Prerequisites: CEGR 3161, CEGR 3278, and permission of department. Pavement design concepts and considerations; engineering properties of pavement materials including soils, bases, asphalt concrete, and Portland cement concrete; design of flexible and rigid pavements including shoulders and drainage; computer applications for pavement analysis and design.

CEGR 5272. Design with Geosynthetics. (3)

Prerequisites: CEGR 3258, CEGR 3278, and permission of department. Pre- or corequisite: CEGR 5278. Introduction to geosynthetic materials, properties, laboratory test procedures, and functions; geosynthetic design methods used for geotechnical, transportation hydraulic, and geo-environmental applications (roadways, walls, slopes, foundation soils, landfills, and dams); the incorporation of geosynthetics for soil reinforcement, separation, filtration, drainage and containment.

CEGR 5273. Soil Improvement. (3) Prerequisites: CEGR 3278 and permission of department. Engineering principles of soil improvement as they

relate to applications in both geotechnical and geoenvironmental engineering; innovative techniques to improve soils to meet technical and economic requirements.

CEGR 5274. Site Characterization. (3) Prerequisites: CEGR 3278 and permission of department. Site investigation and site assessment technologies employed in geotechnical and environmental engineering; Site investigation planning and various geophysical methods including: seismic measurements, ground penetrating radar, electrical resistivity, and electromagnetic conductivity; Drilling methods for soil, gas and ground water sampling; decontamination procedures; and long term monitoring methods; Conventional and state-of-the-art in situ methods for geotechnical and environmental site characterization: standard penetration test, vane shear test, dilatometer test, pressure-meter test and cone penetration tests. Modern advances in cone penetrometer technology, instrumented with various sensors (capable of monitoring a wide range of physical and environmental parameters: load, pressure, sound, electrical resistivity, temperature, PH, oxidation reduction potential, chemical contaminants).

CEGR 5278. Geotechnical Engineering II. (3) Prerequisites: CEGR 3258, CEGR 3278, and permission of department. Design of shallow and deep foundations, including structural considerations; lateral earth pressure theories; design of rigid and flexible earth retaining structures; advanced aspects of slope stability analysis; and computer applications. *(Spring)*

CEGR 5892. Individualized Study and Projects. (1-6) Prerequisite: permission of department. Individual investigation and exposition of results. *May be repeated for credit.*

CEGR 5991. Graduate Research in Civil Engineering. (1-6) Prerequisite: permission of department. Independent study of a theoretical and/or experimental problem in a specialized area of civil engineering. *May be repeated for credit.*

CEGR 6090. Special Topics in Civil Engineering. (1-6) Prerequisite: Permission of department. Directed study of current topics of special interest. *May be repeated for credit.*

CEGR 6122. Advanced Topics in Structural Steel. (3) Prerequisites: CEGR 4222 and permission of department. Theory of plastic-behavior of steel structures; current topics in structural steel.

CEGR 6124. Masonry Design. (3) Prerequisites: CEGR 3225 and permission of department.

Introduction of masonry materials and systems, engineering and materials properties and testing procedures. Design of reinforced and unreinforced masonry (clay and concrete) walls, beams, and columns for vertical, wind, and seismic loads. Analysis and design of masonry structures and introduction to computer applications.

CEGR 6125. Structural Strengthening. (3) Prerequisites: CEGR 3221, CEGR 3225, and permission of department. Code requirements for the evaluation of existing structures; analysis of existing structures; performance based design of buildings and bridges; strengthening/retrofit techniques for concrete, structural steel, masonry and timber elements, such as beams, columns, shear/bearing/retaining walls, and slabs; studies of actual strengthening projects using innovative techniques and materials.

CEGR 6126. Analysis of Plates and Shells. (3) Prerequisite: CEGR 4224 and permission of department. Analysis of rectangular and circular plates using classical as well as numerical methods; orthotropic and continuous plates and plate buckling. Analysis of thin shells and shells of revolution with and without bending; membrane theory of cylindrical shells; symmetric and unsymmetric loading; pipes, tanks, and pressure vessels; computer applications.

CEGR 6127. Fracture Mechanics and Fatigue. (3) Prerequisites: CEGR 3221 and permission of department. Introduction to fracture mechanics and fatigue, including Griffith Theory, plane strain-stress conditions, critical stress intensity factors, factors influencing fracture toughness, fracture mechanics design principles, fatigue performance, and fatigue initiation and propagation.

CEGR 6128. Structural Optimization. (3) Prerequisites: CEGR 4224 and permission of department. Introduction to optimization concepts; reformulation of common structural analysis and design problems to an optimization format; optimization of constrained, unconstrained, linear, and nonlinear problems by classical and numerical techniques; and computer applications.

CEGR 6129. Structural Dynamics. (3) Prerequisites: CEGR 3122 and permission of department. Methods for dynamic analysis of single and multiple degree of freedom systems. Topics include: free vibrations, dynamic response of simple structures under time dependent loads (e.g., harmonic, periodic, impulsive, general dynamic loading), support motion, frequency domain analysis, response spectra, earthquake engineering.

CEGR 6141. Water Quality Modeling. (3) Prerequisite: Permission of department.

Mathematical modeling of water quality in receiving streams including: generation of point and nonpoint sources of pollution; formulation of transport equations for contaminants in stream and estuarine water; and prediction of the fate, persistence and transformation of chemical pollutants in aquatic ecosystems. Computer model simulation and case studies.

CEGR 6142. Bioenvironmental Engineering. (3)

Prerequisites: CEGR 3141 and permission of department. Theoretical principles and design of aerobic and anaerobic biological unit processes for renovating waters and wastewaters. Activated sludge, aerated and facultative lagoons, rotating biological contractors, trickling and anaerobic filters.

CEGR 6144. Environmental Biotechnology. (3)

Prerequisite: Permission of department. Application of biotechnology to the management of environmental problems. Study of bioprocess principles, bioremediation of waste disposal sites, cell immobilization technology and innovative biotechnologies.

CEGR 6145. Waste Incineration. (3) Prerequisite: Permission of department. Fundamentals of incineration of hazardous/solid wastes. Thermochemical applications and equipment design. Computer modeling of the incineration process and air quality control.

CEGR 6146. Advanced Groundwater Analysis. (3) Prerequisite: Permission of department. Modeling of groundwater flow in saturated and unsaturated zones. Contaminant transport including advection, dispersion and numerical modeling. Groundwater remediation technology.

CEGR 6147. Watershed Modeling. (3) Prerequisite: Permission of department. Characterization of non-point source pollution; modeling of flow and pollutant transport in storm runoff. Watershed modeling in a GIS environment including applications of SWIMM, BASINS, HEC-HMS, HEC-RAS, and NRCS models.

CEGR 6148. Water Conservation. (3) Prerequisite: Permission of department. Principles and issues concerning water conservation and methods for effecting water conservation, including residential, industrial, commercial, and agricultural water conservation; water rates, audits and reuse/reclamation as they relate to water conservation; and case studies.

CEGR 6149. Watershed Analysis. (3) Prerequisite: Permission of department. Study of NPS problems in urban and non-urban watersheds and from highway

runoff. Estimate of sediment yield and design of BMP's including sediment control structures. Introduction to monitoring and modeling of hydrologic systems. Watershed modeling in a GIS environment.

CEGR 6161. Traffic Control and Operation. (3)

Prerequisites: CEGR 5161 and permission of department. Traffic control theory and application; traffic regulation, laws and ordinances; speed control, intersection control, flow control and parking control; design and application of control devices, investigation, evaluation techniques; statistical analysis; administration. (*Spring*)

CEGR 6162. Computer Applications for Transportation Engineers. (3) Prerequisites: CEGR 3161 and permission of department. Apply analytical techniques using traffic simulation and transportation planning software to evaluate various transportation facilities; Emphasis on computer applications and software packages such as HCS, SYNCHRO/SimTraffic, and VISSIM; 4-Step planning process using TransCAD; Build mathematical models.

CEGR 6163. GIS for Civil Engineers. (3)

Prerequisites: CEGR 2101 and permission of department. Apply Geographic Information System (GIS) tools to solve Civil Engineering problems: add layers, label, and symbolize features, create maps in ArcMap, generate tables and spatial databases, address matching, query and join tables, perform spatial overlays, generate buffers, and conduct spatial analysis. Civil Engineering case studies.

CEGR 6164. Traffic Safety. (3) Prerequisites: CEGR 3161 and permission of department. Crash data elements and source of data; Crash site reconstruction; Quantifying risk; Safety evaluation process: Problem definition, high crash locations, ranking and prioritization, understanding causal factors, countermeasure selection, before-after evaluation; Crash prediction Modeling; Economic appraisal; Safety conscious planning.

CEGR 6165. Urban Systems Engineering. (3)

Prerequisites: CEGR 3202 and permission of department. Survey of economic, political, sociological and technological factors affecting modern growth; a planning process and its role in solving selected urban problems with emphasis on engineering contributions.

CEGR 6166. Urban Transportation Networks: Operations and Optimization. (3) Prerequisites: CEGR 3161, permission of instructor, and graduate standing. Introduction to planning and optimization techniques for the analysis of transportation networks. Principles of precise algorithms for finding transport network equilibrium flows and applications that relate

to these flows. Topics include: basic optimization skills, shortest path algorithms, user equilibrium, system optimal, elastic demand, OD matrix estimation, network design, congestion pricing, and stochastic user equilibrium.

CEGR 6171. Air Quality Control. (3) Prerequisite: permission of department. Study of various types of air pollutants, their sources, nature and effects. Examination of air quality criteria, standards and monitoring. Analysis of feasibility, applicability and efficiency of diverse systems of control. Evaluation of goal and research needs in the future.

CEGR 6172. Air Dispersion Modeling. (3) Prerequisite: permission of department. Atmospheric pollution problems, federal regulations, boundary layer meteorology, dispersion theory, Gaussian model, plume rise formulas, air toxics, and computer modeling of point area, line and mobile sources.

CEGR 6173. Environmental Aquatic Chemistry. (3) Prerequisites: CHEM 3111, CEGR 3141, or equivalent; and permission of department. Concepts of chemical equilibrium applied to natural aquatic systems. Topics include: acid-base reactions, buffer systems, mineral precipitation, coordinate chemistry, redox reactions, adsorption phenomena and chemical-equilibria computer programs.

CEGR 6181. Traffic Flow Theory. (3) Prerequisites: CEGR 5161 and permission of department. Logical foundations and mathematical representation of traffic flow; interrelation between microscopic and macroscopic equations of motion for highway traffic; stochastic properties of traffic at low and moderate densities. Car-following theories of traffic flow at high densities. Applications of queuing theory.

CEGR 6182. Transportation Systems Analysis. (3) Prerequisites: CEGR 5161 and permission of department. Issues, concepts and methods of transportation systems engineering and planning. Decision making in transportation management. The application of analytical methods to the development and evaluation of transport systems.

CEGR 6222. Experimental Structural Mechanics and Nondestructive Evaluation. (3) Prerequisites: Permission of instructor and graduate standing. A comprehensive overview of experimental techniques used to develop phenomenological understanding of and characterization of solid mechanics, stress analysis, and fracture mechanics problems. Additionally presented are experimental methods routinely employed for nondestructive evaluation of in-service structures, structural components, and structural materials. Students are expected to develop

a familiarity with and ability to conduct data acquisition, signal processing, and data interpretation.

CEGR 6243. Physical Processes in Environmental Systems. (3) Prerequisites: CEGR 3141, CEGR 3143, MATH 2171, and permission of department. Physical processes that describe the behavior of materials in natural and engineered environmental systems including transport, diffusion/dispersion, volatilization, sorption/desorption, flocculation, filtration, and sedimentation.

CEGR 6244. Chemical Fate and Transport. (3) Prerequisites: CEGR 3141 and permission of department. Fate of chemicals in the environment and transport processes within and between phases; Environmental chemo-dynamics; Volatilization, dissolution and adsorption from an equilibrium perspective; Evaluation of mass transfer kinetics across environmental compartments.

CEGR 6245. Chemical and Biological Processes in Environmental Systems. (3) Prerequisites: CHEM 1251, CEGR 3141, and permission of department. Chemical and biological processes that describe the behavior of materials in natural and engineered environmental systems. Chemical processes to be covered may include acid-base reactions, equilibrium partitioning, pH buffering, precipitation/dissolution, complex formation, adsorption, oxidation-reduction, coagulation, and adsorption. Fundamentals of biological theories to be covered may include kinetics, bioenergetics, genetics, and cellular functions.

CEGR 6251. Foundation Engineering. (3) Prerequisites: CEGR 3278 and permission of department. Methodologies for analysis and design of deep foundations including different construction layouts and configurations (e.g., single and group piles), different installation techniques (e.g., driven, drilled, ACIP, etc.), different loading conditions (e.g., axial compression, axial tension, lateral, general loading, etc), different design approaches (e.g., allowable stress design – ASD, and load and resistance factor design - LRFD), among other topics; New emerging technologies, construction and inspection aspects and their implications on deep foundation design, and other topics.

CEGR 6252. Soil Dynamics and Earthquake Engineering. (3) Prerequisites: CEGR 3122, CEGR 3278, and permission of department. Review of the dynamics of single and multi-degree of freedom systems. Earthquake mechanism, distribution, magnitude, intensity, ground shaking, site effects, prediction, and response spectra. Soil liquefaction; aseismic design of foundations; seismic codes; and machine foundation design.

CEGR 6254. Experimental Soil Mechanics. (3)

Prerequisites: CEGR 3278 and permission of department. Experimental methods, with emphasis on laboratory tests, to determine engineering soil properties and investigate soil behavior; 1) classification tests (i.e., used to identify soil classification and identify general engineering behavior type); and 2) assessment of engineering properties, such as permeability, shear strength, stiffness, and compressibility. Primary lab tests to be covered in this course are: consolidation, direct shear, static tri-axial, cyclic tri-axial, cyclic simple shear, resonant column, and other advanced geotechnical laboratory tests. Also includes discussion on field sampling and testing, reconstituted samples, laboratory instrumentation, and measurement techniques.

CEGR 6255. Slope Stability and Earth Structures. (3)

Prerequisites: CEGR 3278 and permission of department. Soil and rock slope stability including the aspects of analysis, design, and stabilization within a geotechnical framework; Concepts related to seepage analysis of isotropic and anisotropic soil structures to relate the influence of groundwater conditions in slope stability problems; Presentation of slope stability analysis procedures based on limit equilibrium principles and stress-deformation analyses; Stability considerations of natural slopes and human-made soil structures. Computer software for seepage and slope stability analysis is explained.

CEGR 6261. Traffic Signal Control Systems. (3)

Prerequisites: CEGR 6161 and permission of department. Study of control systems for isolated intersections, arterial streets, closed networks, and freeways. Emphasis on computer models; state-of-the-art detection, control, and communications equipment and software; and intelligent vehicle/highway systems.

CEGR 6268. Advanced Soil Mechanics. (3)

Prerequisites: CEGR 3258, CEGR 3278, and permission of department. One and two-dimensional consolidation, layered strata effects, and creep; seepage in layered strata, flow net, and seepage forces; shear strength parameters, effective and total stress paths, and application for slope stability evaluation; principles of critical state soil mechanics; computer applications. (*Fall*)

CEGR 6892. Individualized Study and Projects. (1-6)

Prerequisite: permission of department. Individual investigation or exposition of results for the 3-hour MS project. *May be repeated for credit.*

CEGR 6990. Industrial Internship. (1-3) Prerequisite: Completion of 9 credit hours of graduate coursework.

Full- or part-time academic year internship in engineering complementary to the major course of studies and designed to allow theoretical and course-based practical learning to be applied in a supervised industrial experience. Each student's program must be approved by their graduate program director and requires a mid-term report and final report to be graded by the supervising faculty. *Graded on a Pass/Unsatisfactory basis.* Credit hours gained from Internship shall not be part of the minimum credit hours requirement for graduation.

CEGR 6991. Graduate Master Thesis Research. (1-6)

Prerequisite: permission of department. Individual investigation culminating in the preparation and presentation of a thesis. *May be repeated for credit.*

CEGR 8090. Special Topics. Directed study of current topics of special interest. (*See the Infrastructure and Environmental Systems heading for details.*)

Construction and Facilities Management

• M.S. in Construction and Facilities Management

Department of Engineering Technology and Construction Management

et.uncc.edu

Graduate Program Director

Dr. John Hildreth

Graduate Faculty

Dr. Anthony L. Brizendine, PE, Professor
 Dr. Aidan Brown, Assistant Professor
 Dr. Nan Byars, PE, Professor
 Dr. Tara Cavalline, PE, Assistant Professor
 Dr. Don Chen, LEED AP, Assistant Professor
 Dr. G. Bruce Gehrig, PE, Associate Professor
 Dr. Rodney Handy, Professor
 Dr. John Hildreth, Associate Professor
 Dr. Jeff Kimble, Associate Professor
 Dr. Steve Kuyath, Associate Professor
 Dr. Na Lu, AIC, Assistant Professor
 Dr. David Murphy, Associate Professor
 Dr. Demba Ndiaye, Assistant Professor
 Dr. Thomas Nicholas, PE, Assistant Professor
 Dr. Maciej Noras, Associate Professor
 Dr. Carlos Orozco, PE, Associate Professor
 Dr. Peter Schmidt, PE, Associate Professor
 Dr. Deborah Sharer, Associate Professor
 Dr. Barry Sherlock, Professor
 Dr. Patricia Tolley, PE, Associate Professor
 Dr. Nicholas Tymvios, Assistant Professor
 Dr. Jozef Urbas, Associate Professor
 Dr. Sheng-Guo Wang, Professor
 Dr. Wesley Williams, Assistant Professor
 Dr. Aixi Zhou, Associate Professor

M.S. IN CONSTRUCTION AND FACILITIES MANAGEMENT

Construction Management is a program that prepares individuals to manage, coordinate, and supervise the construction process from concept development through project completion on timely and economic bases. Such programs include instruction in commercial, residential, mechanical, highway/heavy civil, electrical, environmental, industrial, and specialty construction; facilities management; project

planning; budgeting and cost control; logistics and materials management; personnel management and labor relations; site safety; construction contracting; construction processes and techniques; organization and scheduling; and applicable codes and regulations.

Facility Management is a profession that encompasses multiple disciplines to ensure functionality of the built environment by integrating people, place, process and technology. The body of knowledge required for facility management degree programs includes facility function (professional practice), human and environmental factors, planning and project management, finance, operation and maintenance, real estate, written and oral communication, information technology, quality management and assessment procedures (research and analytical methods), and integrative and problem solving skills.

Construction and facility management professionals work with owners, engineers, architects, specialty and sub-contractors, government agencies, and others to deliver, operate and maintain constructed projects and facilities. This MSCFM program provides the advanced professional development and graduate education necessary for construction and facility management professionals to work in the increasing high tech, rapidly changing construction industry and related careers such as real estate and land development, infrastructure development, code enforcement, and insurance. The program also has a special relationship with and focus on sustainability and energy infrastructure as part of the Energy Production and Infrastructure Center (EPIC) and Innovative Design, Engineering, and Sustainability (IDEAS) Center initiatives at UNC Charlotte.

Application Deadline

Applications can be received by the Graduate Admission Office any time prior to the published deadlines. In order to be considered for assistantships and tuition grants for the following academic year, students should apply by March 1 for priority consideration. The first round of award decisions typically occurs by March 15. However, the Department will evaluate admission applications at any time complete applications are received by the Graduate School.

Assistantships

Research and teaching assistantships are available from the Department on a competitive basis to highly qualified applicants/students.

Tuition Grants

Tuition grants, including out-of-state tuition differential waivers and in-state tuition support, are

available on a competitive basis for both out-of-state and in-state students, respectively.

Admission Requirements

Admission requirements are available on the Graduate School website at graduateschool.uncc.edu/future-students/admissions.

Documents to be Submitted for Admission

- Official transcripts from all colleges and universities attended
- Official GRE scores
- Official TOEFL scores
- The UNC Charlotte application for graduate admission online
- Three professional recommendations
- Others as required by the Graduate School

Degree Requirements

The program leading to the Master of Science degree in Construction and Facilities Management is a 30 credit-hour program. The program consists of an 9-credit hour common core and a capstone experience including either: (1) a non-research focused sequence of 21 credit hours of electives or (2) a research-focused sequence of 15 credit hours of electives with a formal 6-credit hour graduate research thesis and completion of CMET 6160. At least 15 credit hours must be in courses numbered 6000 or above. The 30-credit hour degree program is outlined below:

Common Core Courses (9 credit hours)

CMET 6135 Advanced Construction Planning and Management (3)
 CMET 6240 Safety and Risk Management (3)
 CMET 6270 Operation of Constructed Facilities (3)

Elective Courses (21 credit hours)

Select one of the following:

Non-Thesis Option

Major Electives (21)

Thesis and Research Option

CMET 6900 Master's Thesis and Research (6)
 CMET 6160 Research and Analytics Methods (3)
 Major Electives (12)

Elective Courses

Select from the following or others with director approval:

CMET 5126 Project Scheduling and Control (3)
 CMET 5135 Building Information Modeling (3)
 CMET 5140 Building Energy Management (3)
 CMET 5150 Green Building (3)
 CMET 5160 Advanced Construction Materials (3)
 CMET 5290 Temporary Structures in Construction (3)

CMET 5350 Construction Geotechnics and Foundations (3)
 CMET 6000 Special Topics in Construction and Facilities Management (3)
 CMET 6145 Facilities Management Financial Analysis (3)
 CMET 6155 Facility Instrumentation and Controls (3)
 CMET 6160 Research and Analytical Methods (3)
 CMET 6165 Transportation Asset Management (3)
 CMET 6180 Alternative Project Delivery Methods (3)
 CMET 6250 Asset Management for Facility Managers (3)
 CMET 6255 Advanced Plant Layout and Design (3)
 CMET 6275 Advanced Construction Means and Methods (3)
 CMET 6285 Quality Assurance in Construction (3)
 CMET 6295 Design and Improvement of Construction Operations (3)
 CMET 6800 Independent Study in Construction and Facilities Management (3)
 ENER 5250 Analysis of Renewable Energy Systems (3)
 ENER 5275 Air Conditioning Systems (3)
 ENER 5285 Applied Noise and Vibration Control (3)
 ENER 5290 Advanced Instrumentation (3)
 ENER 6120 Energy Generation and Conversion (3)
 ENER 6135 Energy Transmission & Distribution (3)
 ENER 6150 System Dynamics (3)
 ENER 6170 Applied Mechatronics (3)
 ENER 6220 High Voltage Technology (3)
 ETGR 5272 Advanced Engineering Analysis (3)

Additional new major elective courses may be created based on industry needs and faculty research interest. In addition, appropriate existing graduate level courses from other programs may be approved by the program director.

Capstone Experiences

Students pursuing the Master of Science in Construction and Facilities Management have two options to complete the 30-credit hour program:

- 24 hours of coursework plus 6 hours of thesis project
- 30 hours of coursework and a comprehensive examination

Both options require the formation of a program committee. The thesis option is reserved for students who are attending the on-campus program and are performing research under formal graduate research or teaching assistantships. Students receiving such assistantships may be required to pursue the thesis option. The thesis option requires students to submit a written thesis and orally defend their work before their program committee.

All non-thesis students must complete 30 credits of coursework and successfully complete a formal comprehensive examination. The comprehensive examination is a written exam. A student's exam will be scheduled when he/she has at least 24 hours of course credit completed or in progress. The student's graduate advisor and the examining committee will coordinate the examination (to be offered once in the fall and once in the spring semesters), preparing the exam with the assistance of members of the student's program committee. The exam will measure the student's mastery of theories and applications in the selected area of specialization within the discipline. Students will have only two opportunities to receive passing marks on the examination.

Advising

Each student is supervised by his/her graduate advisor and a program committee.

Plan of Study Requirements

Each student is required to submit a Plan of Study to the Department's Graduate Director before completing 18 hours of graduate credits.

Application for Degree

Each student should submit an Application for Degree prior to graduation. If a student does not graduate in the semester identified on the Application, the student must complete a new form and repay the application fee to be considered for graduation in a subsequent semester.

Transfer Credit

The Department, at its discretion, may accept transfer of graduate courses (6 credits maximum) taken at another institution or from another program prior to admission to the Master's program in Construction and Facilities Management. Only courses in which the student earned a grade of B or above may be transferred.

Grades Requirement

All candidates must earn an overall 3.0 GPA to graduate. Accumulation of one U grade or three C grades will result in the suspension of the student's enrollment in the program.

Other Requirements

The program has both a thesis and non-thesis track. After admission to candidacy, thesis students will complete a comprehensive oral exam while non-thesis students will complete a comprehensive written exam. Residence will be per Graduate School rules. There is no language requirement. While full-time students will typically take three semesters to complete the program, part-time students are

expected to take no more than six years to complete the program as per Graduate School rules.

COURSES IN CONSTRUCTION AND FACILITIES MANAGEMENT (CMET)

CMET 5126 Project Scheduling and Control. (3)

Methods for planning, scheduling, and controlling construction projects, emphasizing manual and computer-based techniques for critical path method scheduling, resource management, construction cost control, and reporting practices.

CMET 5135. Building Information Modeling. (3) The creation, management, and application of building information models to the construction, operation, and maintenance of a facility. Focus on 3D and 4D computer models of building components, renderings, animations, and interfacing with analysis tools.

CMET 5140. Building Energy Management. (3)

Prerequisites: ETCE 3271, ETME 3143, or permission of instructor. Integrated planning of energy efficient technologies for building environmental control systems. Introduction to the design, planning, and optimization of HVAC systems and technology needed to integrate the heating, cooling, natural ventilation, lighting, electricity, and building energy management systems into a building's structure and design.

CMET 5150. Green Building (3) Sustainable design and construction. Topics include: sustainable sites, water efficiency, energy and atmosphere, materials and resources, indoor environmental quality, innovation in design, and regional priority.

CMET 5160. Advanced Construction Materials. (3)

Materials utilized in concrete, concrete construction, and quality control. Study of concrete properties and the variables that affect them. Topics also include: destructive and non-destructive testing of structural concrete, service life prediction models, and preventative measures, as well as recent advances in concrete materials, construction, and technology.

CMET 5290. Temporary Structures in Construction. (3)

Prerequisite: ETCE 3163 or permission of instructor. Temporary structures used to support construction operations such as concrete formwork, scaffolding systems, shoring systems, cofferdams, underpinning, slurry walls, and construction dewatering systems.

CMET 5350. Construction Geotechnics and Foundations. (3)

Study of the concepts and fundamental principles of construction geotechnics related to foundation engineering/construction

excavations, temporary structures, dewatering and slope stability.

CMET 6000. Special Topics in Construction and Facility Management. (3) Study of specific new areas emerging in the various fields of construction and facility management. *May be repeated for credit.*

CMET 6135. Advanced Construction Planning and Management. (3) Prerequisite: CMET 4126 or permission of instructor. Advanced methods for planning and controlling construction projects. Specific topics of study include resource allocation, leveling and management, critical path method (CPM) and project evaluation and review techniques (PERT) of scheduling, project controls through cost-schedule integration, and schedule compression.

CMET 6145. Facilities Management Financial Analysis. (3) Prerequisite: ETGR 3222, ECON 2102, or permission of instructor. Real property concepts, issues, and topics pertinent to the facility management professional to include fundamentals of commercial real estate investment, understanding market influences, contracts and property portfolio management.

CMET 6155. Facility Instrumentation and Controls. (3) Prerequisite: ETME 3163 or permission of instructor. Design and analysis of industrial process control instrumentation. Topics include: process control devices and process control applications associated with industrial instrumentation and building and facility operation.

CMET 6160. Research and Analytical Methods. (3) Prerequisite: STAT 1220 or permission of instructor. Analytical and research techniques applicable to construction and facility management problems. Topics of study include defining research problems, experiment design, measurement, sampling, and analysis.

CMET 6165. Transportation Asset Management. (3) Management and planning techniques for transportation infrastructure assets. Focus on recent advances for maintaining and managing transportation assets, including performance management, prioritization of maintenance strategies, network and project level optimization.

CMET 6180. Alternative Project Delivery Methods. (3) Prerequisite: CMET 3224 or permission of instructor. Study of the many organizational arrangements between construction owners, designers, contractors, and financiers. Delivery methods studied include design-bid-build (DBB), design-build (DB), construction management (agency

CM and CM@Risk), design-build-operate (DBO), and design-build-finance-operate (DBFO).

CMET 6240. Safety and Risk Management. (3) Causes and prevention of industrial accidents, hazardous processes and material, OSHA regulations and requirements, and design of accident prevention programs.

CMET 6250. Asset Management for Facility Managers. (3) Prerequisite: CMET 5270 or permission of instructor. Study of useful life of building and infrastructure systems and creating a process to manage their life cycles; emphasis on justifying and funding capital projects.

CMET 6255. Advanced Plant Layout and Design. (3) Prerequisite: CMET 5270 or permission of instructor. Designing construction sites and facility plants with respect to material handling, equipment location, auxiliary services, capital requirements, safety, and personnel organization.

CMET 6270. Operation of Constructed Facilities. (3) Acquisition, operation, maintenance, and disposal of building systems, structures, permanent interiors, furniture, and equipment; grounds and other exterior elements.

CMET 6275. Advanced Construction Means and Methods. (3) Construction means, methods, and equipment used to transform a particular design concept into a completed usable structure or facility. Emphasis is placed on current and innovative construction techniques and equipment.

CMET 6285. Quality Assurance in Construction. (3) Prerequisite: CMET 6160 or permission of instructor. The principles and applications of quantitative methods of quality control to production processes with an introduction to process control charts, Pareto charts, and other quality analysis tools for the construction industry.

CMET 6295. Design and Improvement of Construction Operations. (3) Prerequisite: CMET 6135. Design of construction operations based on productivity concepts. Techniques for collecting data, analyzing, and formulating solutions to improve construction operations is emphasized.

CMET 6800. Independent Study in Construction and Facility Management. (3) Prerequisite: Permission of graduate committee advisor. Individual investigation and exposition of results for a directed project in construction and facility management. *May be repeated for credit.*

CMET 6900. Master's Thesis and Research. (1-6)

Prerequisite: permission of graduate committee advisor. Individual investigation culminating in the preparation and presentation of a thesis. *May be repeated for credit.*

Electrical Engineering

- **Ph.D. in Electrical Engineering**
- **M.S. in Electrical Engineering (MSEE)**

Department of Electrical and Computer Engineering

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Graduate Program Director

Dr. Aba Ebong

Graduate Faculty

Dr. Ian Ferguson, Professor and Chair
Dr. Ryan Adams, Associate Professor
Dr. David Binkley, Professor
Dr. Steve Bobbio, Professor
Dr. Valentina Cecchi, Assistant Professor
Dr. Badrul Chowdhury, Professor
Dr. James Conrad, Professor
Dr. Robert Cox, Associate Professor
Dr. Abasifreke Ebong, Professor
Dr. Johan Enslin, Professor
Dr. Michael Fiddy, Professor
Dr. Mohamed-Ali Hasan, Associate Professor
Dr. Ivan Howitt, Associate Professor
Dr. Bharat Joshi, Associate Professor
Dr. Aravind Kailas, Assistant Professor
Dr. Yogendra P. Kakad, Professor
Dr. Sukumar Kamalasadan, Associate Professor
Dr. Vasilije Lukic, Professor
Dr. Mehdi Miri, Associate Professor
Dr. Arindam Mukherjee, Associate Professor
Dr. Asis Nasipuri, Professor
Dr. Babak Parkhideh, Assistant Professor
Dr. Arun Ravindran, Associate Professor
Dr. Ronald Sass, Professor
Dr. Edward B. Stokes, Professor
Dr. Farid Tranjan, Professor
Dr. Thomas P. Weldon, Associate Professor
Dr. Andrew Willis, Associate Professor
Dr. Jiang (Linda) Xie, Professor
Dr. Yong Zhang, Bissell Distinguished Professor

The Department of Electrical and Computer Engineering offers programs leading to M.S. and Ph.D. degrees in Electrical Engineering. The department provides unsurpassed education to its students, preparing them for careers in high-tech industries or academia. The Ph.D. program is focused on providing research expertise, and is designed to impart the aptitude and confidence for generating new knowledge and practices in a chosen research area. The Master's degree can be earned by successfully completing 30 credits of approved

graduate coursework, which can be completed either under the thesis or non-thesis options. Our students are provided with both breadth of knowledge in Electrical and Computer Engineering and related areas and depth of knowledge in the chosen research specialty. The department is staffed with a prestigious faculty conducting research in a number of areas that include circuits and electronics, communications and signal processing, computer engineering, control systems, microelectronics, optics and optoelectronics, power and energy systems. A full range of state-of-the-art laboratories is available enabling faculty and students to conduct research at the cutting edge of technology.

PH.D. IN ELECTRICAL ENGINEERING

The Ph.D. program is designed to provide the students with research-level expertise in a focus area within electrical and computer engineering and breadth of knowledge in areas related to the focus area. In addition to taking a set of courses in a chosen area of concentration, a key aspect of the doctoral degree is the student's research dissertation. Each dissertation is expected to be a significant original contribution on research on a chosen subject, leading to one or more archival publications. Successful doctoral candidates learn how to acquire advanced knowledge from published research articles, identify research problems, formulate plausible approaches to solve them, analyze and evaluate proposed solutions, and present technical material orally and in writing.

Additional Admission Requirements

In addition to the general requirements for admission to the Graduate School, the Electrical and Computer Engineering department seeks the following from applicants to the Ph.D. program in Electrical Engineering:

- 1) A master's degree in electrical and/or computer engineering or a closely allied field, demonstrating strong academic background for performing research in a chosen area of interest. Exceptional students with only a baccalaureate degree who are motivated to pursue a Ph.D. may also be considered for direct admission to the Ph.D. program.
- 2) The applicant must receive satisfactory scores on the quantitative and verbal sections of the Graduate Record Examinations General Test.
- 3) The statement of purpose, written by the applicant, must specify the applicant's research interests within Electrical and Computer Engineering.

Degree Requirements

The following is a chronologically ordered set of requirements for the Ph.D. degree in Electrical Engineering:

- 1) Appointment of a Ph.D. advisor and formation of an advisory committee.
- 2) Development of a Ph.D. Plan of Study detailing all course and examination requirements.
- 3) Successful completion of the qualifying examinations.
- 4) Presentation of a proposal for Ph.D. research and admission to candidacy.
- 5) Successful defense of the Ph.D. Dissertation.

Within the first semester of being admitted into a Ph.D. program, the student should choose a Ph.D. advisor and form an advisory committee. In conjunction with the Ph.D. advisor and this advisory committee, the student will develop a Plan of Study to meet the Ph.D. program requirements of coursework and examinations and prepare to undertake original research leading to a doctoral dissertation. Normally, a student would be expected to have at least one archival publication on the research performed for the dissertation.

Plan of Study

The Plan of Study must be submitted to the Director of Graduate Programs for review and approval within the second semester of enrollment in the Ph.D. program. The Plan of Study must show a minimum of 72 hours of credit beyond the Baccalaureate degree, including 18 hours of doctoral dissertation credits. At least 12 hours of coursework must be taken after admission to the Ph.D. program. The specific course requirements will be set by the student's Advisory Committee. Doctoral students should take 8000-level courses when they are available. 6000 and 5000 level graduate courses that do not have 8000-level counterparts may also be counted towards the doctoral degree if approved by the Advisory Committee. For students who do not possess bachelor's and/or master's degrees in appropriate fields of study, additional coursework may be required. Courses taken without the approval of the advisory committee may not be counted toward the degree.

Grades

A student must have a GPA of at least a 3.0 in order to graduate. The dissertation is graded on a Pass/Unsatisfactory basis and, therefore, will not be included in the cumulative GPA. An accumulation of more than two marginal (C) grades will result in suspension of the student's enrollment in the graduate program. If a student makes a grade of U on any course, enrollment will be suspended. A graduate

student whose enrollment has been suspended because of grades is ineligible to attend any semester or summer session unless properly readmitted to the graduate program. Readmission to the program requires approval of the Dean of the Graduate School upon the recommendation of the student's major department.

Residence

A student may satisfy the residency requirement for the program by completing 18 hours, either coursework or research credits, by study-in-residence during the academic year and during the summer terms, as long as the study is continuous. Study-in-residence is deemed to be continuous if the student is enrolled in one or more courses (including research/dissertation credit) in successive semesters until eighteen hours of credit are earned.

Qualifying Examination

In addition to demonstrating a high level of competence in coursework, the student must pass the Ph.D. qualifying examinations. The qualifying examination should be taken before completion of 24 hours beyond the master's degree but must be passed no later than four semesters after initial enrollment in the program. Failure to pass the qualifying examination after two attempts will result in the termination of the student's enrollment in the Ph.D. program.

The qualifying examination is divided into two test sessions. The first session comprises of a written examination on the breadth areas of electrical and computer engineering, and the second session is a research aptitude test that comprises of a technical presentation. . For a detailed description of the procedures for the Ph.D. qualifying examinations in electrical and computer engineering please contact the ECE department or visit ece.uncc.edu.

Dissertation Proposal and Admission to Candidacy

Because the Ph.D. program is heavily based on independent research, each student must write a proposal describing his/her proposed dissertation research following the technical guidelines established by the department. The proposal must be presented to and orally defended before the student's advisory committee. The proposal must be presented within one year after the qualifying examination is passed. Upon approval of the student's dissertation proposal, the advisory committee will recommend the student's admission to candidacy subject to the approval of the Engineering Doctoral Graduate Committee and the Dean of the Graduate School.

Dissertation

Evidence of a high degree of competence in scholarship, written exposition, independent inquiry and the ability to organize and apply knowledge must be demonstrated by the student in the dissertation. The student will make a public defense of the dissertation at which time the dissertation, as well as the student's knowledge of the field, will be appropriate matter for examination by the student's advisory committee. Although questions may be asked by the general audience, evaluation of the dissertation defense is the sole responsibility of the advisory committee. The dissertation will be graded on a Pass/Unsatisfactory basis.

Application for Degree

Students preparing to graduate must submit an online Application for Degree by the filing date specified in the University Academic Calendar. If a student does not graduate in the semester identified on the Application for Degree, then the student must update his/her Admission to Candidacy and submit a new Application for Degree for graduation in a subsequent semester.

Time Limit

Students are allowed a maximum of eight (8) calendar years from formal admission to the Ph.D. program to complete the program successfully.

Assistantships

There are two forms of assistantships that are offered by the ECE Department. These are Teaching Assistantships (TAs) and Research Assistantships (RAs). RAs are controlled by faculty members with research grants, and the faculty members make the decisions in selecting students for RAs. Therefore, for RAs, students should contact individual faculty members directly. TAs are given to students to help faculty members with classroom teaching or laboratory instruction and these allocations are related to the ECE department needs and available resources. In all cases, the TAs and RAs are awarded to exceptional students. Application forms are available online at ece.uncc.edu.

Tuition Waivers

For exceptionally qualified candidates who are awarded TAs or RAs, a limited number of tuition awards are available on a competitive basis.

MASTER OF SCIENCE IN ELECTRICAL ENGINEERING (MSEE)

The Master of Science in Electrical Engineering (MSEE) program provides advanced knowledge and technical skills in electrical and computer engineering. In

addition to taking graduate level courses in one or more areas of concentration within the department, students in the MSEE program also have opportunities to engage in research and individualized projects. The goal of this program is to graduate engineers with effective problem solving and communication skills.

Additional Admission Requirements

In addition to the general requirements for admission to the Graduate School, the Department of Electrical and Computer Engineering seeks the following from applicants to the Master's programs in Electrical Engineering:

Applicants should have baccalaureate degrees in electrical and/or computer engineering with a GPA of at least 3.0 out of 4.0. Applicants must have satisfactory scores in the quantitative and verbal sections of the Graduate Record Examinations general test.

Applicants with baccalaureate degrees in fields closely related to electrical and computer engineering (e.g., electronics, computer science, mathematics, physics, etc.) may also be considered. However, satisfactory evidence on the aptitude to pursue graduate studies in electrical and computer engineering must be demonstrated. If additional preparatory courses are required, such courses should be taken before applying for the MSEE.

Admission is based on the overall background, motivation, and potential, as determined by the department.

Early Entry to the Graduate School

Exceptional undergraduate students of UNC Charlotte may be accepted into the graduate program and begin work towards a graduate degree before completion of their baccalaureate degree. An Early Entry student may take up to six hours of graduate coursework that will be counted towards his/her undergraduate hours and also towards his/her graduate degree, i.e., up to six credits of graduate coursework may be "double counted" for both baccalaureate and graduate degrees.

An applicant may be accepted at any time after completion of 75 or more hours, although it is expected that close to 90 hours will have been earned by the time the first graduate course is taken. To be accepted into this program, undergraduate students must have an overall GPA of at least 3.2 and have earned satisfactory scores in the Graduate Record Examinations (GRE) general tests. If any Early Entry student does not meet the normal admission requirements of a 3.0 overall undergraduate GPA at

the end of his/her baccalaureate degree, he/she will be dismissed from the graduate program.

Degree Requirements

The MSEE degree requires successful completion of 30 graduate credits as approved by the student's graduate advisor. This can be done using one of three options: (a) the thesis option, where the student completes 9 credit hours of thesis (ECGR 6991) and 21 credit hours of coursework, (b) the project option, where the student completes 3 credit hours of individual study and projects (ECGR 6890) and 27 credit hours of coursework, and (c) comprehensive examinations option, where students complete 30 credits of coursework and pass a comprehensive written examination.

Thesis and Non-Thesis Options

Students may pursue either the Thesis or Non-Thesis Option for a Master's degree in Electrical Engineering. In the Thesis Option, students must complete 9 credit hours of thesis research. Alternatively, students may complete the requirements of a Master's degree under the Non-Thesis Option by taking 30 credit hours of coursework only, or by taking 27 credit hours of coursework along with 3 credits of individualized project work.

Degree Requirements for the Thesis Option

- 1) Plan of Study - students must meet with their advisor to formulate a plan of study and get the committee's approval. The plan of study must be submitted after completing at least 9 but no more than 18 credit hours.
- 2) Satisfactory completion of 30 credit hours of approved graduate credits in major or related area of study including 9 credit hours of thesis.
- 3) Not more than 6 credit hours may be taken from outside the Department of Electrical and Computer Engineering.
- 4) Admission to Candidacy
- 5) Thesis Defense - a copy of the thesis should be distributed to each member of the program committee at least two weeks prior to the defense. Students should make a public announcement of the defense within the department to allow attendance by interested faculty members and students of electrical and computer engineering.

Degree Requirements for the Non-Thesis/Project Option

- 1) Plan of Study - students must meet with their advisor to formulate a plan of study and get the committee's approval. The plan of study must be submitted after completing at least 9 but no more than 18 credit hours.

- 2) Satisfactory completion of 30 credit hours of approved graduate credits. At least 21 credit hours of courses must be in the ECE department.
- 3) A student must take three credits of individualized project that will require a written report and an oral presentation.
- 4) Admission to Candidacy
- 5) Students must pass an oral exam during the presentation of the project that is administered by the program advisory committee.

Degree Requirements for the Comprehensive Examinations Option

- 1) Plan of Study - students must meet with their advisor to formulate a plan of study and get the committee's approval. The plan of study must be submitted after completing at least 9 but no more than 18 credit hours.
- 2) Satisfactory completion of 30 credit hours of approved graduate coursework. At least 21 credit hours of courses must be in the ECE department.
- 3) Admission to Candidacy
- 4) Students must pass a written comprehensive that is administered by the department. Students receive two chances to successfully pass the comprehensive examinations.

Program Committee

For the thesis and non-thesis project options, the student must select a program committee that is composed of at least 3 members of the graduate faculty, the majority of whom must be members of the Electrical and Computer Engineering department. The graduate program advisor generally serves as the chairman of the committee. For the non-thesis coursework only option, the advisor alone plays the roles of the committee (i.e., no other members are required).

Concentration in Power and Energy Systems

The Department of Electrical and Computer Engineering offers a Concentration in Power and Energy Systems for the MSEE degree, which requires taking a set of core and elective courses. Students who elect to pursue the Concentration in Power and Energy Systems towards their MSEE degree primarily take coursework in modern power and energy systems, devices modeling, analysis, protection and control. This concentration prepares students for jobs with power utilities, power and energy devices manufacturing companies, national and regional laboratories, or for continued academic training in power and energy fields. The concentration is reflected in the student's transcript upon successful completion of the MSEE program. Students interested in earning their MSEE degree with the concentration must indicate their interest in this option in their Plan of Study that must be submitted within their second

semester into the MSEE program. The MSEE degree can also be earned without specifying a concentration, where the student has greater flexibility in selecting their courses.

There are two course tracks for the Concentration in Power and Energy Systems: (a) the Power Systems track, and (b) the Power Electronics and Machines track. In order to earn an MSEE degree with a Concentration in Power and Energy Systems, a student must take the four core courses from one of these course tracks and a minimum of three courses from the list of elective courses as described below.

Power Systems Track Core Courses

ECGR 5142 Power Generation Operation and Control (3)
 ECGR 5104 Computational Methods in Power Systems (3)
 ECGR 5194 Power System Analysis II (3)
 ECGR 6144 Electric Power Distribution Systems-I (3)

Note: Students who opt to take the Power Systems course track are expected to have taken the following courses or their equivalents before entering the Master's program: ECGR 4141, ECGR 4143, and ECGR 4144. If a student has not taken these courses or their equivalents, the student must take their graduate equivalents as elective courses for the graduate concentration or obtain permission from their advisor.

Power Electronics and Machines Track Core Courses

ECGR 5144 Power Electronics (3)
 ECGR 5195 Electric Machinery (3)
 ECGR 6197 Power Electronics II (3)
 ECGR 6199 Dynamics and Control of AC Drives (3)

Note: Students who opt to take the Power Electronics and Machines course track are required to have taken ECGR 4141 or its equivalent before entering the Master's program. If a student has not taken this course or its equivalent, the student must take its graduate equivalent as an elective course for the graduate concentration or obtain permission from their advisor.

Elective Courses (for both tracks)

ECGR 5104 Computational Methods in Power Systems (3)
 ECGR 5112 Nonlinear Analysis (3)
 ECGR 5142 Power Generation Operation and Control (3)
 ECGR 5188 Modeling and Analysis of Dynamic Systems (3)
 ECGR 5194 Power System Analysis II (3)
 ECGR 5411 Control Systems Theory I (3)
 ECGR 5412 Control System Theory II (3)
 ECGR 6111 Linear Systems (3)

ECGR 6115 Optimal Control Theory I (3)
 ECGR 6116 Optimal Control Theory II (3)
 ECGR 6117 Multivariable Controls (3)
 ECGR 6141 Power System Protection (3)
 ECGR 6144 Electric Power Distribution Systems-I (3)
 ECGR 6145 Electric Power Distribution Systems-II (3)
 ECGR 6190 Smart Grid Characteristics, Design, and Analysis (3)
 ECGR 6147 Power System Stability and Control (3)
 ECGR 6198 Design of Renewable Energy Electromagnetic Devices (3)

Note: With written permission from their advisor, a student may request to take one course outside of the above listed course electives. Students are advised to review the ECE graduate program webpages for updates and additions to the list of electives.

In addition to the seven courses from the above lists, students seeking a graduate concentration must also complete the general requirements for the MSEE degree for their chosen option. This involves taking 9 credit hours of thesis, if taking the thesis option; 3 credit hours of individualized studies and projects plus two additional courses as approved by the advisor, if taking the project option; and three additional courses approved by the advisor and pass the comprehensive examinations, if taking the comprehensive examinations option.

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Students preparing to graduate must submit an online Application for Degree by the filing date specified in the University Academic Calendar. If a student does not graduate in the semester identified on the Application for Degree, then the student must update his/her Admission to Candidacy and submit a new Application for Degree for graduation in a subsequent semester.

COURSES IN ELECTRICAL AND COMPUTER ENGINEERING (ECGR)

ECGR 5090. Special Topics. (1-6) Directed study of current topics of special interest. *May be repeated for credit.*

ECGR 5101. Embedded Systems. (3) Prerequisite: ITCS3182, ECGR3183, or equivalent. Introduction to designing microcontroller-based embedded computer systems using assembly and C programs. Examination of real-time operating systems and their impact on performance. Computer engineering applications will be emphasized. Credit will not be given for ECGR 5101 where credit has been given for ECGR 4101.

ECGR 5102. Engineering Simulation. (3) Prerequisite: ECGR 2103 or equivalent. A wide range of simulation related topics will be introduced including the theory of simulation, characteristics of simulators, and trade-offs in simulation studies. Continuous and discrete simulation with primary emphasis on application of simulation techniques to engineering problems. Simulation of actual problems based on students' interest and experience areas. Credit will not be given for ECGR 5102 where credit has been given for ECGR 4102.

ECGR 5103. Applied Computer Graphics. (3) Prerequisite: ECGR 3111 or permission of the department. Interactive graphics; raster, character, vector, graphics, display technologies; rotation, scaling, translating of graphics image; image processing/enhancement; feature extraction; 3-D graphics. Credit will not be given for ECGR 5103 where credit has been given for ECGR 4103.

ECGR 5104. Computational Methods in Power Systems. (3) Prerequisite: ECGR 4142 or equivalent. Numerical techniques for analysis, operation and planning of power systems. Sparse matrix techniques applied to power flow algorithms. Economic operation of power systems. Optimum power flow. Credit will not be given for ECGR 5104 where credit has been given for ECGR 4104.

ECGR 5111. Control Systems. (3) Prerequisite: permission of instructor. Mathematical models and characteristics of control systems. Performance and stability of linear feedback systems. Root locus and frequency response techniques. Stability in frequency domain. Time domain analysis. Design and compensation of control systems. Credit will not be given for ECGR 5111 where credit has been given for ECGR 4111.

ECGR 5112. Nonlinear Analysis. (3) Prerequisite: ECGR 3111 or equivalent. Solution of nonlinear problems using numerical and graphical methods, phase plane plots, analysis of singular points and analytical techniques. Forced oscillating systems. Stability of nonlinear systems. Use of analog and digital computer to study nonlinear problems.

ECGR 5113. Network Synthesis. (3) Prerequisite: ECGR 4113 or equivalent. The positive real concept, properties and methods of testing. Realizability conditions on driving point functions. Methods of synthesis of one-port. Physical realizability and properties of two-port networks. Transfer function synthesis. Approximation methods. Credit will not be given for ECGR 5113 where credit has been given for ECGR 4183.

ECGR 5114. Device Characterization, Parameterization and Modeling. (3) Prerequisites: ECGR 3132 and ECGR 4134 or their equivalents. Advance device and circuit analysis; device and circuit simulation using SPICE, ECAP or equivalent. Parametric modeling of active devices. Device characterization and parameterization; temperature effects; thermal cycling. Analysis of device failure modes. Credit will not be given for ECGR 5114 where credit has been given for ECGR 4184.

ECGR 5121. Antennas. (3) Prerequisite: ECGR 3122 or equivalent. Radiation into free space, the point source, thin linear antenna, arrays of linear elements, aperture antennas, impedance, methods of feeding, matching and termination. Antenna systems. Credit will not be given for ECGR 5121 where credit has been given for ECGR 4121.

ECGR 5122. Random Processes and Optimum Filtering. (3) Crosslisted as ECGR 5122. Prerequisites: ECGR 3111 and STAT 3128 or permission of department. Review of probability, univariate and multivariate distribution functions; random processes, discrete and continuous time processes, wide-sense stationary, ergodicity; time- and frequency-domain analysis; linear systems, optimum filtering, Wiener filters, Kalman filters; application. Credit will not be given for ECGR 5122 where credit has been given for ECGR 4422.

ECGR 5123. Advanced Electromagnetic Field Theory. (3) Prerequisite: ECGR 3122 or equivalent. Maxwell's equations and propagation. Properties of guided and surface waves. Wave properties of light; physical and fiber optics. Credit will not be given for ECGR 5123 where credit has been given for ECGR 4185.

ECGR 5124. Digital Signal Processing. (3) Prerequisite: ECGR 3111 or equivalent. Sampling and signal recovery in linear systems; analysis of sampled systems; discrete and fast Fourier transforms; z-transform; discrete convolution; design of digital FIR and IIR filters. Credit will not be given for ECGR 5124 where credit has been given for ECGR 4124.

ECGR 5125. Foundation of Optical Engineering. (3) Prerequisites: ECGR 3121 and PHYS 3141, with a grade of C or above or permission of the department. The engineering aspects and applications of modern optics, optical communications, optical materials, optical devices, basic optical fiber and integrated optics, optical signals, and optical modulation, multiplexing, and related networks, basic Fourier optics and its application in optical images and information. Credit will not be given for ECGR 5125 where credit has been given for ECGR 4125.

ECGR 5132. Analog Integrated Circuit Design. (3) Prerequisite: ECGR 4131 or equivalent. Topics include: analog MOS modeling, design of current mirrors, references, and operational amplifiers. Both hand analysis and SPICE simulation utilized. Credit will not be given for ECGR 5132 where credit has been given for ECGR 4132.

ECGR 5133. VLSI Systems Design. (3) Prerequisite: ECGR 2181 and 3131 or their equivalents. Analysis, design, and synthesis of very large scale integrated circuits. A project-oriented course relying heavily on computer-aided design tools for logic, layout design, and simulation. Credit will not be given for ECGR 5133 where credit has been given for ECGR 4433.

ECGR 5134. Advanced VLSI Systems Design. (3) Prerequisite: ECGR 5133 or permission of department. A project-oriented course dealing with advanced topics in VLSI systems design and analysis such as circuit design techniques, array structures, performance estimation, automated routing and device electronics. Credit will not be given for ECGR 5134 where credit has been given for ECGR 4188.

ECGR 5135. Physical Electronics. (3) Prerequisite: ECGR 3122 or equivalent. Dynamics of charged particles; electron motion in electromagnetic fields; types of electron emission; beam focusing; longitudinal and transverse beam waves; microwave generation; plasma parameters. Credit will not be given for ECGR 5135 where credit has been given for ECGR 4135.

ECGR 5136. Semiconductor Optoelectronic Materials and Devices. (3) Prerequisite: ECGR 3133 with grade of C or above, or permission of department. Direct and indirect bandgap materials; Compound and wide bandgap semiconductors; Electronic properties; Optical properties; Generation and recombination; Junction theory; Light emitting devices; Optical detectors. Credit will not be given for ECGR 5136 where credit has been given for ECGR 4136.

ECGR 5137. Device Electronics for Integrated Circuits. (3) Prerequisites: ECGR 3132 and ECGR 4134 or their equivalents. The basic operating principles of electronic devices in integrated circuits are treated. The physical models of these devices are discussed. Graduate students are required to carry out laboratory experimentation. Credit will not be given for ECGR 5137 where credit has been given for ECGR 4137.

ECGR 5138. Electronic Thin Film Materials and Devices. (3) Prerequisite: ECGR 4133 or 3132, or equivalent. Applications of thin films in microelectronics / optoelectronics manufacturing

processes; vacuum technology, deposition techniques, and the characterization methods relevant to optoelectronic applications; thin film applications such as metallization, silicide formation, light emitting diodes (LED) and lasers, and doping of semiconductors. Credit will not be given for ECGR 5138 where credit has been given for ECGR 4138.

ECGR 5139. Digital Communication Systems. (3)

Prerequisites: ECGR 3111 or equivalent. Topics include: digital data transmission systems, signal and system representation, digital system performance characterization, pulse code modulation, and statistical communications theory. Credit will not be given for ECGR 5139 where credit has been given for ECGR 4139.

ECGR 5140. Introduction to VLSI Processing. (3)

Prerequisite: permission of department. Microelectronic fabrication; relevant materials, processes, and tools; fabrication of a simple structure in the VLSI clean room/lab. Credit will not be given for ECGR 5140 where credit has been given for ECGR 4140.

ECGR 5142. Power Generation: Operation and Control. (3)

Prerequisite: ECGR 4142 or equivalent. Characteristics of power generation units, steam, nuclear reactor and hydroelectric. Economic and thermal system dispatch. Transmission losses, load flow problems. Hydro scheduling, hydro-plant models. Energy production cost models. Interchange evaluation. Credit will not be given for ECGR 5142 where credit has been given for ECGR 4190. (Fall) (Alternate years)

ECGR 5143. Dynamic and Transient Analysis of Power Systems. (3)

Prerequisite: ECGR 4142 or equivalent. Large-scale systems state descriptions and hierarchical control. State space models, dynamic stability and testing. Stability of simple and multi-machine systems. Transient phenomena in electrical power systems. Transient stability problem. Credit will not be given for ECGR 5143 where credit has been given for ECGR 4191.

ECGR 5144. Power Electronics I. (3)

Prerequisite: Graduate standing and knowledge of fundamentals of electric circuit analysis and electronics, or permission of department. High power solid state circuits. Topics include: power transfer, DC/DC converters, DC/AC inverters for use in resonant converters and motor drives, AC/DC rectifiers, gate-drive circuits for linear and switching amplifiers, pulse-width modulators, introduction to power supply design correction. Credit will not be given for ECGR 5144 where credit has been given for ECGR 4144.

ECGR 5146. Introduction to VHDL. (3)

Prerequisites: ECGR 2182 or equivalent and knowledge of a computer language. Introduction to VHSIC Hardware Description Language (VHDL) including VHDL-based high-level design of microelectronic systems, VHDL programming, and VHDL synthesis; emphasis on learning and using industry-standard VHDL tools running on VNIIX workstations. Credit will not be given for ECGR 5146 where credit has been given for ECGR 4146.

ECGR 5161. Control of Robotic Manipulators. (3)

Cross-listed as MEGR 7128 and MEGR 8128. Prerequisites: ECGR 4161 and 4111 or their equivalents. Control of industrial robots including linear, nonlinear, and adaptive control of robot's motion plus control of forces and torques exerted by the end-effector. Additional topics include computer animation of the controlled behavior of industrial robots, actuator and sensor types, robot vision, and control computer/robot interfacing. Credit will not be given for ECGR 5161 where credit has been given for ECGR 4162.

ECGR 5165. Laser Electronics I. (3)

Prerequisites: ECGR 3122 and PHYS 3141 or their equivalents. Basic principles of quantum electronics, interaction of light with atoms, properties of laser light, laser applications. Electromagnetic aspects of lasers, Maxwell's Equations and beam, ray optics, matrix methods for the analysis and synthesis of optical systems. Laser resonator design, oscillations modes, mode frequency and stability. Credit will not be given for ECGR 5165 where credit has been given for ECGR 4165.

ECGR 5171. Introduction to Energy Systems. (3)

Prerequisite: Graduate standing or permission of the department. Overview of energy systems: energy types, generation, conversion, storage, transportation/transmission, and utilization. Principles, physical structure, processes, and utilization of fossil fuel, nuclear, and renewables for transportation, thermal, and electrical energy generation are discussed along with associated performance metrics. The course also provides an introduction to environmental impacts of energy production, life-cycle analysis, energy efficiency concepts and metrics, transmission systems, grid reliability, and the impact of smart grid technologies. All topics are presented in the context of industry standards as well as federal and state regulations. Credit will not be given for ECGR 5171 where credit has been given for ECGR 4171.

ECGR 5172. Energy Markets. (3)

Pre- or corequisite: ECGR 4171 or equivalent; MATH 1241; ECON 2101; or permission of the department. Energy and power systems in regulated and competitive environments

and implications on business decisions for firms in these industries. Topics include: mechanism of energy markets; comparative market systems; determination of prices under different market structures; gas, oil, coal, and electricity market architecture; electricity market design; dispatch and new build decisions; smart grid and renewable energy in electricity markets; risk and risk management in energy including demand and price volatility and use of financial derivatives; and the impact of financial market trends and current and proposed policies on the energy industry. Credit will not be given for ECGR 5172 where credit has been given for ECGR 4172.

ECGR 5181. Computer Architecture. (3) Prerequisite: ECGR 3183 or permission of the department. Latest research and development in the area of computer architecture; multiprocessor architecture, multi-computers, interconnection networks, branch prediction, instruction-level, data-level and thread-level parallelism, and memory hierarchy; high-performance machines and special purpose processors. Credit will not be given for ECGR 5181 where credit has been given for ECGR 4181.

ECGR 5182. Digital System Testing. (3) Prerequisite: ECGR 3181 with a grade of C or above or permission of department. Introduction to VLSI testing, test process and automatic test equipment, test economics and product quality, test economics, fault modeling, logic and fault simulation, testability measures, combinational and sequential circuit test generation, memory test, analog test, delay test, IDDQ test, design for testability, built-in self test, boundary scan, analog test bus, system test and core test. Credit will not be given for ECGR 5182 where credit has been given for ECGR 4182.

ECGR 5187. Data Communications and Networking II. (3) Prerequisite: Principles of data communication networks; computer communications network architecture (layering) with emphasis on the network layer, transport layer, and application layer; local area networks; medium access control; routing; data transport; Internet applications. Credit will not be given for ECGR 5187 where credit has been given for ECGR 4187.

ECGR 5188. Modeling and Analysis of Dynamic Systems. (3) Prerequisite: ECGR 3111 or equivalent. Models and dynamical properties of mechanical, thermal, and fluid systems, utilizing by analogy the properties of electrical circuit theory. Emphasis on the formulation of circuit models and the development of terminal equations of system components. Dynamic response to step, pulse, and sinusoidal driving functions using Laplace transforms. Sinusoidal steady-state and frequency response of systems. Credit will

not be given for ECGR 5188 where credit has been given for ECGR 4113.

ECGR 5190. Acoustics. (3) Prerequisite: ECGR 3122 or equivalent. Vibrations and simple vibrating systems; radiating systems; plane waves of sound; dynamic analogies, microphones and other acoustic transducers; acoustic measurements. Credit will not be given for ECGR 5190 where credit has been given for ECGR 4122.

ECGR 5191. Analog and Digital Communication. (3) Prerequisite: ECGR 3111 with a grade of C or above. Analysis and transmission of signals, including analog communication systems (amplitude and frequency modulation); digital communications systems (pulse code modulation and data transmission systems). Credit will not be given for ECGR 5191 where credit has been given for ECGR 4123.

ECGR 5192. Solid State Microelectronic Devices. (3) Cross-listed as 5392. Prerequisites: ECGR 3121 and ECGR 3133, or their equivalents. PN-junctions and Schottky junctions; bipolar and field effect transistors; optoelectronic and heterojunction devices; lithography and integrated circuits; microwave devices; light emitting devices and detectors; quantum devices using superlattices; quantum wells and quantum dots; material preparation and characterization; and measurement techniques. Credit will not be given for ECGR 5192 where credit has been given for ECGR 4134.

ECGR 5193. Power System Analysis I. (3) Prerequisite: ECGR 3142 or equivalent. Representation of power system components for analysis studies. Transmission line parameters. Network equations. Load flow analysis and numerical methods. Credit will not be given for ECGR 5193 where credit has been given for ECGR 4141.

ECGR 5194. Power System Analysis II. (3) Prerequisite: ECGR 4141 or equivalent. Economic operation of power systems. Short circuit studies. Symmetrical components. Transient stability analysis. Credit will not be given for ECGR 5194 where credit has been given for ECGR 4142.

ECGR 5195. Electrical Machinery. (3) Prerequisite: ECGR 3142 or equivalent. Advanced theory of transformers and rotating. Machines; harmonic and saturation effects on machine performance. Unbalanced operation and transient conditions. Credit will not be given for ECGR 5195 where credit has been given for ECGR 4143.

ECGR 5196. Introduction To Robotics. (3) Cross-listed as MEGR 4127. Prerequisite: ECGR 2103 or equivalent. Modeling of industrial robots including

homogeneous transformations, kinematics, velocities, static forces, dynamics, computer animation of dynamic models, motion trajectory planning, and introduction to vision, sensors and actuators. Credit will not be given for ECGR 5196 where credit has been given for either ECGR 4161 or MEGR 4127.

ECGR 5197. Optical Communication. (3)

Prerequisite: ECGR 4125 or equivalent. Overview of optical fiber, signal degradation in fiber, optical source, optical detectors, optical receiver, optical transmitter, optical network, signal processing, and signal distribution through DWDM and DWDDM. This course also addresses the recent topics in optical communication and optical signal. Credit will not be given for ECGR 5197 where credit has been given for ECGR 4186.

ECGR 5222. Multidimensional Stochastic Signal Processing. (3)

Prerequisite: ECGR 3111 or permission of department. Review of probability, univariate and multivariate distribution functions, noise modeling, least-squares estimation, non-linear optimization, Markov chains, Bayes theorem; applications.

ECGR 5231. Optical Materials. (3) Prerequisite: ECGR 4125 or equivalent. Overview of optical properties of semiconductors and dielectrics, optical waves in crystalline and periodic structures, optical nonlinearities and their applications in optical frequency conversions, and current topics in optical properties.

ECGR 5261. Microwave Circuit Design I. (3)

Prerequisite: ECGR 3122 or permission of department. Design and analysis of microwave devices and circuits; Telegrapher's and wave equations; physical transmission lines; circuit analysis techniques; impedance matching techniques; Wilkinson power dividers, hybrid couplers, transformers, and filters. Credit will not be given for ECGR 5261 where credit has been given for ECGR 4261.

ECGR 5265. Microwave Devices and Electronics. (3)

Prerequisites: ECGR 3122 and PHYS 2231, or their equivalents. Microwave transmission line theory, parameters, microwave waveguides, microstrip line and components including resonators, slow-wave structures, tees, rings, couplers, circulators, isolators, and microwave tubes. Microwave solid state electronics including microwave transistors, tunnel diodes, transferred electron devices, avalanche transit-time devices, and mono-lattice microwave integrated circuits. Credit will not be given for ECGR 5265 where credit has been given for ECGR 4265.

ECGR 5411. Control Systems Theory I. (3)

Prerequisite: ECGR 3111 or equivalent. Transfer

functions, block diagrams and signal flow graphs. Feedback control system characteristics. The performance and stability of feedback systems using root locus and frequency response methods. Time domain analysis of control systems. The design and compensation of control systems. Credit will not be given for ECGR 5411 where credit has been given for ECGR 4111.

ECGR 5412. Control Systems Theory II. (3)

Prerequisite: ECGR 4111 or equivalent. State space techniques and useful state space methods. System stability. Controllability and observability of linear systems. The formulation of the state equations for discrete-time systems and the analysis of these systems by matrices. Analysis of nonlinear systems. Optimal control systems studies. Credit will not be given for ECGR 5412 where credit has been given for ECGR 4112.

ECGR 5431. Linear Integrated Electronics. (3)

Prerequisite: ECGR 3132 or equivalent. Design of linear integrated circuits utilizing bipolar and MOS devices. Application in linear amplifier design, control and processing of analog signals. Power supply regulators, analog switches, and active filters. Credit will not be given for ECGR 5431 where credit has been given for ECGR 4131.

ECGR 5892. Individualized Study. (1-6) Individual investigation and exposition of results. *May be repeated for credit.*

ECGR 6021. Advanced Topics in EM and Applications. (3)

Cross-listed as ECGR 8021.

Prerequisite: permission of department. Possible topics include: advanced boundary value problems; nonlinear magnetic materials; wave guides and resonant cavities; magnetohydrodynamics and plasmas; relativistic effects; charged particle dynamics; radiation. Credit will not be given for ECGR 6021 where credit has been given for ECGR 8021.

ECGR 6090. Special Topics. (1-6)

Cross-listed as ECGR 8090. Directed study of current topics of special interest. *May be repeated for credit.*

ECGR 6101. Advanced Computer Graphics. (3)

Cross-listed as ECGR 8101. Prerequisites: ECGR 5103 and ECGR 5133, or permission of department. A project-oriented course using and developing techniques of CAD/CAM graphics, hardware and software development. Advanced application of graphics in computer-aided systems design. Credit will not be given for ECGR 6101 where credit has been given for ECGR 8101.

ECGR 6102. Optimization of Engineering Designs.

(3) Cross-listed as ECGR 8102. Prerequisite: ECGR 5101 or permission of department. The development of computationally feasible algorithms for solving optimization problems in engineering designs. Introduction to non-linear programming methods; study of constrained and unconstrained problems, linear programming problems and other related topics. Credit will not be given for ECGR 6102 where credit has been given for ECGR 8102.

ECGR 6104. Fabrication of Nanomaterials. (3)

Cross-listed as ECGR 8104, MEGR 7104, and MEGR 8104. Prerequisite: NANO 8101 or permission of instructor. Lithographic methods (CVD, PVD, e-beam, ion beam, magnetron, evaporation, spin coating, mask fabrication, developing resists); microelectromechanical systems and nanoelectromechanical systems; limits of conventional mechanical processing, electroforming, growth mechanisms (organic, inorganic, thermal); powders. Credit will not be awarded for ECGR 6104 where credit has been awarded for ECGR 8104, MEGR 7104, or MEGR 8104.

ECGR 6111. Systems Theory. (3) Cross-listed as ECGR 8111. Prerequisite: ECGR 4112 or equivalent. State space concepts and solutions. Introduction to theory of deterministic linear systems. Application of matrix methods and vector difference equations to lumped parameter electrical mechanical and fluid systems, and discrete time systems. Frequency domain techniques in signal and systems analysis. Computer simulation of system dynamics. Credit will not be given for ECGR 6111 where credit has been given for ECGR 8111.

ECGR 6112. Digital Control Systems. (3) Cross-listed as ECGR 8112. Prerequisite: ECGR 6111 or permission of instructor. Time-domain and Z-domain analysis of linear discrete systems, open and closed loop sampled data systems, engineering characteristics of computer control systems, simulation of system dynamics. Credit will not be given for ECGR 6112 where credit has been given for ECGR 8112.

ECGR 6114. Digital Signal Processing II. (3) Cross-listed as ECGR 8114. Prerequisite: permission of department. Discrete Hilbert Transforms, discrete random signals, effect of finite register length in digital and signal processing, speech processing, radar and other applications. Credit will not be given for ECGR 6114 where credit has been given for ECGR 8114.

ECGR 6115. Optimal Control Theory I. (3) Cross-listed as ECGR 8115. Prerequisite: ECGR 6111 or permission of department. Optimum control of continuous-time and discrete time systems. The

Maximum Principle and Hamilton Jacobi Theory. Theory of optimal regulator, state estimation and Kalman Bucy Filter. Combined estimation and control--the Linear Quadratic Gaussian Problems. Computational methods in optimum control systems. Credit will not be given for ECGR 6115 where credit has been given for ECGR 8115.

ECGR 6116. Optimal Control Theory II. (3) Cross-listed as ECGR 8116. Prerequisite: ECGR 6115 or permission of department. A continuation of ECGR 6115 with emphasis on stochastic systems. Optimal filtering. Discrete-time Kalman filter and Kalman filter properties. Parameter identification. Multi-variable control systems, system sensitivity and robustness. Credit will not be given for ECGR 6116 where credit has been given for ECGR 8116.

ECGR 6117. Multivariable Controls. (3) Cross-listed as ECGR 8117. Prerequisite: ECGR 6111. Problem of robustness controls, emphasizing computer-oriented approaches; high infinity and algebraic methods current developments. Credit will not be given for ECGR 6117 where credit has been given for ECGR 8117.

ECGR 6118. Applied Digital Image Processing. (3) Cross-listed as ECGR 8118 and ITCS 6134. Digital image fundamentals; comparison of image transforms including Fourier, Walsh, Hadamard and Cosine; image data compression techniques; image enhancement algorithms; image restoration; image encoding process; image segmentation and description; relationship of hardware restrictions to image fidelity. Credit will not be given for ECGR 6118 where credit has been given for ECGR 8118.

ECGR 6119. Applied Artificial Intelligence. (3) Cross-listed as ECGR 8119. The theory of machine intelligence. Computational methods for modeling machine intelligence including machine vision and automatic decision making from sensor measurements. Applications of this theory to autonomous robotic decision making such as navigation and industrial quality control. Credit will not be given for ECGR 6119 where credit has been given for ECGR 8119.

ECGR 6120. Wireless Communication and Networking. (3) Cross-listed as ECGR 8120. Prerequisite: Graduate standing. The cellular concept: interference issues, cell layout and planning, control techniques, grade-of-service and system capacity; characteristics of the mobile radio channel and channel models; multiple access techniques in wireless: FDMA, TDMA, and CDMA; analog and digital cellular telephone standards; packet radio systems: description, medium access control, and

routing issues. Credit will not be given for ECGR 6120 where credit has been given for ECGR 8120.

ECGR 6121. Advanced Theory of Communications I.

(3) Cross-listed as ECGR 8121. Prerequisite: introductory probability course or permission of department. Statistical communications theory and modern communications systems emphasizing modulation and methods of taking into account the effects of noise on various systems. Credit will not be given for ECGR 6121 where credit has been given for ECGR 8121.

ECGR 6122. Advanced Theory of Communications II.

(3) Cross-listed as ECGR 8122. Prerequisite: Graduate standing. Continuation of ECGR 6121, including coding and decoding methods. Wave form communications. Applications. Credit will not be given for ECGR 6122 where credit has been given for ECGR 8122.

ECGR 6125. Advanced Topics in Optical Engineering.

(3) Cross-listed as ECGR 8125. Prerequisite: ECGR 5125 or permission of department. Overview of optical passive and active devices and discussion of current advances in optical technologies. Credit will not be given for ECGR 6125 where credit has been given for ECGR 8125.

ECGR 6127. Medical Signal Processing. (3) Cross-listed as ECGR 8127. Prerequisite: ECGR 3122 or equivalent. Fourier methods of medical signal processing. Physics of image formation for different medical imaging modalities including: planar x-ray, computerized tomography (CT), magnetic resonance imaging, and ultrasound. Signal processing techniques for image reconstruction, enhancement, and multimodal fusion. Credit will not be given ECGR 6127 where credit has been given for ECGR 8127.

ECGR 6131. Hybrid Microelectronics. (3) Cross-listed as ECGR 8131. Prerequisite: ECGR 5132 or permission of department. A project-oriented course involving design, bonding, interconnect and testing of a multichip hybrid microelectronics circuit. Emphasis placed upon use of I.C.'s of various technologies in these designs to optimize performance. Credit will not be given for ECGR 6131 where credit has been given for ECGR 8131.

ECGR 6132. Advanced Semiconductor Device

Physics. (3) Cross-listed as ECGR 8132. Prerequisite: ECGR 5137 or permission of department. A review of semiconductor physics, bipolar and unipolar devices, photonic devices and methods of measuring specific device characteristics. Credit will not be given for ECGR 6132 where credit has been given for ECGR 8132.

ECGR 6133. MOS Physics and Technology. (3)

Cross-listed as ECGR 8133. Prerequisite: ECGR 6132 or permission of the instructor. The theoretical and practical aspects of the metal oxide semiconductor (MOS) system, its electrical properties, and the measurement and the technology for their control. These topics are developed from simple beginnings to the current state of the art. Credit will not be given for ECGR 6133 where credit has been given for ECGR 8133.

ECGR 6138. Physical Design of VLSI Systems. (3)

Cross-listed as ECGR 8138. Prerequisite: ECGR 5133 or equivalent. Synthesis and design of high-speed VLSI circuits; state-of-the-art approaches for circuit simulation; models and techniques for VLSI physical design. Credit will not be given for ECGR 6138 where credit has been given for ECGR 8138.

ECGR 6141. Power System Relaying. (3)

Cross-listed as ECGR 8141. Prerequisite: ECGR 4141 or permission of department. Function and principles of protective relaying instrument transformers. Directional, distance and differential relays. Protection of generators, transformers, and transmission lines. Ground fault protection. Computer relaying, algorithms for protective relaying. Credit will not be given for ECGR 6141 where credit has been given for ECGR 8141.

ECGR 6142. Voltage Transients and Surge Protection.

(3) Cross-listed as ECGR 8142. Prerequisite: ECGR 4141 or permission of department. Overvoltages due to lightning and switching surges. Traveling waves on transmission lines. Surge arrestors, insulation coordination. Surge protection of transmission lines, substations and rotating machine. Shielding and grounding. Credit will not be given for ECGR 6142 where credit has been given for ECGR 8142.

ECGR 6143. Power System Control. (3)

Cross-listed as ECGR 8143. Prerequisites: ECGR 4142 and ECGR 4111, or their equivalents. Computer functions for automatic control of power systems. Automatic generation control, regulation of frequency and tie-line power interchanges. Automatic voltage regulation, excitation system model. Power system dynamics. Computer control centers. Credit will not be given for ECGR 6143 where credit has been given for ECGR 8143.

ECGR 6144. Electric Power Distribution Systems I.

(3) Cross-listed as ECGR 8144. Prerequisite: Graduate standing and knowledge of fundamentals of power systems, or permission from the department. The fundamental principles of the electric power delivery system with emphasis on distribution systems. Examines three-phase unbalanced system and component models, distribution power flow

analysis, and radial power flow techniques. Credit will not be given for ECGR 6144 where credit has been given for ECGR 8144.

ECGR 6145. Electric Power Distribution Systems II.

(3) Cross-listed as ECGR 8145. Prerequisite: Graduate standing, knowledge of fundamentals of power systems, and ECGR 6144 or ECGR 8144; or permission of department. Focuses on distribution automation and optimization methods applied to distribution systems operation and planning. Credit will not be given for ECGR 6145 where credit has been given for ECGR 8145.

ECGR 6146. Advanced VHDL. (3) Cross-listed as ECGR 8146. Prerequisite: ECGR 5146 or permission of department. Continuation of ECGR 5146. FPGA design with VHDL; VHDL modeling libraries and techniques, and VHDL coding methodology for efficient synthesized. Credit will not be given for ECGR 6146 where credit has been given for ECGR 8146.

ECGR 6147. Power System Stability and Control. (3) Cross-listed as ECGR 8147. Prerequisite: Graduate standing and knowledge of fundamentals of power systems, or permission of department. The fundamental principles of power system stability with emphasis on modern power grid. Examines various power system stability analyses starting from small signal stability, transient stability, voltage stability, and frequency stability. System dynamics based on various stability conditions and controller design are also discussed. Credit will not be given for ECGR 6147 where credit has been given for ECGR 8147.

ECGR 6151. Advanced Microelectronics Projects. (3) Cross-listed as ECGR 8151. Prerequisite: ECGR 5133. Project-oriented course for the advanced microelectronics student to pursue the testing and simulation at various levels (component, gate, cell and system), as well as the design of a significant VLSI implementation. Credit will not be given for ECGR 6151 where credit has been given for ECGR 8151.

ECGR 6156. Application Specific Integrated Circuit Design. (3) Cross-listed as ECGR 8156. Prerequisite: ECGR 5133 or permission of department. Basic concepts, techniques and CAD tools in Application Specific IC Designs (ASIC); technology of ASIC circuits, method of design, CAD tools, and simulation and verification; practical aspects of design. Credit will not be given for ECGR 6156 where credit has been given for ECGR 8156.

ECGR 6157. CMOS Data Converters. (3) Cross-listed as ECGR 8157. Prerequisite: ECGR 4132, ECGR 5132, or equivalent. Advanced topics in VLSI CMOS data converters including Nyquist and Oversampled

architectures. Includes a design project involving the design, system level modeling, circuit simulation, and layout of an analog-to-digital converter. Credit will not be given for ECGR 6157 where credit has been given for ECGR 8157.

ECGR 6171. Simulation of Electronic Materials. (3)

Cross-listed as ECGR 8171. Prerequisites: PHYS 6142; and PHYS 4271 or ECGR 4185; or permission of department. Tight-binding theory of periodic solids; bond orbital theory applied the linear and non-linear optical properties of insulators and semiconductors; calculation of vibrational spectra; Green's Function methods for amorphous solids. Simulation of electrically active defects in solids. Credit will not be given for ECGR 6171 where credit has been given for ECGR 8171.

ECGR 6173. Power Quality. (3) Cross-listed as ECGR 8173. Prerequisite: ECGR 4141, ECGR 5193, or equivalent. Definitions of power quality, types of power quality problems; sources of sags, transient overvoltages and harmonics; distribution overcurrent protection methods and their effect on power quality and reliability; harmonic analysis, principles of controlling harmonics, devices for filtering harmonics; power quality improvement methods. Credit will not be given for ECGR 6173 where credit has been given for ECGR 8173.

ECGR 6181. Embedded Operating Systems. (3)

Cross-listed as ECGR 8181. Pre-/corequisite: ECGR 4101 or ECGR 5101, graduate standing; or permission of instructor. Introduction to the fundamentals of embedded operating systems with an emphasis on real-time performance. A series of labs provides students practical experience on bare metal programming, embedded Linux kernel configuration and initialization, boot loaders, kernel modules, device drivers, and interrupt handlers.

ECGR 6183. Multiprocessor Systems Design. (3)

Cross-listed as ECGR 8183. Prerequisite: Permission of instructor. Topics include: applications of multiprocessors to digital systems design; hardware/software tradeoff considerations; master/slave, multiple/master and loosely coupled systems; data handling and synchronization problems, networking. Credit will not be given for ECGR 6183 where credit has been given for ECGR 8183.

ECGR 6184. Computer System Engineering. (3)

Cross-listed as ECGR 8184. Topics include: data formats, register transfer operations, computer organization, microprogram control and ALU design. Arithmetic algorithms, I/O organization and memory organization are also covered. Specific emphasis is placed throughout on tradeoffs between hardware and

software. Credit will not be given for ECGR 6184 where credit has been given for ECGR 8184.

ECGR 6185. Advanced Embedded Systems Design.

(3) Cross-listed as ECGR 8185. Prerequisite: ECGR 4101 or ECGR 5101. An advanced course in embedded system design utilizing 16-bit microprocessors. Architecture, software, and interface techniques. This course is project-oriented, involving the use of a logic analyzer and hardware design tools. Credit will not be given for ECGR 6185 where credit has been given for ECGR 8185.

ECGR 6186. Design for Testability. (3) Cross-listed as ECGR 8186. Prerequisite: ECGR 2181 or permission of department. Fault modeling; test generation using the D-algorithm, PODEM, and FAN; partitioning; scan design, built-in self-testing; testing of array logic; and fault tolerance. Project-oriented course involving the use of logic and fault simulation tools. Credit will not be given for ECGR 6186 where credit has been given for ECGR 8186.

ECGR 6187. Modeling and Analysis of

Communication Networks. (3) Cross-listed as ECGR 8187. Prerequisite: Probability theory or permission of department. Communication networks; application of analytical tools for modeling and performance evaluation of these networks, including stochastic processes, Markov models, queuing theory, and teletraffic theory. Credit will not be given for ECGR 6187 where credit has been given for ECGR 8187.

ECGR 6188. Fundamentals of Wireless Systems and Protocols. (3) Cross-listed as ECGR 8188.

Prerequisites: Graduate standing and a prior course in data communications or computer networks. Provides an overview of different wireless and mobile network standards and systems. Covers the distinct characteristics of these wireless systems that require a fundamental redesign of protocols at layer 2 to layer 4 of the network protocol stack. Protocols for medium access control, routing, and reliable transport, in addition to middleware and applications custom-made for wireless networks will be dealt with. Credit will not be given for ECGR 6188 where credit has been given for ECGR 8188.

ECGR 6189. Wireless Sensor Networks. (3) Cross-listed as ECGR 8189. Prerequisites: Graduate standing and knowledge of (a) fundamentals of computer networking, (b) probability and random variables, and (c) C/C++ programming, or permission from the department. Provides the fundamental principles of wireless sensor networks with emphasis on networking protocols and information processing aspects. Reviews basic principles of multi-hop wireless networks and discuss the specific design challenges for the development of networking

protocols and applications with wireless sensors. Students go through hands-on tutorials and design projects with programmable wireless sensors. Credit will not be given for ECGR 6189 where credit has been given for ECGR 8189.

ECGR 6190. Smart Grid: Characteristics, Design, and Analysis. (3) Cross-listed as ECGR 8190.

Prerequisites: Graduate standing and knowledge of fundamentals of power systems, or permission from the department. The fundamental principles of the Smart Grid with emphasis on Grid modernization Analysis and design. Examines the design and integration of renewable energy resources to power grid, the impact of power system analysis in the context of smart grid, smart grid observability and controllability, Wide Area Monitoring and Control, Self-Healing network. Credit will not be given for ECGR 6190 where credit has been given for ECGR 8190.

ECGR 6197. Power Electronics II. (3) Cross-listed as ECGR 8197. Prerequisite: Graduate standing, knowledge of fundamentals of power electronics and basics of semiconductor physics, and ECGR 5144, or permission of department. Focuses on more advanced topics in power electronics. Topics include: converter modeling and control, advanced concepts in magnetic circuit design, gate and base drives, switching losses, resonant converters, zero-voltage and zero-current switching, utility-interfaced applications including FACTS, maximum power-point tracking, and power factor correction. Credit will not be given for ECGR 6197 where credit has been given for ECGR 8197.

ECGR 6198. Design of Renewable Energy

Electromagnetic Devices. (3) Cross-listed as ECGR 8198. Prerequisites: Graduate standing and knowledge of (a) electric machines, (b) electromagnetic, and (c) programming, or permission of department. Introduce modern and classical methods used by engineers to design renewable energy electromagnetic devices, specifically electromagnetic machines. Course separated into two main sections. The first section reviews electromagnetic field theory and introduce the theory behind the finite element method. The second section reviews the theory behind magnetic circuit modeling of electric machines. Emphasis placed on permanent magnet and induction machine design. Credit will not be given for ECGR 6198 where credit has been given for ECGR 8198.

ECGR 6199. Dynamics and Control of AC Drives. (3)

Cross-listed as ECGR 8199. Prerequisites: Graduate standing and knowledge of (a) electric machines, (b) power electronics, and (c) programming, or permission of department. An advanced course

focusing on studying the theory behind the control of ac drive systems. Topics include: coupled circuit modeling of ac machines, dynamic modeling of induction machines, power converter and converter modeling, the simulation of electric machines and drives, electric drive system control, steady state analysis with non-conventional sources, small signal dynamic response and doubly salient electric machines. Credit will not be given for ECGR 6199 where credit has been given for ECGR 8199.

ECGR 6261. Advanced Topics in Laser Electronics.

(3) Cross-listed as ECGR 8261. Prerequisite: ECGR 5165, or permission of instructor. Maxwell-Schrödinger analysis of interactions of light with atoms, Semiclassical laser equations, rate equation approximation. Effects of gain saturation, dispersion, spontaneous emission, and line broadening in laser amplifiers and oscillators. Laser power and frequency calculations. Relaxation oscillations, gain and loss switching, cavity-dumping, and mode-locking. Credit will not be given for ECGR 6261 where credit has been given for ECGR 8261.

ECGR 6263. Advanced Analog Integrated Circuit Design.

(3) Cross-listed as ECGR 8263. Prerequisite: ECGR 4132, ECGR 5132 or equivalent. Design of low-noise preamplifiers, advanced operational amplifiers, and other analog CMOS circuits, including analysis of noise and DC mismatch, and design from weak through strong inversion. Includes a design project involving analysis and simulation. Credit will not be given for ECGR 6263 where credit has been given for ECGR 8263.

ECGR 6264. Radio Frequency Design. **(3)** Cross-listed as ECGR 8264. Prerequisite: permission of instructor. Design and analysis of radio frequency circuits and systems including S-parameters, impedance matching, noise, intermodulation distortion, image rejection, cascade analysis, and incorporation of these methods in the design of modern radio receivers and transmitters. Credit will not be given for ECGR 6264 where credit has been given for ECGR 8264.

ECGR 6265. Neural Networks and Fuzzy Logic.

(3) Cross-listed as ECGR 8265. Topics include: Fuzzy sets, fuzzy logic, fuzzy logic control systems, applications of neural networks, structure adaptive neural network, applications, fuzzy integrated systems, neural networks based fuzzy systems, applications, neural fuzzy controllers, applications in control systems. Credit will not be given for ECGR 6265 where credit has been given for ECGR 8265.

ECGR 6266. Neural Networks Theory and Design.

(3) Cross-listed as ECGR 8266. Topics include: Neural

network model and network architectures; single layers, multiple layers network, perceptron learning rules; supervised Hebbian learning; performance optimization; Widrow Hoff learning; backpropagation; associative learning; competitive learning; Grossberg network; Hopfield network; application of neural network. Credit will not be given for ECGR 6266 where credit has been given for ECGR 8266.

ECGR 6437. Mixed-Signal IC Design.

(3) Prerequisite: permission of department. Design and analysis of mixed-signal integrated circuits and systems including amplifiers, digital circuits, analog-to-digital converters, voltage-controlled oscillators, integrated circuit layout, simulation, and fabrication using modern CAD tools. Students are expected to design, fabricate, and test a mixed-signal integrated circuit.

ECGR 6890. Individualized Study and Projects.

(1-6) Individual investigation and exposition of results. *May be repeated for credit.*

ECGR 6990. Industrial Internship.

(1-3) Prerequisite: Completion of nine hours of graduate coursework. Full- or part-time academic year internship in engineering complementary to the major course of studies and designed to allow theoretical and course-based practical learning to be applied in a supervised industrial experience. Each student's program must be approved by their graduate program director. Requires a mid-term report and final report to be graded by the supervising faculty.

ECGR 6991. Graduate Master Thesis Research.

(0-6) Individual investigation culminating in the preparation and presentation of a thesis. *May be repeated for credit.*

ECGR 8021. Advanced Topics in EM and Applications.

(3) Cross-listed as ECGR 6021. Prerequisite: Permission of department. Possible topics include: advanced boundary value problems; nonlinear magnetic materials; wave guides and resonant cavities; magnetohydrodynamics and plasmas; relativistic effects; charged particle dynamics; radiation. Credit will not be given for ECGR 8021 where credit has been given for ECGR 6021.

ECGR 8090. Special Topics.

(1-6) Cross-listed as ECGR 6090. Directed study of current topics of special interest. *May be repeated for credit.*

ECGR 8101. Advanced Computer Graphics.

(3) Prerequisites: ECGR 5103 and ECGR 5133, or permission of department. A project-oriented course

using and developing techniques of CAD/CAM graphics, hardware and software development. Advanced application of graphics in computer-aided systems design. Credit will not be given for ECGR 8101 where credit has been given for ECGR 6101.

ECGR 8102. Optimization of Engineering Designs.

(3) Cross-listed as ECGR 6102. Prerequisite: ECGR 5101 or permission of department. The development of computationally feasible algorithms for solving optimization problems in engineering designs. Introduction to non-linear programming methods; study of constrained and unconstrained problems, linear programming problems and other related topics. Credit will not be given for ECGR 8102 where credit has been given for ECGR 6102.

ECGR 8104. Fabrication of Nanomaterials. (3)

Cross-listed as ECGR 6104, MEGR 7104, and MEGR 8104. Prerequisite: NANO 8101 or permission of instructor. Lithographic methods (CVD, PVD, e-beam, ion beam, magnetron, evaporation, spin coating, mask fabrication, developing resists); microelectromechanical systems and nanoelectromechanical systems; limits of conventional mechanical processing, electroforming, growth mechanisms (organic, inorganic, thermal); powders. Credit will not be awarded for ECGR 8104 where credit has been awarded for ECGR 6104, MEGR 7104, or MEGR 8104.

ECGR 8111. Systems Theory. (3)

Prerequisite: ECGR 4112 or equivalent. State space concepts and solutions. Introduction to theory of deterministic linear systems. Application of matrix methods and vector difference equations to lumped parameter electrical mechanical and fluid systems, and discrete time systems. Frequency domain techniques in signal and systems analysis. Computer simulation of system dynamics. Credit will not be given for ECGR 8111 where credit has been given for ECGR 6111.

ECGR 8112. Digital Control Systems. (3)

Cross-listed as ECGR 6112. Prerequisite: ECGR 6111, ECGR 8111, or permission of instructor. Time-domain and Z-domain analysis of linear discrete systems, open and closed loop sampled data systems, engineering characteristics of computer control systems, simulation of system dynamics. Credit will not be given for ECGR 8112 where credit has been given for ECGR 6112.

ECGR 8114. Digital Signal Processing II. (3)

Cross-listed as ECGR 6114. Prerequisite: Permission of department. Discrete Hilbert Transforms, discrete random signals, effect of finite register length in digital and signal processing, speech processing, radar and other applications. Credit will not be given for ECGR 8114 where credit has been given for ECGR 6114.

ECGR 8115. Optimal Control Theory I. (3) Cross-listed as ECGR 6115. Prerequisite: ECGR 6111 or permission of department. Optimum control of continuous-time and discrete time systems. The Maximum Principle and Hamilton Jacobi Theory. Theory of optimal regulator, state estimation and Kalman Bucy Filter. Combined estimation and control--the Linear Quadratic Gaussian Problems. Computational methods in optimum control systems. Credit will not be given for ECGR 8115 where credit has been given for ECGR 6115.

ECGR 8116. Optimal Control Theory II. (3) Cross-listed as ECGR 6116. Prerequisite: ECGR 6115, ECGR 8115, or permission of department. A continuation of ECGR 8115 with emphasis on stochastic systems. Optimal filtering. Discrete-time Kalman filter and Kalman filter properties. Parameter identification. Multi-variable control systems, system sensitivity and robustness. Credit will not be given for ECGR 8116 where credit has been given for ECGR 6116.

ECGR 8117. Multivariable Controls. (3) Cross-listed as ECGR 6117. Prerequisite: ECGR 6111 or ECGR 8111. Problem of robustness controls, emphasizing computer-oriented approaches; high infinity and algebraic methods current developments. Credit will not be given for ECGR 8117 where credit has been given for ECGR 6117.

ECGR 8118. Applied Digital Image Processing. (3)

Cross-listed as ECGR 6118 and ITCS 6134. Digital image fundamentals; comparison of image transforms including Fourier, Walsh, Hadamard and Cosine; image data compression techniques; image enhancement algorithms; image restoration; image encoding process; image segmentation and description; relationship of hardware restrictions to image fidelity. Credit will not be given for ECGR 8118 where credit has been given for ECGR 6118.

ECGR 8119. Applied Artificial Intelligence. (3)

Cross-listed as ECGR 6119. The theory of machine intelligence. Computational methods for modeling machine intelligence including machine vision and automatic decision making from sensor measurements. Applications of this theory to autonomous robotic decision making such as navigation and industrial quality control. Credit will not be given for ECGR 8119 where credit has been given for ECGR 6119.

ECGR 8120. Wireless Communication and Networking. (3)

Cross-listed as ECGR 6120. Prerequisite: Graduate standing. The cellular concept: interference issues, cell layout and planning, control techniques, grade-of-service and system capacity; characteristics of the mobile radio channel

and channel models; multiple access techniques in wireless: FDMA, TDMA, and CDMA; analog and digital cellular telephone standards; packet radio systems: description, medium access control, and routing issues. Credit will not be given for ECGR 8120 where credit has been given for ECGR 6120.

ECGR 8121. Advanced Theory of Communications I.

(3) Cross-listed as ECGR 6121. Prerequisite: introductory probability course or permission of department. Statistical communications theory and modern communications systems emphasizing modulation and methods of taking into account the effects of noise on various systems. Credit will not be given for ECGR 8121 where credit has been given for ECGR 6121.

ECGR 8122. Advanced Theory of Communications II.

(3) Cross-listed as ECGR 6122. Prerequisite: Graduate standing. Continuation of ECGR 8121, including coding and decoding methods. Wave form communications. Applications. Credit will not be given for ECGR 8122 where credit has been given for ECGR 6122.

ECGR 8125. Advanced Topics in Optical Engineering.

(3) Cross-listed as ECGR 6125. Prerequisite: ECGR 5125 or permission of department. Overview of optical passive and active devices and discussion of current advances in optical technologies. Credit will not be given for ECGR 8125 where credit has been given for ECGR 6125.

ECGR 8127. Medical Signal Processing. (3) Cross-listed as ECGR 6127. Prerequisite: ECGR 3122 or equivalent. Fourier methods of medical signal processing. Physics of image formation for different medical imaging modalities including: planar x-ray, computerized tomography (CT), magnetic resonance imaging, and ultrasound. Signal processing techniques for image reconstruction, enhancement, and multimodal fusion. Credit will not be given for ECGR 8127 where credit has been given for ECGR 6127.

ECGR 8131. Hybrid Microelectronics. (3) Cross-listed as ECGR 6131. Prerequisite: ECGR 5132 or permission of department. A project-oriented course involving design, bonding, interconnect and testing of a multichip hybrid microelectronics circuit. Emphasis placed upon use of I.C.'s of various technologies in these designs to optimize performance. Credit will not be given for ECGR 8131 where credit has been given for ECGR 6131.

ECGR 8132. Advanced Semiconductor Device

Physics. (3) Cross-listed as ECGR 6132. Prerequisite: ECGR 5137 or permission of department. A review of semiconductor physics, bipolar and unipolar devices, photonic devices and methods of measuring specific

device characteristics. Credit will not be given for ECGR 8132 where credit has been given for ECGR 6132.

ECGR 8133. MOS Physics and Technology. (3)

Cross-listed as ECGR 6133. Prerequisite: ECGR 6132, ECGR 8132, or permission of the instructor. The theoretical and practical aspects of the metal oxide semiconductor (MOS) system, its electrical properties, and the measurement and the technology for their control. These topics are developed from simple beginnings to the current state of the art. Credit will not be given for ECGR 8133 where credit has been given for ECGR 6133.

ECGR 8138. Physical Design of VLSI Systems. (3)

Cross-listed as ECGR 6138. Prerequisite: ECGR 5133 or equivalent. Synthesis and design of high-speed VLSI circuits; state-of-the-art approaches for circuit simulation; models and techniques for VLSI physical design. Credit will not be given for ECGR 8138 where credit has been given for ECGR 6138.

ECGR 8141. Power System Relaying. (3) Cross-listed

as ECGR 6141. Prerequisite: Permission of department. Function and principles of protective relaying instrument transformers. Directional, distance and differential relays. Protection of generators, transformers, and transmission lines. Ground fault protection. Computer relaying, algorithms for protective relaying. Credit will not be given for ECGR 8141 where credit has been given for ECGR 6141.

ECGR 8142. Voltage Transients and Surge Protection.

(3) Cross-listed as ECGR 6142. Prerequisite: Permission of department. Overvoltages due to lightning and switching surges. Traveling waves on transmission lines. Surge arrestors, insulation coordination. Surge protection of transmission lines, substations and rotating machine. Shielding and grounding. Credit will not be given for ECGR 8142 where credit has been given for ECGR 6142.

ECGR 8143. Power System Control. (3) Cross-listed

as ECGR 6143. Prerequisites: ECGR 4142 and ECGR 4111, or their equivalents. Computer functions for automatic control of power systems. Automatic generation control, regulation of frequency and tie-line power interchanges. Automatic voltage regulation, excitation system model. Power system dynamics. Computer control centers. Credit will not be given for ECGR 8143 where credit has been given for ECGR 6143.

ECGR 8144. Electric Power Distribution Systems I.

(3) Cross-listed as ECGR 6144. Prerequisites: Graduate standing and knowledge of fundamentals of power systems, or permission of department. The fundamental principles of the electric power delivery

system with emphasis on distribution systems. Examines three-phase unbalanced system and component models, distribution power flow analysis, and radial power flow techniques. Credit will not be given for ECGR 8144 where credit has been given for ECGR 6144.

ECGR 8145. Electric Power Distribution Systems II.

(3) Cross-listed as ECGR 6145. Prerequisite: Graduate standing, knowledge of fundamentals of power systems, and ECGR 6144 or ECGR 8144; or permission of department. Focuses on distribution automation and optimization methods applied to distribution systems operation and planning. Credit will not be given for ECGR 8145 where credit has been given for ECGR 6145.

ECGR 8146. Advanced VHDL. (3) Cross-listed as ECGR 6146. Prerequisite: ECGR 5146 or permission of department. Continuation of ECGR 5146. FPGA design with VHDL; VHDL modeling libraries and techniques, and VHDL coding methodology for efficient synthesized. Credit will not be given for ECGR 8146 where credit has been given for ECGR 6146.

ECGR 8147. Power System Stability and Control. (3) Cross-listed as ECGR 6146. Prerequisite: Graduate standing and knowledge of fundamentals of power systems, or permission of department. The fundamental principles of power system stability with emphasis on modern power grid. Examines various power system stability analyses starting from small signal stability, transient stability, voltage stability, and frequency stability. System dynamics based on various stability conditions and controller design are also discussed. Credit will not be given for ECGR 8147 where credit has been given for ECGR 6147.

ECGR 8151. Advanced Microelectronics Projects. (3) Cross-listed as ECGR 6151. Prerequisite: ECGR 5133. Project-oriented course for the advanced microelectronics student to pursue the testing and simulation at various levels (component, gate, cell and system), as well as the design of a significant VLSI implementation. Credit will not be given for ECGR 8151 where credit has been given for ECGR 6151.

ECGR 8156. Application Specific Integrated Circuit Design. (3) Cross-listed as ECGR 6156. Prerequisite: ECGR 5133 or permission of department. Basic concepts, techniques and CAD tools in Application Specific IC Designs (ASIC); technology of ASIC circuits, method of design, CAD tools, and simulation and verification; practical aspects of design. Credit will not be given for ECGR 8156 where credit has been given for ECGR 6156.

ECGR 8157. CMOS Data Converters. (3) Cross-listed as ECGR 6157. Prerequisite: ECGR 4132, ECGR 5132, or equivalent. Advanced topics in VLSI CMOS data converters including Nyquist and Oversampled architectures. Includes a design project involving the design, system level modeling, circuit simulation, and layout of an analog-to-digital converter. Credit will not be given for ECGR 8157 where credit has been given for ECGR 6157.

ECGR 8171. Simulation of Electronic Materials. (3)

Cross-listed as ECGR 6171. Prerequisites: PHYS 6142; and PHYS 4271 or ECGR 4185; or permission of department. Tight-binding theory of periodic solids; bond orbital theory applied the linear and non-linear optical properties of insulators and semiconductors; calculation of vibrational spectra; Green's Function methods for amorphous solids. Simulation of electrically active defects in solids. Credit will not be given for ECGR 8171 where credit has been given for ECGR 6171.

ECGR 8173. Power Quality. (3) Cross-listed as ECGR 6173. Prerequisite: ECGR 4141, ECGR 5193, or equivalent. Definitions of power quality, types of power quality problems; sources of sags, transient overvoltages and harmonics; distribution overcurrent protection methods and their effect on power quality and reliability; harmonic analysis, principles of controlling harmonics, devices for filtering harmonics; power quality improvement methods. Credit will not be given for ECGR 8173 where credit has been given for ECGR 6173.

ECGR 8181. Embedded Operating Systems. (3)

Cross-listed as ECGR 6181. Pre-/corequisite: ECGR 4101 or ECGR 5101, graduate standing; or permission of instructor. Introduction to the fundamentals of embedded operating systems with an emphasis on real-time performance. A series of labs provides students practical experience on bare metal programming, embedded Linux kernel configuration and initialization, boot loaders, kernel modules, device drivers, and interrupt handlers.

ECGR 8183. Multiprocessor Systems Design. (3)

Cross-listed as ECGR 6183. Prerequisites: ECGR 3184 or equivalent, or permission of instructor. Topics include: applications of multiprocessors to digital systems design; hardware/software tradeoff considerations; master/slave, multiple/master and loosely coupled systems; data handling and synchronization problems, networking. Credit will not be given for ECGR 8183 where credit has been given for ECGR 6183.

ECGR 8184. Computer System Engineering. (3)

Cross-listed as ECGR 6184. Topics include: data formats, register transfer operations, computer

organization, microprogram control and ALU design. Arithmetic algorithms, I/O organization and memory organization are also covered. Specific emphasis is placed throughout on tradeoffs between hardware and software. Credit will not be given for ECGR 8184 where credit has been given for ECGR 6184.

ECGR 8185. Advanced Microprocessor-Based Design. (3) Cross-listed as ECGR 6185. Prerequisite: ECGR 4101 or ECGR 5101. An advanced course in embedded system design utilizing 16-bit microprocessors. Architecture, software, and interface techniques. This course is project-oriented, involving the use of a logic analyzer and hardware design tools. Credit will not be given for ECGR 8185 where credit has been given for ECGR 6185.

ECGR 8186. Design for Testability. (3) Cross-listed as ECGR 6186. Prerequisite: ECGR 2181 or permission of department. Fault modeling; test generation using the D-algorithm, PODEM, and FAN; partitioning; scan design, built-in self-testing; testing of array logic; and fault tolerance. Project-oriented course involving the use of logic and fault simulation tools. Credit will not be given for ECGR 8186 where credit has been given for ECGR 6186.

ECGR 8187. Modeling and Analysis of Communication Networks. (3) Cross-listed as ECGR 6187. Prerequisite: Probability theory or permission of department. Communication networks; application of analytical tools for modeling and performance evaluation of these networks, including stochastic processes, Markov models, queuing theory, and teletraffic theory. Credit will not be given for ECGR 8187 where credit has been given for ECGR 6187.

ECGR 8188. Fundamentals of Wireless Systems and Protocols. (3) Cross-listed as ECGR 6188. Prerequisites: Graduate standing and a prior course in data communications or computer networks. Provides an overview of different wireless and mobile network standards and systems. Covers the distinct characteristics of these wireless systems that require a fundamental redesign of protocols at layer 2 to layer 4 of the network protocol stack. Protocols for medium access control, routing, and reliable transport, in addition to middleware and applications custom-made for wireless networks will be dealt with. Credit will not be given for ECGR 8188 where credit has been given for ECGR 6188.

ECGR 8189. Wireless Sensor Networks. (3) Cross-listed as ECGR 6189. Prerequisites: Graduate standing and knowledge of (a) fundamentals of computer networking, (b) probability and random variables, and (c) C/C++ programming, or permission from the department. Provides the fundamental principles of wireless sensor networks with emphasis

on networking protocols and information processing aspects. Reviews basic principles of multi-hop wireless networks and discuss the specific design challenges for the development of networking protocols and applications with wireless sensors. Students go through hands-on tutorials and design projects with programmable wireless sensors. Credit will not be given for ECGR 8189 where credit has been given for ECGR 6189.

ECGR 8190. Smart Grid: Characteristics, Design, and Analysis. (3) Cross-listed as ECGR 6190. Prerequisites: Graduate standing and knowledge of fundamentals of power systems, or permission from the department. The fundamental principles of the Smart Grid with emphasis on Grid modernization Analysis and design. Examines the design and integration of renewable energy resources to power grid, the impact of power system analysis in the context of smart grid, smart grid observability and controllability, Wide Area Monitoring and Control, Self-Healing network. Credit will not be given for ECGR 8190 where credit has been given for ECGR 6190.

ECGR 8197. Power Electronics II. (3) Cross-listed as ECGR 6197. Prerequisite: Graduate standing, knowledge of fundamentals of power electronics and basics of semiconductor physics, and ECGR 5144, or permission of department. Focuses on more advanced topics in power electronics. Topics include: converter modeling and control, advanced concepts in magnetic circuit design, gate and base drives, switching losses, resonant converters, zero-voltage and zero-current switching, utility-interfaced applications including FACTS, maximum power-point tracking, and power factor correction. Credit will not be given for ECGR 8197 where credit has been given for ECGR 6197.

ECGR 8198. Design of Renewable Energy Electromagnetic Devices. (3) Cross-listed as ECGR 6198. Prerequisites: Graduate standing and knowledge of (a) electric machines, (b) electromagnetic, and (c) programming, or permission of department. Introduce modern and classical methods used by engineers to design renewable energy electromagnetic devices, specifically electromagnetic machines. Course separated into two main sections. The first section reviews electromagnetic field theory and introduce the theory behind the finite element method. The second section reviews the theory behind magnetic circuit modeling of electric machines. Emphasis placed on permanent magnet and induction machine design. Credit will not be given for ECGR 8198 where credit has been given for ECGR 6198.

ECGR 8199. Dynamics and Control of AC Drives. (3)

Cross-listed as ECGR 6199. Prerequisites: Graduate standing and knowledge of (a) electric machines, (b) power electronics, and (c) programming, or permission of department. An advanced course focusing on studying the theory behind the control of ac drive systems. Topics include: coupled circuit modeling of ac machines, dynamic modeling of induction machines, power converter and converter modeling, the simulation of electric machines and drives, electric drive system control, steady state analysis with non-conventional sources, small signal dynamic response and doubly salient electric machines. Credit will not be given for ECGR 8199 where credit has been given for ECGR 6199.

ECGR 8261. Advanced Topics in Laser Electronics.

(3) Cross-listed as ECGR 6261. Prerequisite: ECGR 5165 or permission of instructor. Maxwell-Schrödinger analysis of interactions of light with atoms, Semiclassical laser equations, rate equation approximation. Effects of gain saturation, dispersion, spontaneous emission, and line broadening in laser amplifiers and oscillators. Laser power and frequency calculations. Relaxation oscillations, gain and loss switching, cavity-dumping, and mode-locking. Credit will not be given for ECGR 8261 where credit has been given for ECGR 6261.

ECGR 8263. Advanced Analog Integrated Circuit Design. (3)

Cross-listed as ECGR 6263. Prerequisite: ECGR 4132, ECGR 5132, or equivalent. Design of low-noise preamplifiers, advanced operational amplifiers, and other analog CMOS circuits, including analysis of noise and DC mismatch, and design from weak through strong inversion. Includes a design project involving analysis and simulation. Credit will not be given for ECGR 8263 where credit has been given for ECGR 6263.

ECGR 8264. Radio Frequency Design. (3) Cross-listed as ECGR 6264. Prerequisite: Permission of instructor. Design and analysis of radio frequency circuits and systems including S-parameters, impedance matching, noise, intermodulation distortion, image rejection, cascade analysis, and incorporation of these methods in the design of modern radio receivers and transmitters. Credit will not be given for ECGR 8264 where credit has been given for ECGR 6264.

ECGR 8265. Neural Networks and Fuzzy Logic. (3)

Cross-listed as ECGR 6265. Topics include: Fuzzy sets, fuzzy logic, fuzzy logic control systems, applications of neural networks, structure adaptive neural network, applications, fuzzy integrated systems, neural networks based fuzzy systems, applications, neural fuzzy controllers, applications in

control systems. Credit will not be given for ECGR 8265 where credit has been given for ECGR 6265.

ECGR 8266. Neural Networks Theory and Design. (3)

Cross-listed as ECGR 6266. Topics include: Neural network model and network architectures; single layers, multiple layers network, perceptron learning rules; supervised Hebbian learning; performance optimization; Widrow Hoff learning; backpropagation; associative learning; competitive learning; Grossberg network; Hopfield network; application of neural network. Credit will not be given for ECGR 8266 where credit has been given for ECGR 6266.

ECGR 8890. Individualized Study and Projects. (1-6)

Individual investigation and exposition of results. *May be repeated for credit.*

ECGR 8990. Industrial Internship. (1-3)

Prerequisite: Completion of nine hours of graduate coursework. Full- or part-time academic year internship in engineering complementary to the major course of studies and designed to allow theoretical and course-based practical learning to be applied in a supervised industrial experience. Each student's program must be approved by their graduate program director. Requires a mid-term report and final report to be graded by the supervising faculty.

ECGR 8999. Doctoral Dissertation Research. (0-9)

Individual investigation culminating in the preparation and presentation of a doctoral dissertation.

Energy and Electromechanical Systems

- **M.S. in Applied Energy and Electromechanical Systems**
- **Graduate Certificate in Applied Energy**

Department of Engineering Technology and Construction Management

et.uncc.edu

Graduate Program Director

Dr. Barry Sherlock

Graduate Faculty

Dr. Anthony L. Brizendine, Chair and Professor

Dr. Aidan Browne, Assistant Professor

Nan Byars, Professor

Dr. Tara Cavalline, Assistant Professor

Dr. Don Chen, Assistant Professor

Dr. G. Bruce Gehrig, Associate Professor

Dr. Rodney Handy, Professor

Dr. John Hildreth, Associate Professor

Jeffrey Kimble, Associate Professor

Dr. Steve Kuyath, Associate Professor

Dr. Na Lu, Assistant Professor

David Murphy, Associate Professor

Dr. Demba Ndiaye, Assistant Professor

Dr. Thomas Nicholas, Assistant Professor

Dr. Maciej Noras, Associate Professor

Dr. Carlos Orozco, Associate Professor

Dr. Peter Schmidt, Associate Professor

Dr. Deborah Sharer, Associate Professor

Dr. Barry Sherlock, Professor

Dr. Patricia Tolley, Associate Professor

Dr. Nicholas Tymvios, Assistant Professor

Dr. Jozef Urbas, Associate Professor

Dr. Sheng-Guo Wang, Professor

Dr. Wesley Williams, Assistant Professor

Dr. Aixi Zhou, Associate Professor

MASTER OF SCIENCE IN APPLIED ENERGY AND ELECTROMECHANICAL SYSTEMS

The Department of Engineering Technology and Construction Management provides an opportunity for discipline-specific and multidisciplinary graduate-

level education in Applied Energy and Electromechanical Systems. Advanced coursework and research are used to enhance professional development, improve technical competency, and initiate a life-long learning experience.

Application Deadline

Applications can be received by the Graduate Admission Office any time prior to the published deadlines. In order to be considered for assistantships and tuition grants for the following academic year, students should apply by March 1 for priority consideration. The first round of award decisions typically occurs by March 15. However, the Department will evaluate admission applications at any time complete applications are received by the Graduate School.

Early Entry to Graduate School

Exceptional undergraduate students at UNC Charlotte may be accepted into the graduate program and begin work toward a graduate degree before completion of the baccalaureate degree. An applicant may be accepted at any time after completion of 75 or more hours, although it is expected that close to 90 hours will have been earned by the time the first graduate course is taken.

To be accepted into this program, an undergraduate student must have at least a 3.2 overall GPA and have taken the appropriate graduate standardized test and have earned an acceptable score. If any Early Entry student has not met the normal admission requirements of a 3.0 overall undergraduate GPA and a 3.0 junior-senior GPA at the end of his/her baccalaureate degree, she/he will be dismissed from the graduate program.

Students accepted into an Early Entry Program will be subject to the same policies that pertain to other matriculated graduate students. Generally, it will be assumed that Early Entry students will finish their baccalaureate degrees before they complete 15 hours of graduate work.

Up to six hours earned at the graduate level may be substituted for required undergraduate hours. (Up to six hours of graduate work may be "double counted" toward both baccalaureate and graduate degrees.)

Assistantships

Research and teaching assistantships are available from the Department on a competitive basis to highly qualified applicants/students.

Tuition Grants

Tuition grants including out-of-state tuition differential waivers and in-state tuition support are available on a

competitive basis for both out-of-state and in-state students, respectively.

Admission Requirements

The minimum admission requirements for the program are:

- An earned undergraduate degree in engineering technology, engineering, energy or a closely related field
- An undergraduate GPA of 3.0 or above
- Acceptable scores on the verbal, quantitative, and analytical sections of the GRE
- Positive recommendations
- Acceptable TOEFL score is required if the previous degree was from a country where English is not the common language
- Integral and differential calculus (MATH 1121 or MATH 1241 or ETGR 2171, and ETGR 2272 or MATH 1242 at UNC Charlotte or equivalent from other institution)
- Statistics (STAT 1220 or STAT 3128 at UNC Charlotte or equivalent from other institution)
- Other credentials as required by the Graduate School

Documents to be Submitted for Admission

- Official transcripts from all colleges and universities attended
- Official GRE scores
- Official TOEFL scores
- UNC Charlotte application for graduate admission online
- Three professional recommendations
- Others as required by the Graduate School

Degree Requirements

The program leading to the Master of Science degree in Applied Energy and Electromechanical Systems is a 30 credit-hour program. The program consists of a 15-credit hour common core, a 6-credit hour elective core in either applied energy or electromechanical systems, and a capstone experience including either a sequence of 9-credit hours of major electives or a specified 3-hour research and analytical methods course in conjunction with a formal 6-credit hour graduate research thesis. At least 15 credit hours must be in courses numbered 6000 or above. The 30-credit hour degree program is outlined below:

Common Core Courses (15 hours)

ENER 6120 Energy Generation and Conversion (3)
 ENER 6135 Energy Transmission and Distribution (3)
 ENER 6150 Systems Dynamics (3)
 ENER 6170 Applied Mechatronics (3)
 ETGR 5272 Engineering Analysis IV (3)

Master's Thesis and Research Sequence (15 hours)

CMET 6160 Research and Analytical Methods (3)
 ENER 6900 Master's Research and Thesis (6)
 Major Electives (6)*

OR

Coursework Sequence (15-hours)

Major Electives (15)*

*Major electives will be selected from the following list (or others with approval):

CMET 5135 Building Information Modeling (3)
 CMET 5140 Building Energy Management (3)
 CMET 6155 Facility Instrumentation and Controls (3)
 CMET 6270 Operation of Constructed Facilities (3)
 ENER 5250 Analysis of Renewable Energy Systems (3)
 ENER 5260 Hydrogen Production and Storage (3)
 ENER 5275 Air Conditioning Systems (3)
 ENER 5280 Fuel Cell Technologies (3)
 ENER 5285 Applied Noise and Vibration Control (3)
 ENER 5290 Advanced Instrumentation (3)
 ENER 6000 Special Topics in Applied Energy or Electromechanical Systems (1-3)
 ENER 6220 High Voltage Technology (3)
 ENER 6235 Modern Electric Power Grids (3)
 ENER 6260 Computational Fluid Dynamics for Energy Applications (3)
 ENER 6270 Dynamic Systems Control and Design (3)
 ENER 6800 Independent Study (1-3)

Additional new major electives courses may be created based on industry needs and faculty research interest. In addition, appropriate existing graduate level courses from other programs may be approved by the program director.

Capstone Experiences

Students pursuing a master's degree in applied energy and electromechanical systems have two options to complete the 30-credit hour program.

- 24 hours of coursework plus 6 hours of thesis project
- 30 hours of coursework and a comprehensive examination

Both options require the formation of a program committee. The thesis option is reserved for students who are attending the on-campus program and are performing research under formal graduate research or teaching assistantships. Students receiving such assistantships may be required to pursue the thesis option. The thesis option requires students to submit a written thesis and orally defend their work before their program committee.

All non-thesis students must complete 30 credits of

coursework and successfully complete a formal comprehensive examination. The comprehensive examination is a written exam. A student's exam will be scheduled when he/she has at least 24 hours of course credit completed or in progress. The student's graduate advisor and the examining committee will coordinate the examination (to be offered once in the fall and once in the spring semesters), preparing the exam with the assistance of members of the student's program committee. The exam will measure the student's mastery of theories and applications in the selected area of specialization within the discipline. Students will have only two opportunities to receive passing marks on the examination.

Advising

Each student is supervised by his/her graduate advisor and a program committee.

Plan of Study Requirements

Each student is required to submit a Plan of Study to the Department's Graduate Director before completing 18 hours of graduate credits.

Application for Degree

Each student should submit an Application for Degree prior to graduation. If a student does not graduate in the semester identified on the Application, the student must complete a new form and repay the application fee to be considered for graduation in a subsequent semester.

Transfer Credit

The Department, at its discretion, may accept transfer of graduate courses (6 credits maximum) taken at another institution or from another program prior to admission to the master's program in applied energy and electromechanical systems. Only courses in which the student earned a grade of B or above may be transferred.

Grades Required

All candidates must earn an overall 3.0 GPA to graduate. Accumulation of one U grade will result in the suspension of the student's enrollment in the program.

Other Requirements

The program has both a thesis and non-thesis track. After admission to candidacy, thesis students will complete a comprehensive oral exam while non-thesis students will complete a comprehensive written exam. Residence will be per Graduate School rules. There is no language requirement. While full-time students will typically take three semesters to complete the program, part-time students are expected to take no more than six years to complete the program as per Graduate School rules.

GRADUATE CERTIFICATE IN APPLIED ENERGY

The Graduate Certificate in Applied Energy provides graduate students and professionals with the opportunity to reach a demonstrated level of competence in applied energy. Each course in this certificate is applicable toward either the M.S. in Applied Energy and Electromechanical Systems (MSEEM) or the M.S. in Construction and Facilities Management (MSCFM) degree requirements. The graduate certificate may act as a standalone graduate option for post-baccalaureate students, or may be pursued concurrently with the MSEEM or MSCFM degree program at UNC Charlotte.

Admission Requirements

In addition to the general requirements for admission to the Graduate School, the Department of Engineering Technology and Construction Management seeks the following:

- Either a bachelor's degree in engineering, engineering technology, construction management or a closely related technical or scientific field.
- Undergraduate coursework of at least 3 semesters in engineering analysis or calculus
- An average GPA of 3.0 (out of 4.0)
- Applicants whose native language is not English, will need to satisfy the UNC Charlotte Graduate School's English proficiency requirements.

Certificate Requirements

The certificate is awarded upon completion of four graduate level courses (12 credit hours) in the area of applied energy. The cumulative GPA must be at least 3.0 and at most one course with a grade of C may be allowed toward the certificate. Requests for other energy-related course substitutions may be approved at the discretion of the department graduate director.

Select four of the following:

- CMET 5140 Building Energy Management (3)
- CMET 6155 Facility Instrumentation and Controls (3)
- ENER 5275 Air Conditioning Systems (3)
- ENER 6120 Energy Generation and Conversion (3)
- ENER 6135 Energy Transmission and Distribution (3)
- ENER 6150 System Dynamics (3)
- ENER 6170 Applied Mechatronics (3)
- ETGR 5272 Engineering Analysis IV (3)

Early Entry Program

Undergraduate students with a GPA of 3.2 or above and with at least 75 credit hours completed toward a baccalaureate degree in Engineering or Engineering

Technology at UNC Charlotte may be admitted as an Early Entry student provided they meet all other requirements of admission except the earned bachelor's degree.

COURSES IN ENERGY AND ELECTROMECHANICAL SYSTEMS (ENER)

ENER 5140. Energy Management. (3) Prerequisite: Senior standing and a working knowledge of engineering economics and thermodynamics. Study of the understanding and implementation of energy management techniques. Emphasis is on energy efficiency applications in homes, businesses, large buildings and industry. Topics include: energy auditing, energy management, energy cost analysis, energy and electric rate structures, lighting, HVAC systems, motors and drivers, boilers and steam systems, cogeneration, commercial and industrial applications, and alternative energy sources.

ENER 5250. Analysis of Renewable Energy Systems. (3) Prerequisite: ETME 3143 or permission of instructor. System analysis of renewable energy systems: well-to-wheels analysis, lifecycle energy and emissions, total cost, skill sets, methodologies and tool kits needed to analyze various technologies on a consistent basis for a given application. Topics include: solar photovoltaics, wind energy, and fuel cell technologies.

ENER 5260. Hydrogen Production and Storage. (3) Prerequisite: PHYS 1101 or equivalent, ETME 3143 or equivalent, or permission of instructor. Basic concepts and principles of hydrogen technologies, including properties, usage, safety, fundamental understanding of hydrogen storage and production technologies.

ENER 5275. Air Conditioning Systems. (3) Prerequisite: ETME 3143 or permission of instructor. Functions and operating characteristics of the major components of refrigerating machines, heat pumps, boilers, furnaces, solar collectors, heat exchangers, fans and pumps. Emphasis on sizing, economics and performance characteristics. Includes coverage of psychometric principles and fan and pump laws.

ENER 5280. Fuel Cell Technology. (3) Prerequisite: ETME 3143 or equivalent, or permission of instructor. Basic concepts and principles of fuel cell technologies, including chemistry, thermodynamics, electrochemistry, cell components and operating conditions fuel cell systems.

ENER 5285. Applied Noise and Vibration Control. (3) Prerequisites: ETME 3113 or ELET 3113, and ETGR 3171, both with a grade of C or above. Laplace transformation method for solution of differential equations. Review of Newton's 2nd Law of Motion. Solution to the free vibration problem both with and without damping. Introduction to acoustics and the one dimensional solution to the wave equation. Noise sources and mechanics of noise generation. System design for noise and vibration minimization. Methods of noise and vibration remediation.

ENER 5290. Advanced Instrumentation. (3) Prerequisite: ELET 2241 or ETME 3163. Methodologies for measurement, analysis, and control of physical components of conventional and renewable energy conversion and storage systems.

ENER 6000. Special Topics in Applied Energy or Electromechanical Systems. (1-3) Study of specific new areas emerging in the various fields of energy and electromechanical systems. *May be repeated for credit.*

ENER 6120. Energy Generation and Conversion. (3) Overview of energy use. Fossil fuel resources and energy conversion. Solar energy principles, solar collector, photovoltaic cells and applications. Wind energy and wind turbines. Nuclear energy principles, nuclear reactors and power generation. Geothermal and Hydraulic energy conversion. Hydrogen energy, storage, and transportation. Overview of fuel cell, fuel cell types, and application.

ENER 6135. Energy Transmission and Distribution. (3) Power transmission and distribution network architectures. Transmission line models, parameters, and equivalent circuits. Symmetrical components. Power flow studies. Symmetrical and unsymmetrical faults. Transient operation and power system protection. Power system stability. Distribution optimization.

ENER 6150. System Dynamics. (3) Pre-or corequisite: ETGR 3171 or equivalent. Energy-based modeling of dynamic mechanical, electrical, thermal, and fluid systems to formulate linear state equations, including system stability, time domain response, and frequency domain techniques.

ENER 6170. Applied Mechatronics. (3) Prerequisite: ETGR 3171 or equivalent. Analog electronic design for purposes of controlling electromechanical systems, including electromechanical sensors and actuators, analog electronic design of filters, state-space and classical controllers, and transistor-based servoamplifiers and high voltage amplifiers. Significant laboratory component with design and

fabrication of circuits to control electromechanical systems. Implementation of digital controllers.

ENER 6220. High Voltage Technology. (3) Covers concepts of high voltage generation, measurements, protection and safety. Study of high electric fields theory, breakdown mechanisms in gases, liquids, and solid dielectrics. The high voltage insulation, including insulation coordination, is also discussed. Instruction on high voltage applications and safety.

ENER 6235. Modern Electric Power Grids. (3) Instruction on network steady-state analysis; faults; protection systems; switching equipment; voltage and power static control; surge voltages and protection, transient operation and stability, "smart grid" enabling technologies.

ENER 6260. Computational Fluid Dynamics for Energy Applications. (3) Prerequisites: ETGR 3171 and ETME 3133. Introduction to the use of commercial CFD codes to analyze flow and heat transfer in energy related problems. Finite difference and finite volume methods, SIMPLE model for incompressible flow, models of simple geometries are developed and studied, post processing and visualization. Overview of turbulence and turbulence modeling.

ENER 6270. Dynamic Systems Control and Design. (3) Prerequisite: ELET 4242 or ENER 6150. Analysis and design of dynamic systems control. Analysis of linear feedback systems, deterministic and stochastic dynamic systems, their characteristics, robust stability, and robust performance. Robust control, Kalman filter, and its design and compensation of deterministic and stochastic dynamic systems, including wind turbines system control and piezo (mechatronics) systems.

ENER 6800: Independent Study. (1-3) Prerequisite: Permission of graduate committee advisor. Individual investigation and exposition of results for a directed project in energy and electromechanical systems. *May be repeated for credit.*

ENER 6900: Master's Research and Thesis. (1-6) Prerequisite: Permission of graduate committee advisor. Individual investigation culminating in the preparation and presentation of a thesis. *May be repeated for credit.*

COURSES IN ENGINEERING TECHNOLOGY (ETGR)

ETGR 5272. Engineering Analysis IV. (3) Prerequisites: ETGR 2272 or MATH 1242 with a grade of C or above, and STAT 1220 with a grade of C or

above. A continuation of engineering analysis to include additional topics and applications in vector operations, probability, and statistics.

Fire Protection and Administration

• Master of Fire Protection and Administration

Department of Engineering Technology and Construction Management

et.uncc.edu

Graduate Program Director

Mr. Jeff Kimble, Associate Professor

Graduate Faculty

Dr. Anthony L. Brizendine, PE, Professor
 Dr. Aidan Brown, Assistant Professor
 Dr. Nan Byars, PE, Professor
 Dr. Tara Cavalline, PE, Assistant Professor
 Dr. Don Chen, LEED AP, Assistant Professor
 Dr. G. Bruce Gehrig, PE, Associate Professor
 Dr. Rodney Handy, Professor
 Dr. John Hildreth, Associate Professor
 Dr. Steve Kuyath, Associate Professor
 Dr. Na Lu, AIC, Assistant Professor
 Mr. David Murphy, Associate Professor
 Dr. Demba Ndiaye, Assistant Professor
 Dr. Thomas Nicholas, PE, Assistant Professor
 Dr. Maciej Noras, Associate Professor
 Dr. Carlos Orozco, PE, Associate Professor
 Dr. Peter Schmidt, PE, Associate Professor
 Dr. Deborah Sharer, Associate Professor
 Dr. Barry Sherlock, Professor
 Dr. Patricia Tolley, PE, Associate Professor
 Dr. Nicholas Tymvios, Assistant Professor
 Dr. Jozef Urbas, Associate Professor
 Dr. Sheng-Guo Wang, Professor
 Dr. Wesley Williams, Assistant Professor
 Dr. Aixi Zhou, Associate Professor

MASTER OF FIRE PROTECTION AND ADMINISTRATION

The Master of Fire Protection and Administration (MFPA) program provides an advanced technical background for professionals involved with fire protection and administration, in areas such as fire protection analysis and design, fire service, fire safety, occupational safety, and security. The MFPA program is designed to provide the necessary knowledge and skills to begin work in many areas of the fire protection and administration fields and to solve fire protection and related safety problems in our complex technical society.

The program consists of a common core and concentrations in Fire Protection and Fire Administration. The Fire Protection Concentration prepares fire protection professionals to use modern fire protection methodologies, techniques and tools for fire protection design, fire investigation, industrial fire safety, key infrastructure security, safety assessment, and other fire safety related matters. The Fire Administration Concentration prepares those who are engaged in occupations in the fire, emergency services, and safety fields to effectively manage the administrative decision making requirements of both public and private entities.

Application Deadline

Applications can be received by the Graduate Admission Office any time prior to their published deadlines. In order to be considered for assistantships and tuition grants for the following academic year, students should apply by March 1 for priority consideration. The first round of award decisions typically occur by March 15. However, the Department will evaluate admission applications at any time complete applications are received by the Graduate School.

Assistantships

Research and teaching assistantships are available from the Department on a competitive basis to highly qualified applicants/students.

Tuition Grants

Tuition grants, including out-of-state tuition differential waivers and in-state tuition support, are available on a competitive basis for both out-of-state and in-state students, respectively.

Admission Requirements

The minimum admission requirements for the program are:

- An earned undergraduate degree in engineering, engineering technology, emergency management, or a related technical or scientific discipline. For the Fire Protection concentration, an undergraduate degree in engineering, engineering technology, or a related technical or scientific discipline is acceptable. For the Fire Administration concentration, a degree in engineering, engineering technology, emergency management, or a related discipline is acceptable.
- An undergraduate GPA of 3.0 or better
- Acceptable scores on the verbal, quantitative, and analytical sections of the GRE
- Positive recommendations
- A combined TOEFL score of 220 (computer-based) or 557 (paper-based) is required if the

previous degree was from a country where English is not the common language

- f) Integral and differential calculus (MATH 1120, MATH 1121, or ETGR 3171 at UNC Charlotte or equivalent) is required for students pursuing the fire protection concentration
- g) Statistics (STAT 1220 or STAT 3128 at UNC Charlotte or equivalent)
- h) Other credentials as required by the Graduate School

Documents to be Submitted for Admission

- a) Official transcripts from all colleges and universities attended.
- b) Official GRE scores.
- c) Official TOEFL scores.
- d) The UNC Charlotte application for graduate admission online.
- e) An essay detailing the applicant's motivation and career goals, along with any specific research and training interests.
- f) Three professional recommendations.
- g) Others as required by the Graduate School.

Degree Requirements

The minimum requirement for the MFPA degree is 30 credit hours beyond the baccalaureate degree. This includes a minimum of 24 credit hours of formal coursework. Students enrolled will: 1) take a common core of 12 credit hours which includes study in both fire protection and fire administration; 2) choose additional concentrated study of 6 credits in either fire protection or fire administration; and 3) select 12 credit hours of directed elective. Students who elect the thesis option must complete 6 credit hours of MFPA 6900 as part of the directed electives. Students who select the non-thesis option will complete 30 credit hours of coursework and complete a comprehensive exam. At least 15 credit hours must be in courses numbered 6000 or above. The 30 credit hour degree program is outlined below:

Common Core (12 credit hours)

MFPA 5123 Human Behavior in Fire (3)
 MFPA 5132 Fire and Building Codes, Standards and Practices (3)
 MFPA 5223 Industrial Safety and Facilities Management (3)
 MFPA 6144 Fire Protection Systems (3)

Concentration Core (6 credit hours)

Select one of the following:

- 1) Fire Administration Concentration Core
 - MFPA 6120 Public and Private Sector Interoperability (3)
 - MFPA 6124 Fire Service and the Community (3)
- 2) Fire Protection Concentration Core

MFPA 6103 Fire Dynamics (3)

MFPA 6203 Fire Modeling (3)

Elective Courses (12 credit hours)

Select four of the following:

MFPA 5150 Human Resource Management in Emergency Services (3)
 MFPA 6113 Fire Failure Analysis (3)
 MFPA 6126 Arson (3)
 MFPA 6164 Fire Science Laboratory (3)
 MFPA 6232 Structural Fire Safety (3)
 MFPA 6233 Performance-Based Design (3)
 MFPA 6243 Research Investigation (3)
 MFPA 6244 Fire Detection and Smoke Management (3)
 MFPA 6252 Law and Fire Safety (3)
 MFPA 6255 Leadership/Conflict Management in Public Emergency Services (3)
 MFPA 6260 Organization and Management of Public Fire Protection (3)
 MFPA 6270 Budgeting, Grants, Contracts and Finance in Emergency Services (3)
 MFPA 6800 Independent Study (1-3)
 MFPA 6900 Thesis (6)
 CMET 5135 Building Information Modeling (3)
 CMET 5140 Building Energy Management (3)
 CMET 6240 Safety and Risk Management (3)
 CMET 6270 Operation of Constructed Facilities (3)

Additional new major electives courses may be created based on industry needs and faculty research interest. In addition, appropriate existing graduate level courses from other programs may be approved by the program director.

Capstone Experiences

Students pursuing a master's degree in Fire Protection and Administration have two options to complete the 30 credit hour program as follows:

- 1) 24 credit hours of coursework plus 6 credit hours of thesis project (MFPA 6900) OR
- 2) 30 credit hours of coursework and a comprehensive examination.

Both options require the formation of a program committee. The thesis option is reserved for students who are attending the on-campus program and are performing research under formal graduate research or teaching assistantships. Students receiving such assistantships may be required to pursue the thesis option. The thesis option requires students to submit a written thesis and orally defend their work before their program committee.

All non-thesis students must complete 30 credit hours of coursework and successfully complete a formal comprehensive examination. The comprehensive

examination is a written exam. A student's exam will be scheduled when he/she has at least 24 credit hours of course credit completed or in progress. The student's graduate advisor and the examining committee will coordinate the examination (to be offered once in the fall and once in the spring semesters), preparing the exam with the assistance of members of the student's program committee. The exam will measure the student's mastery of theories and applications in the selected area of specialization within the discipline. Students will have only two opportunities to receive passing marks on the examination.

Advising

Each student is supervised by his/her graduate advisor and a program committee.

Plan of Study Requirements

Each student is required to submit a Plan of Study to the Department's Graduate Director before completing 18 credit hours of graduate credits.

Application for Degree

Each student should submit an Application for Degree prior to graduation. If a student does not graduate in the semester identified on the Application, the student must complete a new form and repay the application fee to be considered for graduation in a subsequent semester.

Transfer Credit

The Department, at its discretion, may accept transfer of graduate courses (6 credits maximum) taken at another institution or from another program prior to admission to the master's program in construction and facility management. Only courses in which the student earned a grade of B or above may be transferred.

Grade Requirements

All candidates must earn an overall 3.0 GPA to graduate. Accumulation of one U grade will result in the suspension of the student's enrollment in the program.

Other Requirements

The program has both a thesis and non-thesis track. After admission to candidacy, thesis students will complete a comprehensive oral exam while non-thesis students will complete a comprehensive written exam. Residence will be per Graduate School rules. There is no language requirement. While full-time students will typically take three semesters to complete the program, part-time students are expected to take no more than six years to complete the program as per Graduate School rules.

COURSES IN FIRE PROTECTION AND ADMINISTRATION (MFPA)

MFPA 5123. Human Behavior in Fire. (3)

Prerequisites: ETFS 3103 and ETFS 3113, or permission of department. Individual decision processes and behavior, modeling of people movement, calculation methods for egress prediction, egress design, and fire safety signs and alarm systems.

MFPA 5132. Fire and Building Codes, Standards, and Practices. (3)

Prerequisite: ETFS 3103 or permission of department. History of fire safety regulation development; building fire characteristics, fire test methods, and fire safety of buildings and structures; contemporary building and fire codes, practices, and their enforcement.

MFPA 5150. Human Resources Management in Emergency Services. (3)

Cross-listed as MPAD 6134. Prerequisite: permission of department. A study of the context of public personnel fire/emergency services related administration; basic functions of job evaluation and compensation, employee rights and responsibilities; the legal constraints including equal opportunity, health and safety, collective bargaining; government productivity.

MFPA 5223. Industrial Safety and Facilities

Management. (3) Prerequisite: ETFS 3123 or permission of department. Investigation and analysis of hazard control principles relating to the management of personnel, facilities, and equipment, including control procedures, work-task analysis, risk identification and countermeasures, safety training, and pertinent safety management techniques.

MFPA 6103. Fire Dynamics. (3) Prerequisites: ETME 3143 and ETME 3244, or permission from the department. Introduces students to fundamentals of fire and combustion and is intended to serve as the first exposure to fire dynamics phenomena. Includes fundamental topics in fire and combustion such as thermodynamics of combustion, fire chemistry, premixed and diffusion flames, solid burning, ignition, plumes, heat release rate curves, and flame spread.

MFPA 6113. Fire Failure Analysis. (3) Prerequisite: MFPA 6103 or permission of department. Provides knowledge for the development of fire investigation and reconstruction as a basis for determining fire cause and origin and evaluating and improving fire safety design. Accident investigation theory and failure analysis techniques such as fire re-creation testing and modeling are presented.

MFPA 6120. Public and Private Sector

Interoperability. (3) Cross-listed as MPAD 6290. Prerequisite: Permission of department. A study of multi-agency interoperability and the effective organization and management of emergency resources at various fire and large-scale emergency incidents. Includes a review of national standards and federal regulations impacting emergency incident management. Case studies of actual and theoretical incidents will be used to reinforce command and control concepts.

MFPA 6124. Fire Service and the Community. (3) Prerequisite: Permission of department. Theoretical concepts of public service to build an understanding of how the fire service fits within the community.

MFPA 6126. Arson. (3) Prerequisite: Permission of department. Utilizes lecture and case studies of arson fires that were started for various reasons, including financial gain, revenge and to conceal other crimes. The criminal intent and the psychological aspects of the fire setter are discussed.

MFPA 6144. Fire Protection Systems. (3) Prerequisite: ETFS 3103, ETFS 3113, or permission of department. An advanced study of various fire protection systems in regard to contemporary fire and life safety problems. Topics include: process of fire and smoke development, principles of active fire suppression and detection systems, hydraulics, automatic sprinkler systems, passive fire protection systems, structural fire resistance, installation and maintenance of fire protection systems.

MFPA 6164. Fire Science Laboratory. (3) Prerequisite: MFPA 6103 or permission of department. Instruction and hands-on experience with fire-science-related experimental measurement techniques. The objective is to expose students to laboratory-scale fire experiments, standard fire tests and state-of-the-art measurement techniques.

MFPA 6203. Fire Modeling. (3) Prerequisite: MFPA 6103 or permission from the department. Modeling of compartment fire behavior is studied through the use and application of two types of models: zone and field. The zone model studied is CFAST. The field model studied is FDS. Focus on the understanding of each of these models is the primary objective in terms of needed input, interpretation of output and limitations.

MFPA 6232. Structural Fire Safety. (3) Prerequisites: ETGR 2102 or ETME 3123, ETME 3244, or permission of department. Provides the knowledge needed for structural fire safety design and analysis. Course topics include design philosophies and methods in fire safety engineering, principles of and approaches for structural design for fire safety, behavior of

compartment fires, behavior of structural materials in fire, and structural fire safety of typical materials and their components.

MFPA 6233. Performance-Based Design. (3) Prerequisite: ETFS 6203 or permission of department. Practical applications of fire protection engineering principles to the design of buildings. Both compartmented and non-compartmented buildings will be designed for criteria of life safety, property protection, continuity of operations, operational management and cost.

MFPA 6243. Research Investigation. (3) Prerequisite: permission of the department. Opportunities in conducting research to tackle fire safety related real-world problems. With guidance from the instructor, students can work individually or as a team on a one-semester project.

MFPA 6244. Fire Detection and Smoke Management. (3) Prerequisite: ETFS 3103 or permission of department. Addresses the fundamentals and practices of fire detection and smoke management. Topics include: principles of fire detection, fire alarm technology, and contemporary fire detection and alarm systems; principles applicable to the design and analysis of smoke management systems; factors affecting smoke movement; smoke hazard assessment; airflow in buildings, performance characteristics of smoke control and management systems.

MFPA 6252. Law and Fire Safety. (3) Prerequisite: Permission of department. Responding to natural and manufactured building hazards requires a complex legal environment, including regulation and liability. Key topics include the use of model codes, administrative regulation, retrospective codes, federal preemption, arson, performance based codes, risk based regulation, engineering malpractice, product liability and disaster investigation.

MFPA 6255. Leadership/Conflict Management in Public Emergency Services. (3) Cross-listed as MPAD 6141. Prerequisite: Permission of department. The role of the administrator as a focal point in social change and the management of the conflict, which occurs. Perspectives on the negotiation and bargaining process will be reviewed.

MFPA 6260. Organization and Management of Public Fire Protection. (3) Cross-listed as MPAD 6104. Prerequisite: Permission of department. A presentation of modern management principles and techniques to the organization and delivery of the array of services that communities have come to expect from the fire service. The traditional and evolving roles of the fire service to protection, prevention, risk analysis and community service are

also considered.

MFPA 6270. Budgeting, Grants, Contracts and Finance in Emergency Services. (3) Prerequisite: Permission of department. Develops the understanding of strategic planning, contracting and budgeting practices as well as grant proposal writing with the emphasis on contract administration skills necessary to operation of a functioning governmental entity.

MFPA 6800. Independent Study. (1-3) Prerequisite: Permission of department. The MFPA program offers independent study and special study courses to allow students to pursue studies in areas for which there are no approved formal courses. *Graded on a Pass/Unsatisfactory basis.* Special study courses can be taken for a grade if the paperwork indicates it will be taken A/F. Each requires a title, justification, and the method of evaluation. Courses taken for A/F grade may be used to satisfy degree requirements. *May be repeated for credit.*

MFPA 6900. Thesis. (1-6) Prerequisite: permission of graduate committee advisor. Individual investigation culminating in the preparation and presentation of a thesis. *May be repeated for credit.*

Infrastructure and Environmental Systems

• Ph.D. in Infrastructure and Environmental Systems

Ph.D. Program in Infrastructure and Environmental Systems

ines.uncc.edu

Graduate Program Directors

Dr. Jy S. Wu, Director

Dr. John A. Diemer, Associate Director

Graduate Faculty

Civil Infrastructure and Materials

Dr. Nicole Braxtan, Assistant Professor

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Dr. Tara Cavalline, P.E., Assistant Professor

Dr. Don Chen, Associate Professor

Dr. Shen-en Chen, P.E. Professor

Dr. John Daniels, P.E., Professor

Dr. Wei Fan, P.E., Associate Professor

Dr. Janos Gergely, S.E., P.E., Associate Professor

Dr. Edd Hauser, Professor

Dr. John C. Hildreth, Associate Professor

Dr. Rajaram Janardhanam, Professor

Dr. Martine R. Kane, P.E., Associate Professor

Dr. Milind Khire, P.E., Professor

Dr. Thomas Nicholas, Assistant Professor

Dr. Vincent Ogunro, Associate Professor

Dr. Miguel Pando, P.Eng., Associate Professor

Dr. Srinivas S. Pulugurtha, P.E., Professor

Dr. Brett Tempest, Associate Professor

Dr. Nicholas Tymvios, Assistant Professor

Dr. Kimberly A. Warren, Associate Professor

Dr. David Weggel, P.E., Professor

Dr. Matthew Whelan, Associate Professor

Dr. David Young, P.E., Professor

Environmental Systems

Dr. Craig Allan, Professor

Dr. James E. Amburgey, Associate Professor

Dr. James Bowen, Associate Professor

Dr. John Daniels, P.E., Professor

Dr. Rodney G. Handy, Professor

Dr. Hilary Inyang*, Professor

Dr. Olya Keen, Assistant Professor

Dr. Mariya Munir, Assistant Professor

Dr. Mei Sun, Assistant Professor

Dr. Patricia Tolley, P.E., Associate Professor

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Earth Systems and Geospatial Analysis

Dr. Craig Allan, Professor
 Dr. Andy Bobyarchick, Associate Professor
 Dr. Robby Boyer, Assistant Professor
 Dr. Harrison S. Campbell, Associate Professor
 Dr. Gang Chen, Assistant Professor
 Dr. Sandra Clinton, Research Assistant Professor
 Dr. Casey Davenport, Assistant Professor
 Dr. Elizabeth Delmelle, Assistant Professor
 Dr. Eric Delmelle, Associate Professor
 Dr. John Diemer, Professor
 Dr. Matt Eastin, Associate Professor
 Dr. Martha C. Eppes, Associate Professor
 Dr. Sara Gagné, Associate Professor
 Dr. Scott P. Hippensteel, Associate Professor
 Dr. Brian Magi, Assistant Professor
 Dr. Heather Smith, Professor
 Dr. Wenwu Tang, Assistant Professor
 Dr. Jean-Claude Thill, Knight Distinguished Professor
 Dr. David Vinson, Assistant Professor
 Dr. Wei-Ning Xiang, Professor

Systems Optimization and Management

Dr. Tao Hong, Assistant Professor
 Dr. Simon M. Hsiang, Professor
 Dr. Churlzu Lim, Associate Professor
 Dr. Michael Ogle, Assistant Professor
 Dr. Ertunga Ozelkan, Professor
 Dr. Yesim Sireli, Associate Professor
 Dr. S. Gary Teng, Professor

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 Dr. Thomas A Gentry, AIA, Associate Professor
 Dr. Kyounghee Kim, Assistant Professor
 Dr. David J. Thaddeus, AIA, Professor

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Dr. James Oliver, Bonnie E. Cone Distinguished Professor
 Dr. Inna Sokolova, Professor
 Dr. Todd R. Steck, Associate Professor

Chemistry

Dr. Brian T. Cooper, Associate Professor
 Dr. Bernadette T. Donovan-Merkert, Professor
 Dr. Craig A. Ogle, Professor
 Dr. Jordan Poler, Associate Professor
 Dr. Tom Schmedake, Associate Professor

Economics and Business

Dr. Xiuli He, Associate Professor
 Dr. Gaines Liner, Professor
 Dr. Peter M. Schwarz, Professor
 Dr. Dmitry A. Shapiro, Associate Professor
 Dr. Weidong Tian, Distinguish Professor
 Dr. Hui-Kuan Tseng, Associate Professor

AIA = Registered Professional Architect
P.E. = Professional Engineer
P.H. = Professional Hydrologist
S.E. = Structural Engineer
**Affiliated Program Faculty*

PH.D. IN INFRASTRUCTURE AND ENVIRONMENTAL SYSTEMS (INES)

The Ph.D. in Infrastructure and Environmental Systems (INES) is an interdisciplinary program emphasizing innovations in design, analysis, construction and operation of civil, energy and environmental infrastructure; and the scientific analysis of environmental systems. The interdisciplinary program also involves the development and sustainable use of renewable resources, and the protection of our earth and its environmental systems. The interplay between the environment and infrastructure is thoroughly studied by students as they confront the challenges facing urbanizing regions. INES engages a diverse group of talented faculty from the science, engineering and management disciplines. INES students are required to conduct interdisciplinary and original research that contributes new knowledge to the profession, as evidenced by scholarly publications in refereed journals. The program is intended to:

- 1) Provide students with educational opportunities in science, engineering, and management, culminating in an interdisciplinary research-based Ph.D. in Infrastructure and Environmental Systems
- 2) Involve students in emerging issues pertaining to infrastructure and the environment for promoting regional and national economic and social development, as well as policy implications
- 3) Prepare students for careers as research scientists, resources and systems managers, professional engineers and educators who are capable of advancing the knowledge in science, technology, and management relevant to infrastructure and environmental systems

INES Students can participate in multidisciplinary activities provided by the UNC Charlotte research centers such as the Infrastructure, Design, Environment, and Sustainability (IDEAS) Center; the Center for Applied Geographic Information Science (CAGIS); the Energy Production and Infrastructure Center (EPIC); the Center for Transportation Policy Studies; the NSF I/UCRC Sustainably Integrated Buildings and Sites; the Integrated Design Research Lab and the Urban Institute. Current areas of INES research can be categorized as follows:

- Blast, impact, and ballistics testing and modelling
- Building and infrastructure security
- Climate change and atmospheric dynamics
- Civil infrastructure and materials
- Earth and geo-environmental systems
- Ecological valuation and stream restorations
- Environmental science and technology
- Integrated building design and BIM
- Natural hazards and geophysics
- Quaternary geology and landform evolution
- Renewable energy and environmental economics
- Systems optimization and management
- Transportation systems analysis and operation
- Urban and regional planning
- Integrated Watershed Management

Program Learning Outcomes

Doctoral students engage in coursework that develops their competency for research. Through research, students generate knowledge and become competent scientists and engineers. During this process, students acquire knowledge of foundation subjects and specialty areas within their focus of research and, as a result, they develop into professionals.

Specific outcomes of the INES program are that students completing the Ph.D. degree will demonstrate abilities to analyze and evaluate advanced topics in engineering and/or science, to communicate technical information effectively, to discover and create new knowledge, and to understand interactions among advanced topics in science, engineering, and management.

Admission Requirements

The following are general guidelines for successful admissions into the Ph.D. in Infrastructure and Environmental Systems:

- 1) The equivalent to a U.S. baccalaureate or master's degree, from a regionally accredited college or university, in engineering, earth science, geology, chemical and biological sciences, resources economics, or a related field with a minimum undergraduate GPA of 3.2 and a minimum graduate GPA of 3.5 (on a 4.0 scale) in all graduate work.
- 2) Applicants holding baccalaureate degrees with an undergraduate GPA of 3.75 or higher may be considered for admission.
- 3) Acceptable scores on the verbal, quantitative, and analytical sections of the Graduate Record Examination (GRE) are expected to be in the upper 50th percentile.
- 4) An acceptable TOEFL score as required by the Graduate School for international students.
- 5) Three letters of reference, two of which must be from faculty members.

- 6) An essay which addresses the applicant's motivation and research issues of interest.
- 7) Students entering the program are expected to remediate any coursework deficiencies identified by their advisory committee in the first semester after enrolling in the program. The required coursework depends on the background of the student and is established by the INES Program Director and the student's research advisor.

Documents Required for Application of Admission

The Office of the Graduate School at UNC Charlotte requires the following documents be submitted in the application package for each student:

- 1) One official transcript from all colleges and universities attended
- 2) Official GRE scores (verbal, quantitative and analytical)
- 3) Official TOEFL scores if the student's native language is not English.
- 4) UNC Charlotte graduate online application
- 5) Three letters of reference
- 6) Essay which addresses the applicant's motivation and research issues of interest
- 7) Current CV

Admission Assessment

- 1) The INES Program Committee reviews applications and recommends to the Program Director whether each applicant should be admitted or not and, if so, under what conditions.
- 2) The Program Committee assesses each student's previous academic coursework in light of the student's stated direction of study.
- 3) For each entering student, a member of the INES faculty is selected to serve as the student's interim advisor for the first year of study.

Student Responsibility

Students entering the program must present evidence that they are capable of undertaking the coursework required of them. Such evidence must include familiarity, background, and/or interest in infrastructure and environmental issues.

Students may have completed equivalent courses elsewhere. Normally, transcripts provide the evidence required by the Program Committee. However, if the student's previous experience is offered as evidence, the student must provide all the documentation necessary to specify such experience. A more detailed list of the types of prerequisite coursework can be found on the [Error! Hyperlink reference not valid.](#) Program's website.

Degree Requirements

The degree of Doctor of Philosophy in Infrastructure and Environmental Systems is awarded for completion of scholarly research that advances the knowledge base in the field of that research. Evidence of this is demonstrated by a successful dissertation defense. In addition, recipients of the degree should demonstrate a mastery of relevant subject matter and a potential for success in research and teaching.

The INES Ph.D. program requires a minimum of 72 post-baccalaureate credit hours (a minor in this program is not applicable). A master's degree in an appropriate field consistent with the admission requirements may count up to 30 credit hours of transfer credit into the INES Program upon recommendation of the Program Director and upon approval by the Graduate School.

For Students with a Master's Degree:

Core Courses (6 credit hours)

INES 8101 Environmental Systems (3)
INES 8102 Infrastructure Systems (3)

Elective Interdisciplinary Course (3 credit hours)

With approval of the Program Director, select one of the following for data, policy, or economic emphasis:
INES 8110 Acquisition and Analysis of Scientific Data (3)

INES 8113 Case Study (1-3)
INES 8201 Environmental and Ecological Economics (3)
ECON 6000-8999 (3)
EGMT 6000-8999 (3)
PPOL 6000-8999 (3)
STAT 6000-8999 (3)

Seminar Courses (3 credit hours)

Repeat the following course each Fall for a total of 3 credit hours:

INES 8690 Seminar (1)

Specialized Elective Courses (12 credit hours)

Select four courses from the following:
INES 8000-8890 (excluding INES 8690)

Note: Up to one non-INES doctoral-level course may be substituted with approval of the Program Director.

Directed Studies Courses (0-30 credit hours)

Directed Studies courses are based on a maximum of 30 credit hours transferred from a master's program. Less than 30 credit hours transferred into the INES Program results in a higher number of credit hours to be completed at UNC Charlotte. Select from the following:

Accepted master's transfer courses (0-30 credit hours)

INES 8890 Doctoral Independent Study and Project
(maximum of 9 credit hours)

ARCH 6000-8999 (3)
BIOL 6000-8999 (3)
CEGR 6000-8999 (3)
CHEM 6000-8999 (3)
ECON 6000-8999 (3)
EGMT 6000-8999 (3)
ESCI 6000-8999 (3)
GEOG 6000-8999 (3)
GEOL 6000-8999 (3)
ITCS 6000-8999 (3)
MEGR 6000-8999 (3)
STAT 6000-8999 (3)

Dissertation Research (18 credit hours)

INES 8999 Doctoral Dissertation Research (1-9)
(maximum of 18 credit hours)

Degree Total beyond Master's Degree = 42 credit hours

For Students with a Bachelor's Degree:

Core Courses (6 credit hours)

INES 8101 Environmental Systems (3)
INES 8102 Infrastructure Systems (3)

Elective Interdisciplinary Course (3 credit hours)

With approval of the Program Director, select one of the following for data, policy, or economic emphasis:
INES 8110 Acquisition and Analysis of Scientific Data (3)

INES 8113 Case Study (1-3)
INES 8201 Environmental and Ecological Economics (3)
ECON 6000-8999 (3)
EGMT 6000-8999 (3)
PPOL 6000-8999 (3)
STAT 6000-8999 (3)

Seminar Courses (3 credit hours)

Repeat the following course each Fall for a total of 3 credit hours:

INES 8690 Seminar (1)

Specialized Elective Courses (12 credit hours)

Select 9-12 credit hours from the following:
INES 8090 Topics in Infrastructure and Environmental Systems (3)
INES 8000-8999

Select 0-3 credit hours from the following, as needed:

ARCH 6000-8999 (3)
BIOL 6000-8999 (3)
CEGR 6000-8999 (3)
CHEM 6000-8999 (3)
ECON 6000-8999 (3)
EMGT 6000-8999 (3)
ENGR 6000-8999 (3)

GEOG 6000-8999 (3)
 GEOL 6000-8999 (3)
 ITCS 6000-8999 (3)
 MEGR 6000-8999 (3)

Directed Studies Courses (30 credit hours)

Select from the following:

INES 8890 Doctoral Independent Study and Project
(maximum of 9 credit hours)

ARCH 6000-8999 (3)
 BIOL 6000-8999 (3)
 CEGR 6000-8999 (3)
 CHEM 6000-8999 (3)
 ECON 6000-8999 (3)
 EGMT 6000-8999 (3)
 ESCI 6000-8999 (3)
 GEOG 6000-8999 (3)
 GEOL 6000-8999 (3)
 ITCS 6000-8999 (3)
 MEGR 6000-8999 (3)
 STAT 6000-8999 (3)

Dissertation Research (18 credit hours)

INES 8999 Doctoral Dissertation Research (1-9)
(maximum of 18 credit hours)

Degree Total beyond Bachelor's Degree = 72 credit hours

Graduate Course Requirements

All courses taken for credit in the INES Ph.D. program shall be graduate level courses (6000-level and 8000-level: graduate students only), and the majority shall be at the Ph.D. level (8000-level: Ph.D. students only). Core courses and seminar courses (all designated INES 8000-level courses) are open only to Ph.D. students. All 6000-level courses available as specialized electives are open only to graduate students (Master's and Ph.D.). No credit is given in the INES Program for graduate coursework completed at the combined undergraduate–graduate level (5000-level at UNC Charlotte).

For students entering the INES Ph.D. Program who have completed a master's degree, the minimum number of hours specified below in each category will be adjusted based on the number of transfer credits awarded to the student for his/her master's work.

Core Courses, Interdisciplinary Elective, and Seminars

INES Ph.D. students participate in interdisciplinary activities throughout their program of study. Students begin with a set of interdisciplinary core courses that teach them about key aspects of infrastructure and environmental systems present in all applications of INES. These common aspects are reflected in four core offerings (two core courses, one interdisciplinary

elective, and one continuous seminar). Students must complete the two core courses in their first year of study and, throughout the program, students participate in interdisciplinary seminars.

Specialized Elective Courses

It is recognized that doctoral degree study requires advanced knowledge of issues, the breadth of which depends on the context and objectives of the academic program. Both the infrastructure and the environment involve broad and multi-faceted issues. Beyond the core, a student needs to support doctoral research with enrollment in particular courses related to his/her research. For this reason, a minimum of 12 credit hours have been reserved for specialized electives. The objective of these specialized electives is to provide an opportunity for students, their advisors, and their doctoral committee to select a complementary set of specialized courses intended to support the student's area of interest and research.

Specialized Elective courses come from many fields and sub-fields of various academic disciplines to address the program's focus of INES design/technology, science, and management. Many acceptable courses are offered in various departments at the master's level and Ph.D. levels. Selected courses must be approved by each student's advisor and doctoral committee.

Directed Studies

In recognition of varying backgrounds, preparation, interests, and goals, each student may complete additional credits through directed studies (transfer credit, courses, research, or individual study), with the consent of his/her advisor and doctoral committee. This category may include courses within a student's specialized area as well as courses outside the specialized area. Within the directed studies category, a student may complete a maximum of 9 credit hours of independent study toward the Ph.D. degree.

Dissertation Requirement

The INES doctoral program includes a maximum of 18 credit hours of dissertation credit (INES 8999). The number of research credits taken each semester must be approved by the student's advisor and doctoral committee. If more than 18 credit hours of dissertation credit are needed, students should register for INES 8998.

Each student must complete and defend a dissertation based on a research program approved by the student's doctoral committee. The dissertation must be of high quality and represent an original piece of research that advances the body of knowledge in infrastructure and environmental systems. Oral presentation and successful defense of the dissertation

before the student's doctoral committee in a forum open to the public is required.

A copy of the student's dissertation is made available to the graduate faculty of the program at least two weeks prior to the public defense. The dissertation must be written in a format acceptable to the Graduate School and shall satisfy all requirements and deadlines specified by the Graduate School. Students are strongly encouraged to publish in a refereed journal before graduation.

Advising

Upon acceptance into the INES Ph.D. Program, a student is assigned an interim advisor by the Program Director. Within the first year in the Program, each student selects a permanent doctoral research advisor. This selection is approved by the Program Director and Dean of the Graduate School. At any time, a student may request a change of initial supervisor or research advisor. These requests are submitted to the Program Director for consideration and action.

Plan of Study

Students who enter the Ph.D. Program must prepare a plan of study before the end of their second semester in the Program. The plan of study proposes a schedule for completion of all coursework by the student. Each plan is approved by the student's doctoral committee and the Program Director.

Qualifying Examination

Each student must complete a qualifying examination comprising (1) written examinations and (3) oral defense of the research proposal. The written examinations include: (a) an exam for each of the two core courses (INES 8101 and INES 8102) and (b) a comprehensive examination based on specialized elective courses and research areas of the student. The comprehensive written examination is administrated by the student's doctoral committee. The oral defense of the research proposal is also administrated by the student's doctoral committee and requires a presentation and defense by the student of his/her proposed research topic. Students who enter the Ph.D. Program directly from a baccalaureate program generally sit for the two written examinations before the end of their third post-baccalaureate year in the program; students who enter from a master's degree program must sit for the written examinations before the end of their second year in the program. To sit for these examinations, a student must have at least a 3.0 GPA and must have removed all deficiencies upon admission.

A student may attempt to pass each part of the qualifying exam no more than twice. Failure of any of

these examinations a second time results in termination of enrollment in the Ph.D. Program.

Doctoral Committee

Each student's Doctoral Committee contains five members. One committee position is filled by a UNC Charlotte Graduate Faculty member appointed by the Dean of the Graduate School. The remaining four members are recommended, before the completion of the student's first year in the program, by the student's Doctoral Research Advisor, with input from the Program Director. Recommended faculty members should have expertise in the student's area of research interest. The Program Director approves, with subsequent concurrence by the Dean of the Graduate School, the four recommended faculty members to serve on the Committee. The doctoral program committee of each student is chaired by the student's Doctoral Research Advisor.

At least three of the Doctoral Committee members must be INES Program Faculty members. At least one of the four members must come from a different academic department, in order to reflect the interdisciplinary nature of the program. The inclusion of one member from outside the University of North Carolina Charlotte is strongly encouraged, and this person must also be a member of the UNC Charlotte Graduate Faculty.

Admission to Candidacy

After passing the qualifying examination, a student can propose a dissertation topic. A student advances to candidacy after the dissertation topic has been approved by the student's doctoral committee. Candidacy must be achieved at least 6 months before the degree is conferred.

Application for Degree

Each student should make application for his/her degree by completing the online Application for Degree through Banner Self Service no later than the filing date specified in the University Academic Calendar.

Research Opportunities

INES faculty members reside in two primary departments (Civil & Environmental Engineering and Geography & Earth Sciences) and six supporting departments (Biological Sciences, Chemistry, Economics, Finance, Systems Engineering & Engineering Management, and the School of Architecture). INES Faculty members in these departments currently conduct research in their specialized areas of interest as well as in interdisciplinary areas (see current areas of research listed at the beginning of this catalog section). Several

international universities collaborate with INES to implement joint supervision of doctoral research.

Other Requirements

Requirements for grades, transfer credits, residency, and time limits for completion match those described generally for the University. Various forms must be submitted to the Graduate School at various times by each INES student. Those forms include: Application for Transfer of Credit into a Graduate Degree Program, INES Plan of Study, Appointment of Doctoral Committee, Application for Qualifying Examination, Qualifying Examination Report, Graduate School Petition for Topic Approval, Application for Degree, and Dissertation Defense Report for Doctoral Candidates. Refer to the appropriate sections of this *Catalog* and to the INES and Graduate School websites for details.

Financial Support

The INES program offers financial support in the form of assistantships and tuition grants as described below.

Assistantships

Research and teaching assistantships are available from the INES Program on a competitive basis to qualified applicants/students.

Tuition Grants

Tuition grants including partial and full out-of-state and in-state tuition support are available on a competitive basis for out-of-state and in-state students, respectively.

COURSES IN INFRASTRUCTURE AND ENVIRONMENTAL SYSTEMS (INES)

Notes:

- *Permission of the instructor is required on all courses in the INES Ph.D. program*
- *Some of these courses may be offered during one of the summer sessions as well as during one of the listed semesters. Check with summer course schedules for details.*

INES 8090. Topics in Infrastructure and Environmental Systems. (3)

Selected topics in civil and environmental engineering, earth sciences, engineering management, biology, chemistry, economics, or public policy. May be cross-listed with advanced graduate courses offered by respective departments. *May be repeated for credit.*

INES 8101. Environmental Systems. (3) Prerequisite: Admission into the INES PhD program. Examines the principles of energy and mass transport as applied to

the atmosphere, hydrosphere, lithosphere and the Earth's biogeochemical systems and how these impact human activities and infrastructure. Emerging environmental issues and technologies in the areas of environmental impact due to human activities and natural disasters, and environmental sustainability including industrial ecology, waste minimization and recycling, will also be examined.

INES 8102. Infrastructure Systems. (3) Prerequisite: Admission into the INES PhD program. Overview of urban infrastructural development. Sustainable design features for facilities including municipal, transit, industrial, agricultural, telecommunications, and waste management. Impact of infrastructure development on environmental management including storm water quality and quantity, soil and channel erosion, urban air quality, sprawl, and waste production, treatment, and storage.

INES 8110. Acquisition and Analysis of Scientific Data. (3) Prerequisite: Admission into the INES PhD program. The study of theories and techniques for acquiring and analyzing scientific data and information related to the analysis, design and management of the infrastructure and the environment. Includes pertinent aspects of data analysis such as statistical analysis, uncertainty, detection limits, correlation methods, trend analysis, and data management/warehousing. Includes applications of GIS and non-destructive assessment technologies to data acquisition.

INES 8113. Case Study. (1-3) Prerequisites: INES 8101 and INES 8102. Students work together on interdisciplinary teams to study relevant environmental and infrastructure problems presented through case studies. The intent of the course is to directly involve the students in ongoing urban community projects. *May be repeated for credit.*

INES 8201. Environmental and Ecological Economics. (3) Prerequisite: permission of instructor. Students will explore the ways in which ecosystem services are measured, valued, and monetized by the society. The course is divided into three lecture modules: (a) environmental economics, (b) risk analysis and management, and (c) ecosystem services and valuation. It is appropriate for advanced graduate students with background in engineering, environmental sciences, business, and public policy.

INES 8690. Seminar. (1) Prerequisite: Admission into the INES PhD program. Students are required to actively participate in program seminars delivered by student researchers, faculty and invited speakers. These seminars are advertised to the campus and professional communities. Participation in these seminars count for a total of 3 credits (1 credit for

each semester). Prior to graduation, each student makes at least one seminar presentation and provides at least one formal critique of a presentation. *May be repeated for credit.*

INES 8890. Doctoral Independent Study and Project. (1-9) Individual investigation and exposition of results. *May be repeated for credit.*

INES 8998. Doctoral Dissertation Research. (1-9) Students continue individual investigations culminating in the preparation and presentation of a doctoral dissertation upon completing the 18-credit maximum of INES 8999. *Graded on a Pass/Unsatisfactory basis. May be repeated for credit.*

INES 8999. Doctoral Dissertation Research. (1-9) Students initiate and conduct individual investigations culminating in the preparation and presentation of a doctoral dissertation. *May be repeated for credit up to 18 credits.*

Mechanical Engineering

- **Ph.D. in Mechanical Engineering**
- **M.S. in Mechanical Engineering (MSME)**
- **M.S. in Engineering (MSE)**

Department of Mechanical Engineering and Engineering Science
mees.uncc.edu

Associate Chair for Graduate Programs
Dr. Edward P. Morse

Graduate Faculty

Dr. Harish P. Cherukuri, Professor
Dr. James F. Cuttino, Associate Professor
Dr. Matthew A. Davies, Professor
Dr. Kent Day, Assistant Professor
Dr. Ahmed El-Ghannam, Associate Professor
Dr. Gloria D. Elliott, Professor
Dr. Christopher J. Evans, Professor
Dr. Hongbing Fang, Professor
Dr. Jerre Hill, Senior Lecturer
Dr. Robert E. Johnson, Professor
Dr. Russell G. Keanini, Professor
Dr. Scott D. Kelly, Associate Professor
Dr. Laszlo Kecskes, Adjunct Professor
Dr. Kevin M. Lawton, Senior Lecturer
Dr. Charles Y. Lee, Associate Professor
Dr. Jimmie A. Miller, Adjunct Professor
Dr. Edward P. Morse, Professor
Dr. Brigid A. Mullany, Associate Professor
Dr. Steven R. Patterson, SPX Distinguished Professor
Dr. Jayaraman Raja, Professor
Dr. Praveen Ramaprabhu, Associate Professor
Dr. Nenad Sarunac, Associate Professor
Dr. Tony L. Schmitz, Associate Professor
Dr. Ronald E. Smelser, Professor
Dr. K. Scott Smith, Professor and Department Chair
Dr. Stuart T. Smith, Professor
Dr. Alireza Tabarraei, Assistant Professor
Dr. Peter T. Tkacik, Associate Professor
Dr. Mesbah Uddin, Professor
Dr. Christopher Vermillion, Assistant Professor
Dr. Qiuming Wei, Professor
Dr. Robert G. Wilhelm, Professor
Dr. Terry T. Xu, Professor
Dr. Haitao Zhang, Assistant Professor
Dr. Naiquan Zheng, Associate Professor
Dr. John C. Ziegert, Professor

The Department of Mechanical Engineering and Engineering Science offers degree programs leading to the Master of Science in Mechanical Engineering (MSME), the Master of Science in Engineering (MSE), and the Doctor of Philosophy (Ph.D.) in Mechanical Engineering. At the Master's level, the program is broad based, allowing students to develop expertise in a number of areas including design, manufacturing, thermal and fluid sciences, solid mechanics, bioengineering, materials engineering and science, and mechanical control and instrumentation. The Ph.D. program is more closely focused on precision engineering and manufacturing, computational modeling and simulation, automotive engineering, and biomedical engineering. The graduate program is supported by a world class metrology laboratory, numerous graduate research and computer labs, core and specialized biotechnology laboratories, and a first rate machine shop managed by a group of highly skilled lab and shop personnel. The William States Lee College of Engineering also supports a network of engineering computer laboratories.

PH.D. IN MECHANICAL ENGINEERING

The Department of Mechanical Engineering and Engineering Science offers multi-disciplinary programs leading to a Ph.D. degree in mechanical engineering in the areas of automotive engineering, biomedical engineering (BME), computational modeling and simulation (CMS), and precision engineering and manufacturing (PE).

The objectives of the Ph.D. program are:

- To provide students with the opportunity to develop a breadth of knowledge in mechanical engineering so that they can adapt to the changing requirements of the technological workplace.
- To develop engineering researchers who can contribute to the development of new knowledge and the dissemination of best practices in academic, industrial, and government environments.
- To prepare graduates for personal and professional success, both as individuals and in team environments.

Additional Admission Requirements

In addition to the general requirements for admission to the Graduate School, the following are required for study toward the Ph.D. program in Mechanical Engineering:

- 1) A master's degree in engineering or a closely allied field with a GPA of at least 3.5.

Exceptional students with only a baccalaureate degree may also be considered for admission to the Ph.D. program.

- 2) The applicant must receive a satisfactory score on the verbal and quantitative sections of the Graduate Record Examination (GRE) General Test.
- 3) Three letters of reference, at least two of which must be from faculty members. All three must be from professionals working in the applicant's field of interest.

Acceptability for admission is based upon the applicant's record and background as determined by the department.

Degree Requirements

- 1) Appointment of a Ph.D. advisor and formation of an advisory committee.
- 2) Development of a Ph.D. Plan of Study detailing all course and examination requirements.
- 3) Successful completion of the written qualifying examination.
- 4) Presentation of a proposal for Ph.D. research and admission to candidacy.
- 5) Successful defense of the Ph.D. Dissertation.

Within the first semester of being admitted into a Ph.D. program, the student should choose a Ph.D. advisor and form an advisory committee. In conjunction with the Ph.D. advisor and the advisory committee, the student will develop a Plan of Study to meet the Ph.D. program requirements of coursework and examinations and prepare to undertake original research leading to a dissertation of a quality that would be acceptable for publication of articles in peer-refereed professional journals.

Plan of Study

The Plan of Study must show at least 72 credit hours beyond the baccalaureate degree, including at least 45 credit hours of graduate coursework (6000-level or above), and 21 credit hours of research/dissertation. For students who do not possess appropriate bachelor's and/or master's degrees in engineering, additional coursework will be expected. The specific course requirements will be set by the student's advisory committee but must include: at least 6 credit hours of graduate mathematics (e.g., MATH 6103, MATH 6171, MATH 6172, MEGR 7172) and at least 18 credit hours of MEGR courses. Graduate courses from outside the department may be taken, but must be approved by the Associate Chair for Graduate Programs as part of the student's Plan of Study. Students are pre-approved to choose one of the following Graduate School courses: GRAD 8001, GRAD 8010, or GRAD 8011. The Plan of Study must be submitted to the department for review and

approval no later than the second semester after admission to the Ph.D. program.

Residence

A student may satisfy the residency requirement for the program by completing 18 credit hours, either coursework or research credits, by study-in-residence during the academic year and during the summer terms, as long as the study is continuous. Study-in-residence is deemed to be continuous if the student is enrolled in one or more courses (including research/dissertation credit) in successive semesters until eighteen hours of credit are earned.

Grades

A student is expected to achieve A's or B's in all coursework taken for graduate credit and must have a GPA of at least a 3.0 in order to graduate. The dissertation is graded on a Pass/Unsatisfactory basis and, therefore, will not be included in the cumulative average. An accumulation of more than two marginal C grades will result in termination of the student's enrollment in the graduate program. If a student makes a grade of U in any course, enrollment will be terminated. A graduate student whose enrollment has been terminated because of grades is ineligible to attend any semester or summer session unless properly readmitted to the graduate program. Readmission to the program requires approval of the Dean of the Graduate School upon the recommendation of the student's major department and the Engineering Doctoral Graduate Committee of the College of Engineering.

Qualifying Examination

After completing two semesters in the PhD program, every student will take qualifying exams in math and two topical areas, selected by the student and his/her dissertation committee. The student and committee will select 4 out of the 9 subjects in the math syllabus for the math qualifying exam. The student will be tested on these 4 subjects. The student must answer all the questions in these 4 subjects and obtain 70% or above to pass.

The student and the committee will select the two areas for the topical exams. 70% or above is the passing grade in the two topic areas.

For each of the three exams, two outcomes are possible: Pass (70% or above) or Fail (<70%). If the student passes all three of the exams, the student must present his thesis topic proposal to his/her dissertation committee in the semester following the semester in which the qualifying exam is taken. If the student fails any or all of the exams in the first attempt, then he/she will either be allowed to retake the failed exam(s) or terminated from the program. If the student fails any

exam for the second time, this is sufficient grounds for termination from the program.

Admission to Candidacy

The single requirement for admission to candidacy is the appointment of an advisory committee. This committee will consist of at least four graduate faculty members. Two of these four members shall be from a department other than the student's major. One of these external members shall be chosen by the student in consultation of his graduate advisor and the other member is appointed by the graduate school. The graduate advisor serves as chair of the committee. The committee is recommended by the department after appropriate consultation between the advisor and student.

Dissertation Proposal and Admission to Candidacy

Because the Ph.D. program is heavily based on independent research, each student must write a proposal describing his/her proposed dissertation research following the technical guidelines established by the department. Upon approval of the student's dissertation proposal, the advisory committee will recommend the student's admission to candidacy. This is subject to the approval of the Dean of the Graduate School.

Once the student has been admitted to candidacy, a tentative date for the dissertation defense should be agreed upon by the candidate and chair and indicated on this application. The date should be realistic and allow ample time for completion and review of the dissertation.

Application for Degree

Students preparing to graduate must submit an online Application for Degree by the filing data specified in the University Academic Calendar. If a student does not graduate in the semester identified on the Application for Degree, then the student must update his/her Admission to Candidacy and submit a new Application for Degree for graduation in a subsequent semester.

Dissertation

Evidence of a high degree of competence in scholarship, written exposition, independent inquiry and the ability to organize and apply knowledge must be demonstrated by the student in the dissertation. The student will make a public defense of the dissertation at which time the dissertation, as well as the student's knowledge of the field, will be appropriate matter for examination by the student's advisory committee. Although questions may be asked by the general audience, evaluation of the dissertation defense is the sole responsibility of the

advisory committee. The dissertation will be graded on a Pass/Unsatisfactory basis.

Assistantships

Teaching and Research Assistantships (TAs and RAs, respectively) are available on a competitive basis.

Time Limit

Students are allowed a maximum of eight (8) calendar years from formal admission to the Ph.D. program to complete the program successfully.

MASTER OF SCIENCE IN MECHANICAL ENGINEERING AND MASTER OF SCIENCE IN ENGINEERING

The Department of Mechanical Engineering and Engineering Science offers programs of study and research leading to the Master of Science in Mechanical Engineering (M.S.M.E.) and the Master of Science in Engineering (M.S.E.). The M.S.M.E program of study is for students who have completed a B.S.M.E. degree while the M.S.E. degree offers a more generic program of study for students who may not possess a baccalaureate degree in engineering.

The objectives of the M.S.M.E and M.S.E. program are:

- To provide our students with the opportunity to develop a breadth of knowledge in mechanical engineering so that they can adapt to the changing requirements of the technological workplace.
- To produce graduates who are able to practice as mechanical engineers with advanced skills and serve state, regional, and national industries.
- To prepare graduates for personal and professional success, both as individuals and in team environments.

Additional Admission Requirements

In addition to the general requirements for admission to the Graduate School, the following are required for study toward the Master's programs in Mechanical Engineering:

- Applicants must demonstrate evidence of satisfactory undergraduate preparation in engineering, usually manifested by the possession of a baccalaureate degree from an accredited institution in some area of engineering, with a grade point average of at least 3.0 on a 4.0 scale. Special consideration may be given to candidates with substantial engineering work experience.

- Applicants with baccalaureate degrees from fields other than engineering (e.g., biology, physics, chemistry, mathematics, etc.) may be considered for admission to graduate study. Typically these applicants complete mathematics, science, and engineering courses, as determined by the Director of Graduate Programs, before entering the graduate program.
- The applicant must receive a satisfactory score on the verbal and quantitative sections of the Graduate Record Examination (GRE) General Test.
- Acceptability for admission is based upon the applicant's record and background as determined by the department.

Early Entry to Graduate School

Exceptional undergraduate students at UNC Charlotte may be accepted into the graduate program and begin work toward a graduate degree before completion of the baccalaureate degree. An applicant may be accepted at any time after completion of 75 or more hours, although it is expected that close to 90 hours will have been earned by the time the first graduate course is taken.

To be accepted into this program, an undergraduate student must have at least a 3.2 overall GPA and have taken the appropriate graduate standardized test and have earned an acceptable score. If any Early Entry student has not met the normal admission requirements of a 2.75 overall undergraduate GPA and a 3.0 junior-senior GPA at the end of his/her baccalaureate degree, she/he will be dismissed from the graduate program.

Students accepted into an Early Entry Program will be subject to the same policies that pertain to other matriculated graduate students. Generally, it will be assumed that Early Entry students will finish their baccalaureate degrees before they complete 15 hours of graduate work.

Up to six hours earned at the graduate level may be substituted for required undergraduate hours. (Up to six hours of graduate work may be "double counted" toward both baccalaureate and graduate degrees.)

Degree Requirements

The applicant must complete at least 30 approved graduate credit hours as prescribed by the graduate advisor and fulfill the following:

- 1) A minimum of 12 credit hours of coursework in Mechanical Engineering and Engineering Science.
- 2) The completion of one mathematics course (3 credit hours).

- 3) Students pursuing the thesis or creative design project option may complete up to 6 credit hours of thesis research.
- 4) Students pursuing the problem report option may complete up to 3 credit hours of problem report.
- 5) Students pursuing the coursework-only option must satisfactorily complete a comprehensive exam that is administered by the advisory committee.

In summary, the required 30 graduate credit hours are satisfied by: 1) thesis option – at least 12 credits hours of MEGR graduate coursework, 3 credit hours of mathematics, and 15 credit hours of MEGR or other department (with Associate Chair for Graduate Programs approval) graduate courses, including up to 6 credit hours of thesis research; or 2) coursework-only option – at least 12 credits hours of MEGR graduate coursework, 3 credit hours of mathematics, and 15 credit hours of MEGR or other department graduate courses (with Associate Chair for Graduate Programs approval).

The required mathematics course can be any 6000-level math course approved by the thesis advisor or one of the following:

MATH 6103 Computer Techniques and Numerical Methods (3)
 MATH 6171 Advanced Applied Mathematics I (3)
 MATH 6172 Advanced Applied Mathematics II (3)
 MEGR 7172 Computational Methods in Engineering (3)

The decision as to whether a program will include a thesis, design project or problem report is to be made on an individual basis by the advisory committee at the time of filing the student's Plan of Study.

Plan of Study

The Plan of Study must show at least 30 credit hours beyond the baccalaureate degree and the degree completion option as determined by the advisory committee; Option 1) thesis or creative design project, Option 2) problem report; or Option 3) coursework only with comprehensive exam. For students who do not possess an appropriate bachelor degree in engineering, additional coursework will be expected. The specific course requirements will be set by the student's advisory committee but must include: At least 3 hours of graduate (6000-level or above) mathematics and at least 12 credit hours of MEGR coursework. Graduate (6000-level or above) courses from outside the department may be taken, but must be approved by the Associate Chair for Graduate Programs as part of the student's Plan of Study. The Plan of Study must be submitted to the department for review and approval no later than the second semester after admission to the master's program.

Academic Standards

Only grades of A, B, or C are accepted towards a graduate degree. A grade of U in any graduate course will suspend the student's enrollment subject to readmission as prescribed in the *Graduate Catalog*. Similarly, an accumulation of three C grades will result in suspension of the student's enrollment, subject to readmission to a program. A student in any graduate program is required to maintain satisfactory progress toward the degree. Continued enrollment is at all times subject to review on the basis of academic record and actions with regard to observance of University rules and regulations.

Admission to Candidacy

Following Admission to Candidacy, a tentative date for the comprehensive examination should be agreed upon and indicated. The date should be realistic and allow ample time for completion and review of the thesis or project.

The student and faculty advisor will agree on the appointment of an advisory committee. The advisory committee will be composed of at least three graduate faculty members. The graduate advisor will serve as chair of the committee. The committee is recommended by the department after appropriate consultation between the advisor and student.

Application for Degree

Students preparing to graduate must submit an online Application for Degree by the filing data specified in the University Academic Calendar. If a student does not graduate in the semester identified on the Application for Degree, then the student must update his/her Admission to Candidacy and submit a new Application for Degree for graduation in a subsequent semester.

Transfer Credit

At the time of admission, up to six hours of transfer credit may be accepted from an ABET accredited engineering institution.

Assistantships

Teaching and Research Assistantships (TAs and RAs, respectively) are available on a competitive basis.

COURSES IN MECHANICAL ENGINEERING AND ENGINEERING SCIENCE (MEGR)

MEGR 6000. Research Seminar. (1) Presentations on the current research in Mechanical Engineering,

Engineering Science, and related fields. *Graded on a Pass/Unsatisfactory basis. May be repeated for credit.*

MEGR 6090. Special Topics. (1-6) Prerequisite: Post-Baccalaureate students only. Directed study of current topics of special interest. *May be repeated for credit.*

MEGR 6109. Biotechnology and Bioengineering. (3) Cross-listed as MEGR 8109. Prerequisite: admission to a graduate program or permission of instructor(s). This interdisciplinary course discusses key issues in device design, and heat and mass transport with cell biology, molecular biology, and physiology to introduce students to technological innovations in biotechnology and bioengineering. Credit will not be awarded for MEGR 6109 where credit has been awarded for MEGR 8109.

MEGR 6116. Fundamentals of Heat Transfer and Fluid Flow. (3) Cross-listed as MEGR 8116. Prerequisite: MEGR 3114 or equivalent. A unified treatment of transfer operations developed in terms of physical rate processes; formulation and solution of typical boundary value problems associated with heat, mass and momentum transfer. Credit will not be awarded for MEGR 6116 where credit has been awarded for MEGR 8116.

MEGR 6125. Vibrations of Continuous Systems. (3) Cross-listed as MEGR 8125. Prerequisite: MEGR 4143 or equivalent. Analysis of vibration of continuous linear elastic structures such as strings, rods, beams and plates with varying boundary conditions. Approximate solution techniques such as Rayleigh, Rayleigh-Ritz, and Galerkin are presented. Credit will not be awarded for MEGR 6125 where credit has been awarded for MEGR 8125.

MEGR 6141. Theory of Elasticity I. (3) Cross-listed as MEGR 8141. Prerequisite: MEGR 3221 or equivalent. Introduction to the theory of elastic media; the fundamentals of stress, strain, stress-strain relationships, compatibility and equilibrium. Applications to two- and three-dimensional problems. Structural mechanics and energy methods. Credit will not be awarded for MEGR 6141 where credit has been awarded for MEGR 8141.

MEGR 6166. Mechanical Behavior of Materials I. (3) Cross-listed as MEGR 8166. Prerequisite: MEGR 3161 or equivalent. Macroscopic and microscopic aspects of elastic and plastic deformation and fracture of engineering materials; applications of dislocation theory to an interpretation and control of mechanical properties; temperature, strain rate and texture effects. Credit will not be awarded for MEGR 6166 where credit has been awarded for MEGR 8166.

MEGR 6181. Engineering Metrology. (3) Cross-listed as MEGR 8181, OPTI 6381, and OPTI 8381. Prerequisite: MEGR 3282 or equivalent. Introduction to metrology and standards. Uncertainty, precision and accuracy in metrology. Measurement of size and form, computational methods in measurement of form. Measurement of surface texture and out of roundness. Machine tool and robot accuracy and calibration. Evaluation of screw threads and gears. Introduction to design of precision instruments. Credit will not be awarded for MEGR 6181 where credit has been awarded for MEGR 8181.

MEGR 6990. Industrial Internship. (1-3) Cross-listed as MEGR 8990. Prerequisite: Completion of nine hours of graduate coursework. Full- or part-time academic year internship in engineering complementary to the major course of studies and designed to allow theoretical and course-based practical learning to be applied in a supervised industrial experience. Each student's program must be approved by their graduate program director. Requires a mid-term report and final report to be graded by the supervising faculty.

MEGR 7090. Special Topics. (1-6) Directed study of current topics of special interest for Master's degree. *May be repeated for credit.*

MEGR 7101. Transport Processes. (3) Cross-listed as MEGR 8101. Prerequisite: permission of department. Unified field theory approach to the fluid transport of momentum, energy, mass and electrical charge. Statistical theories of turbulence and molecular transport. Multiphase systems, chemically reacting flows, ionized fluids, separation processes. Credit will not be awarded for MEGR 7101 where credit has been awarded for MEGR 8101.

MEGR 7102. Introduction to Continua. (3) Cross-listed as MEGR 8102. Prerequisites: MEGR 2144 and MEGR 3114 or equivalents, or permission of department. A unified treatment of those topics which are common to all continua. Stress, deformation and velocity fields, constitutive equations and field equations. Representative applications in solid, fluid and electromagnetic continua, including interaction problems. Credit will not be awarded for MEGR 7102 where credit has been awarded for MEGR 8102.

MEGR 7104. Fabrication of Nanomaterials. (3) Cross-listed as MEGR 8104. Prerequisite: NANO 8101 or permission of instructor. Lithographic methods (CVD, PVD, e-beam, ion beam, magnetron, evaporation, spin coating, mask fabrication, developing resists); microelectromechanical systems and nanoelectromechanical systems; limits of conventional mechanical processing, electroforming,

growth mechanisms (organic, inorganic, thermal); powders. Credit will not be awarded for MEGR 7104 where credit has been awarded for MEGR 8104.

MEGR 7104. Fabrication of Nanomaterials. (3)

Cross-listed as ECGR 7104 and MEGR 8104.

Prerequisite: NANO 8101 or permission of instructor. Lithographic methods (CVD, PVD, e-beam, ion beam, magnetron, evaporation, spin coating, mask fabrication, developing resists); microelectromechanical systems and nanoelectromechanical systems; limits of conventional mechanical processing, electroforming, growth mechanisms (organic, inorganic, thermal); powders. Credit will not be awarded for MEGR 7104 where credit has been awarded for ECGR 7104 or MEGR 8104.

MEGR 7108. Finite Element Analysis and Applications. (3) Cross-listed as MEGR 8108.

Prerequisites: MEGR 6141 and MATH 6171 or permission of department. An introduction to the finite element method and its application to engineering problems. Application of the displacement methods to plane stress, plane strain, plate bending and axisymmetrical bodies. Topics may include, but are not limited to: dynamics, heat conduction, and structural mechanics. Credit will not be awarded for MEGR 7108 where credit has been awarded for MEGR 8108.

MEGR 7110. Advanced Conductive Heat Transfer. (3) Cross-listed as MEGR 8110. Prerequisite: MEGR 3116 or equivalent.

Theory of steady and unsteady heat conduction in isotropic and anisotropic media. Treatment of concentrated and distributed heat sources. Application of the finite difference and finite element methods. Credit will not be awarded for MEGR 7110 where credit has been awarded for MEGR 8110.

MEGR 7111. Advanced Engineering Thermodynamics. (3) Cross-listed as MEGR 8111.

Prerequisites: MEGR 3112 and MATH 3142, or equivalents. Postulational treatment of the laws of thermodynamics. Equilibrium and maximum entropy postulates. Development of formal relationships and principles for general systems. Applications to chemical, magnetic, electric, and elastic systems. Credit will not be awarded for MEGR 7111 where credit has been awarded for MEGR 8111.

MEGR 7112. Radiative Heat Transfer. (3) Cross-listed as MEGR 8112. Prerequisite: MEGR 3116 or equivalent. Fundamentals of radiation heat transfer, analysis of gray body and wavelength dependent systems; radiation from gases at high temperature, and particulate-laden gases; combined radiation and

conduction. Credit will not be awarded for MEGR 7112 where credit has been awarded for MEGR 8112.

MEGR 7113. Dynamics and Thermodynamics of Compressible Flow. (3) Cross-listed as MEGR 8113.

Prerequisites: MEGR 3111 and MEGR 3114, or equivalents. Compressible flow equations, isentropic flow, normal shock waves, Fanno and Rayleigh line flows. Nonsteady one dimensional flow. Credit will not be awarded for MEGR 7113 where credit has been awarded for MEGR 8113.

MEGR 7114. Advanced Fluid Mechanics. (3) Cross-listed as MEGR 8114. Prerequisite: MEGR 4112 or equivalent. Unified tensorial-theoretical treatment of the transport of mass, momentum, energy and vorticity in fluids. General theorems for inviscid and irrational flows. Viscous effects, boundary layer theory, nonlinear phenomena hydrodynamic instability and turbulence with applications. Credit will not be awarded for MEGR 7114 where credit has been awarded for MEGR 8114.

MEGR 7115. Convective Heat Transfer. (3) Cross-listed as MEGR 8115. Prerequisites: MEGR 3116 and MEGR 4112, or equivalents. Heat and momentum transfer prediction in channel flows and boundary layers. Differential equation methods for fully developed and entry length laminar tube flows. Similarity solution for laminar heat transfer. Superposition methods for non-uniform boundary conditions. Integral equations of the boundary layer, approximate and semiempirical methods of solution. Credit will not be awarded for MEGR 7115 where credit has been awarded for MEGR 8115.

MEGR 7118. Thermal Environmental Engineering. (3) Cross-listed as MEGR 8118. Prerequisite: MEGR 3116 or equivalent. Application of the thermodynamic and heat transfer principles to the analysis of thermal environmental systems. Topics include:

thermodynamic properties of moist air, psychometric charts, transfer processes, heating and cooling of moist air coils, physiological effects of thermal environments, food processing and storage. Credit will not be awarded for MEGR 7118 where credit has been awarded for MEGR 8118.

MEGR 7119. Thermal Applications in Biomedical Engineering. (3) Cross-listed as MEGR 8119.

Prerequisite: permission of department. Application of thermodynamic and heat transfer principles to the analysis of biomedical systems. Topics include: thermodynamic and transport properties of biological tissue, thermoregulation, design and use of cryosurgical probes, and numerical modeling methods. Credit will not be awarded for MEGR 7119 where credit has been awarded for MEGR 8119.

MEGR 7120. Bearing Design and Lubrication. (3)

Cross-listed as MEGR 8120. Prerequisite: MEGR 3222 or equivalent. Hydrodynamic lubrication, fluid film and rolling element bearings, design and control of gas and fluid lubricated bearings. Credit will not be awarded for MEGR 7120 where credit has been awarded for MEGR 8120.

MEGR 7121. Mechanism Analysis. (3) Cross-listed as MEGR 8121. Prerequisite: MEGR 3221 or equivalent, or permission of department. Analysis of coplanar and spatial mechanisms, application of matrix methods in analysis of mechanisms, mobility analysis of mechanisms, rigid body guidance, computer-aided analysis of mechanisms. Credit will not be awarded for MEGR 7121 where credit has been awarded for MEGR 8121.

MEGR 7122. Mechanism Synthesis. (3) Cross-listed as MEGR 8122. Prerequisite: MEGR 7121 or permission of department. Synthesis of coplanar and spatial mechanisms, number and type synthesis, function generator, path generator, optimal synthesis of mechanisms, case studies in optimal design of mechanisms. Credit will not be awarded for MEGR 7122 where credit has been awarded for MEGR 8122.

MEGR 7123. Mechanical Design. (3) Cross-listed as MEGR 8123. Prerequisite: MEGR 6141 or permission of department. Impact loading on critical sections, fatigue consideration, stress concentration, fluctuating stresses, failure analysis, contact stresses, industrial case studies. Credit will not be awarded for MEGR 7123 where credit has been awarded for MEGR 8123.

MEGR 7124. Introduction to Automatic Controls. (3) Cross-listed as MEGR 8124. Prerequisite: permission of department. Emphasis on mechanical systems. Mathematical models and characteristics of control systems. Performance and stability of linear feedback systems. Root locus and frequency response techniques. State space methods. Design and compensation of control systems. Credit will not be awarded for MEGR 7124 where credit has been awarded for MEGR 8124.

MEGR 7126. Dynamics of Machinery. (3) Cross-listed as MEGR 8126. Prerequisite: MEGR 3221 or equivalent, or permission of department. Application of dynamics of machinery, balancing of rigid and flexible rotors. Dynamics of spatial mechanisms. Computer-aided dynamic analysis of machinery. Credit will not be awarded for MEGR 7126 where credit has been awarded for MEGR 8126.

MEGR 7127. Computer-Aided Manufacturing. (3) Cross-listed as MEGR 8127. Prerequisite: MEGR 3255 or permission of department. Topics include: flowline production, numerical control, computer-

aided process monitoring and control, group technology, flexible manufacturing, and material requirement planning. Credit will not be awarded for MEGR 7127 where credit has been awarded for MEGR 8127.

MEGR 7128. Control of Robotic Manipulators. (3)

Cross-listed as ECGR 5161 and MEGR 8128. Prerequisite: MEGR 4127, ECGR 4151, or equivalent. Control of industrial robots including linear, nonlinear, and adaptive control of the motion of robots; plus control of forces and torques exerted by the end-effector. Additional topics include computer animation of the controlled behavior of industrial robots, actuators and sensors, robot vision and artificial intelligence, and control computer/robot interfacing. Credit will not be awarded for MEGR 7128 where credit has been awarded for MEGR 8128.

MEGR 7129. Structural Dynamics of Production Machinery. (3)

Cross-listed as MEGR 8129. Prerequisite: permission of department. The analytical study of dynamic characteristics of production machinery and the corresponding measurement, specification, and effects on machine performance. Machine tool vibration, machine tool stability, high speed machining. Credit will not be awarded for MEGR 7129 where credit has been awarded for MEGR 8129.

MEGR 7142. Theory of Elasticity II. (3) Cross-listed as MEGR 8142. Prerequisite: MEGR 6141 and MATH 6172. Continuation of MEGR 6141 with additional topics in three-dimensional analyses. Topics include: complex variable techniques, variational methods and numerical techniques. Credit will not be awarded for MEGR 7142 where credit has been awarded for MEGR 8142.

MEGR 7143. Inelastic Behavior of Materials. (3)

Cross-listed as MEGR 8143. Prerequisite: MEGR 6141 or permission of department. Introduction to plasticity and linear viscoelasticity. Topics include: a study of yield criteria, plastic stress-strain relations, plastic hinge analysis, discrete viscoelastic models, the hereditary integral and selected boundary value problems. Credit will not be awarded for MEGR 7143 where credit has been awarded for MEGR 8143.

MEGR 7145. Advanced Topics in Dynamics. (3)

Cross-listed as MEGR 8145. Prerequisite: permission of department. Selected advanced topics in dynamics such as Lagrangian dynamics, vibrations of continuous media, stress wave propagation, and motion measurement. Credit will not be awarded for MEGR 7145 where credit has been awarded for MEGR 8145.

MEGR 7146. Experimental Stress Analysis. (3) Cross-listed as MEGR 8146. Prerequisite: MEGR 6141 or permission of department. Theoretical and experimental techniques of stress and strain analysis, with experimental emphasis on strain gages and instrumentation. Brittle coatings and photoelasticity are also considered. Two lectures and a two-hour lab per week. Credit will not be awarded for MEGR 7146 where credit has been awarded for MEGR 8146.

MEGR 7161. Atomic Processes in Solids. (3) Cross-listed as MEGR 8161. Prerequisite: MEGR 2144 or equivalent, or permission of department. Processes dependent on large- and small-scale atomic motions leading to changes in material structures and properties. Theories of diffusion controlled and diffusionless transformations. Modern concepts in structure and property control. Credit will not be awarded for MEGR 7161 where credit has been awarded for MEGR 8161.

MEGR 7164. Diffraction/Spectroscopic Studies of Matter. (3) Cross-listed as MEGR 8164. Prerequisite: permission of department. Atomic arrangements in crystalline and non-crystalline forms of matter. Symmetry properties of crystals. Treatment of diffraction theory and experimental methods. X-ray diffraction and spectroscopic analysis of matter. Credit will not be awarded for MEGR 7164 where credit has been awarded for MEGR 8164.

MEGR 7165. Diffraction and NDE Methods in Materials Science. (3) Cross-listed as MEGR 8165. Prerequisites: MEGR 3161 or equivalent or permission of department. Principles of diffraction and non-destructive evaluation methods and their applications to material problems; characterization of atomic and microstructural features and process induced defects in materials; evaluation of residual stress and texture effects; phase and elemental analysis; experimental methodologies. Credit will not be awarded for MEGR 7165 where credit has been awarded for MEGR 8165.

MEGR 7166. Deformation and Fracture of Materials. (3) Cross-listed as MEGR 8168. Prerequisite: permission of department. Macroscopic and microscopic aspects of elastic and plastic deformation and fracture; applications of dislocation theory to an interpretation and control of mechanical properties; temperature, strain rate and texture effects. Credit will not be awarded for MEGR 7166 where credit has been awarded for MEGR 8166.

MEGR 7167. Mechanical Behavior of Materials II. (3) Cross-listed as MEGR 8167. Prerequisite: MEGR 6166 or equivalent. Continuation of MEGR 6166. Topics include: further treatments of dislocation theory and its applications; analysis of fatigue and creep phenomena; strength of polymers and composites;

statistical treatment of strength; materials design and failure analysis. Credit will not be awarded for MEGR 7167 where credit has been awarded for MEGR 8167.

MEGR 7172. Computational Methods in Engineering. (3) Cross-listed as MEGR 8172. Prerequisite: MATH 6171 or permission of department. Numerical linear algebra, solution of systems of equations, numerical integration, differentiation and interpolation, root finding, numerical solution of partial differential equations by finite difference and finite element methods. Credit will not be awarded for MEGR 7172 where credit has been awarded for MEGR 8172.

MEGR 7182. Machine Tool Metrology. (3) Cross-listed as MEGR 8182. Prerequisites: MEGR 2180 or equivalent, MEGR 3281, and MEGR 6181. Machine tool accuracy and performance testing. Modeling and measurement of volumetric accuracy using parametric error separation and quasi-static error models. Use of homogeneous transformations for error mapping. Linear and higher order thermal models. Error budgeting and management. Axis of rotation metrology, spindle accuracy, and cutting performance tests. Laboratory experience on CNC machine tools using heterodyne laser interferometers, capacitance gages, and other computer assisted sensor systems for machine checking. Credit will not be awarded for MEGR 7182 where credit has been awarded for MEGR 8182.

MEGR 7183. Design of Precision Machines and Instruments I. (3) Cross-listed as MEGR 8183. Prerequisites: MEGR 3221 or equivalent, and MEGR 7182. Basic patterns in the design of precision machines and instruments. Design process, error assessment and examples, materials, sensors, drives, and controls for precision machines. Machine frames, sliding and rolling element bearings, flexures, hydrostatic bearings. Design methodology, analysis of potential design, design case studies, and modeling of design alternatives. Credit will not be awarded for MEGR 7183 where credit has been awarded for MEGR 8183.

MEGR 7184. Design of Precision Machines and Instruments II. (3) Cross-listed as MEGR 8184. Prerequisite: MEGR 7183. Continuation of MEGR 7183. Application of principles, methodology, and analysis to specific design problems. Management of design. Students design machine components, subsystems or whole instruments either individually or as members of design teams. Critical design reviews are conducted. Designs are quantitatively analyzed for conformance to design specifications and intent. Credit will not be awarded for MEGR 7184 where credit has been awarded for MEGR 8184.

MEGR 7281. Theory and Application of Computer-Aided Tolerancing. (3)

Cross-listed as MEGR 8281. Prerequisite: permission of department. Theory of geometric tolerance representation, analysis, and synthesis. Applications of geometric tolerances for design function and efficient metrology. Laboratory experience with mechanical design and tolerance analysis software. Implementation projects for tolerance analysis and synthesis. Credit will not be awarded for MEGR 7281 where credit has been awarded for MEGR 8281.

MEGR 7282. Computer-Aided Process Planning. (3)

Cross-listed as MEGR 8282. Prerequisite: permission of department. Theory and computing methods for the specification, manufacture, and verification of manufactured artifacts with a particular emphasis on precision engineering applications. Representation of engineering designs. Feature recognition. Generation of manufacturing and metrology instructions. Computer software implementation projects. Credit will not be awarded for MEGR 7282 where credit has been awarded for MEGR 8282.

MEGR 7283. Advanced Coordinate Metrology. (3)

Cross-listed as MEGR 8283. Prerequisite: MEGR 6181 or permission of department. Error compensation of coordinate measuring machines, algorithms and sampling methods used in data analysis. Probing systems, compensation of probing errors. Scanning coordinate measuring machines and their dynamic behavior. Performance testing of coordinate measuring machines. Credit will not be awarded for MEGR 7283 where credit has been awarded for MEGR 8283.

MEGR 7284. Advanced Surface Metrology. (3)

Cross-listed as MEGR 8284, OPTI 6384, and OPTI 8384. Prerequisite: MEGR 6181 or permission of department. Constituents of surface texture, stylus, optical, atomic force microscope and other advanced methods of measuring surface texture. Two and three dimensional measurement of surfaces. Separation of form, waviness and roughness. Random process analysis techniques, use of transforms for filtering. Numerical evaluation of surface texture. Use of surface texture as fingerprint of the process. Relationship between function and surface texture. Credit will not be awarded for MEGR 7284 where credit has been awarded for MEGR 8284.

MEGR 7380. Tribology. (3) Cross-listed as MEGR 8380. Prerequisite: permission of department. Surface properties and study of surfaces in contact. Friction and wear of materials. Tribological properties of solid materials. Fluid lubricated journal bearings, lubrication of highly loaded contacts, lubricating systems and bearing selection. Credit will not be

awarded for MEGR 7380 where credit has been awarded for MEGR 8380.

MEGR 7480. Advanced Manufacturing Processes and Equipment. (3)

Cross-listed as MEGR 8480. Prerequisite: permission of department. Detailed analytical treatment of manufacturing materials and processes. Forming processes (forging, extrusion, rolling, drawing, bending, shearing), casting processes, metal cutting processes (turning, boring, drilling, shaping, milling), tool materials, joining processes, automation. Credit will not be awarded for MEGR 7480 where credit has been awarded for MEGR 8480.

MEGR 7892. Individual Study and Projects. (1-6)

Cross-listed as MEGR 8892. Individual investigation and exposition of results. *May be repeated for credit.*

MEGR 7893. Advanced Topics in Precision Engineering. (3)

Cross-listed as MEGR 8893. Prerequisite: permission of department. Topics include: precision control, materials for precision engineering, precision manufacturing, precision measurement, advanced analytical and numerical methods used in precision engineering. *May be repeated for credit with change of topic and permission of department.*

MEGR 7991. Graduate Master Thesis Research. (1-6)

Individual investigation culminating in the preparation and presentation of a thesis. *Graded on a Pass/Unsatisfactory basis. May be repeated for credit.*

Note: 8000-level courses are for Ph.D. students only

MEGR 8000. Research Seminar. (1) Presentations on the current research in Mechanical Engineering, Engineering Science, and related fields. Required for all doctoral students in the MEES program. *Graded on a Pass/Unsatisfactory basis. May be repeated for credit.*

MEGR 8090. Special Topics. (1-6) Directed study of current topics of special interest for Ph.D. degree. *May be repeated for credit.*

MEGR 8101. Transport Processes. (3) Cross-listed as MEGR 7101. Prerequisite: permission of department. Unified field theory approach to the fluid transport of momentum, energy, mass and electrical charge. Statistical theories of turbulence and molecular transport. Multiphase systems, chemically reacting flows, ionized fluids, separation processes. Credit will not be awarded for MEGR 8101 where credit has been awarded for MEGR 7101.

MEGR 8102. Introduction to Continua. (3) Cross-listed as MEGR 7102. Prerequisites: MEGR 2144,

MEGR 3114, or permission of department. A unified treatment of those topics which are common to all continua. Stress, deformation and velocity fields, constitutive equations and field equations. Representative applications in solid, fluid and electromagnetic continua, including interaction problems. Credit will not be awarded for MEGR 8102 where credit has been awarded for MEGR 7102.

MEGR 8104. Fabrication of Nanomaterials. (3)

Cross-listed as ECGR 7104 and MEGR 7104. Prerequisite: NANO 8101 or permission of instructor. Lithographic methods (CVD, PVD, e-beam, ion beam, magnetron, evaporation, spin coating, mask fabrication, developing resists); microelectromechanical systems and nanoelectromechanical systems; limits of conventional mechanical processing, electroforming, growth mechanisms (organic, inorganic, thermal); powders. Credit will not be awarded for MEGR 8104 where credit has been awarded for ECGR 7104 or MEGR 7104.

MEGR 8108. Finite Element Analysis and Applications. (3)

Cross-listed as MEGR 7108. Prerequisites: MEGR 6141 and MATH 6171 or permission of department. An introduction to the finite element method and its application to engineering problems. Application of the displacement methods to plane stress, plane strain, plate bending and axisymmetrical bodies. Topics may include but are not limited to: dynamics, heat conduction, and structural mechanics. Credit will not be awarded for MEGR 8108 where credit has been awarded for MEGR 7108.

MEGR 8109. Biotechnology and Bioengineering. (3)

Cross-listed as MEGR 8109. Prerequisite: admission to a graduate program or permission of instructor(s). This interdisciplinary course discusses key issues in device design, and heat and mass transport with cell biology, molecular biology, and physiology to introduce students to technological innovations in biotechnology and bioengineering. Credit will not be awarded for MEGR 8109 where credit has been awarded for MEGR 6109.

MEGR 8110. Advanced Conductive Heat Transfer. (3)

Cross-listed as MEGR 8110. Prerequisite: MEGR 3116. Theory of steady and unsteady heat conduction in isotropic and anisotropic media. Treatment of concentrated and distributed heat sources. Application of the finite difference and finite element methods. Credit will not be awarded for MEGR 8110 where credit has been awarded for MEGR 7110.

MEGR 8111. Advanced Engineering

Thermodynamics. (3) Cross-listed as MEGR 7111.

Prerequisites: MEGR 3112 and MATH 3142.

Postulational treatment of the laws of thermodynamics. Equilibrium and maximum entropy postulates. Development of formal relationships and principles for general systems. Applications to chemical, magnetic, electric, and elastic systems. Credit will not be awarded for MEGR 8111 where credit has been awarded for MEGR 7111.

MEGR 8112. Radiative Heat Transfer. (3)

Cross-listed as MEGR 7112. Prerequisite: MEGR 3116. Fundamentals of radiation heat transfer, analysis of gray body and wavelength dependent systems; radiation from gases at high temperature, and particulate-laden gases; combined radiation and conduction. Credit will not be awarded for MEGR 8112 where credit has been awarded for MEGR 7112.

MEGR 8113. Dynamics and Thermodynamics of Compressible Flow. (3)

Cross-listed as MEGR 7113. Prerequisites: MEGR 3111 and MEGR 3114. Compressible flow equations, isentropic flow, normal shock waves, Fanno and Rayleigh line flows. Nonsteady one dimensional flow. Credit will not be awarded for MEGR 8113 where credit has been awarded for MEGR 7113.

MEGR 8114. Advanced Fluid Mechanics. (3)

Cross-listed as MEGR 7114. Prerequisite: MEGR 4112 or permission of department. Unified tensorial-theoretical treatment of the transport of mass, momentum, energy and vorticity in fluids. General theorems for inviscid and irrational flows. Viscous effects, boundary layer theory, nonlinear phenomena hydrodynamic instability and turbulence with applications. Credit will not be awarded for MEGR 8114 where credit has been awarded for MEGR 7114.

MEGR 8115. Convective Heat Transfer. (3)

Cross-listed as MEGR 7115. Prerequisites: MEGR 3116 and MEGR 4112. Heat and momentum transfer prediction in channel flows and boundary layers. Differential equation methods for fully developed and entry length laminar tube flows. Similarity solution for laminar heat transfer. Superposition methods for non-uniform boundary conditions. Integral equations of the boundary layer, approximate and semiempirical methods of solution. Credit will not be awarded for MEGR 8115 where credit has been awarded for MEGR 7115.

MEGR 8116. Fundamentals of Heat Transfer and Fluid Flow. (3)

Cross-listed as MEGR 6116. Prerequisite: MEGR 3114 or permission of department. A unified treatment of transfer operations developed in terms of physical rate processes; formulation and solution of typical boundary value problems associated with heat, mass and momentum

transfer. Credit will not be awarded for MEGR 8116 where credit has been awarded for MEGR 6116.

MEGR 8118. Thermal Environmental Engineering. (3)

Cross-listed as MEGR 7118. Prerequisite: MEGR 3116. Application of the thermodynamic and heat transfer principles to the analysis of thermal environmental systems. Topics include: thermodynamic properties of moist air, psychometric charts, transfer processes, heating and cooling of moist air coils, physiological effects of thermal environments, food processing and storage. Credit will not be awarded for MEGR 8118 where credit has been awarded for MEGR 7118.

MEGR 8119. Thermal Applications in Biomedical Engineering. (3)

Cross-listed as MEGR 7119. Prerequisite: permission of department. Application of thermodynamic and heat transfer principles to the analysis of biomedical systems. Topics include: thermodynamic and transport properties of biological tissue, thermoregulation, design and use of cryosurgical probes, and numerical modeling methods. Credit will not be awarded for MEGR 8119 where credit has been awarded for MEGR 7119.

MEGR 8120. Bearing Design and Lubrication. (3)

Cross-listed as MEGR 7120. Prerequisite: MEGR 3222 or permission of department. Hydrodynamic lubrication, fluid film and rolling element bearings, design and control of gas and fluid lubricated bearings. Credit will not be awarded for MEGR 8120 where credit has been awarded for MEGR 7120.

MEGR 8121. Mechanism Analysis. (3) Cross-listed as MEGR 7121. Prerequisite: MEGR 3221 or permission of department. Analysis of coplanar and spatial mechanisms, application of matrix methods in analysis of mechanisms, mobility analysis of mechanisms, rigid body guidance, computer-aided analysis of mechanisms. Credit will not be awarded for MEGR 8121 where credit has been awarded for MEGR 7121.

MEGR 8122. Mechanism Synthesis. (3) Cross-listed as MEGR 7122. Prerequisite: MEGR 7121, MEGR 8121, or permission of department. Synthesis of coplanar and spatial mechanisms, number and type synthesis, function generator, path generator, optimal synthesis of mechanisms, case studies in optimal design of mechanisms. Credit will not be awarded for MEGR 8122 where credit has been awarded for MEGR 7122.

MEGR 8123. Mechanical Design. (3) Cross-listed as MEGR 7123. Prerequisite: MEGR 6141 or permission of department. Impact loading on critical sections, fatigue consideration, stress concentration, fluctuating stresses, failure analysis, contact stresses, industrial

case studies. Credit will not be awarded for MEGR 8123 where credit has been awarded for MEGR 7123.

MEGR 8124. Introduction to Automatic Controls. (3)

Cross-listed as MEGR 7124. Prerequisite: permission of department. Emphasis on mechanical systems. Mathematical models and characteristics of control systems. Performance and stability of linear feedback systems. Root locus and frequency response techniques. State space methods. Design and compensation of control systems. Credit will not be awarded for MEGR 8124 where credit has been awarded for MEGR 7124.

MEGR 8125. Vibrations of Continuous Systems. (3)

Cross-listed as MEGR 6125. Prerequisite: MEGR 4143. Analysis of vibration of continuous linear elastic structures such as strings, rods, beams and plates with varying boundary conditions. Approximate solution techniques such as Rayleigh, Rayleigh-Ritz, and Galerkin are presented. Credit will not be awarded for MEGR 8125 where credit has been awarded for MEGR 6125.

MEGR 8126. Dynamics of Machinery. (3) Cross-listed as MEGR 7126. Prerequisite: MEGR 3222 or permission of department. Application of dynamics of machinery, balancing of rigid and flexible rotors. Dynamics of spatial mechanisms. Computer-aided dynamic analysis of machinery. Credit will not be awarded for MEGR 8126 where credit has been awarded for MEGR 7126.

MEGR 8127. Computer-Aided Manufacturing. (3)

Cross-listed as MEGR 7127. Prerequisite: MEGR 3255 or permission of department. Topics include: flowline production, numerical control, computer-aided process monitoring and control, group technology, flexible manufacturing, and material requirement planning. Credit will not be awarded for MEGR 8127 where credit has been awarded for MEGR 7127.

MEGR 8128. Control of Robotic Manipulators. (3)

Cross-listed as ECGR 5161 and MEGR 7128. Prerequisite: MEGR 4127 or ECGR 4151. Control of industrial robots including linear, nonlinear, and adaptive control of the motion of robots; plus control of forces and torques exerted by the end-effector. Additional topics include computer animation of the controlled behavior of industrial robots, actuators and sensors, robot vision and artificial intelligence, and control computer/robot interfacing. Credit will not be awarded for MEGR 8128 where credit has been awarded for MEGR 7128.

MEGR 8129. Structural Dynamics of Production Machinery. (3)

Cross-listed as MEGR 7129. Prerequisite: permission of department. The

analytical study of dynamic characteristics of production machinery and the corresponding measurement, specification, and effects on machine performance. Machine tool vibration, machine tool stability, high speed machining. Credit will not be awarded for MEGR 8129 where credit has been awarded for MEGR 7129.

MEGR 8141. Theory of Elasticity I. (3) Cross-listed as MEGR 6141. Prerequisite: MEGR 3221 or permission of department. Introduction to the theory of elastic media; the fundamentals of stress, strain, stress-strain relationships, compatibility and equilibrium. Applications to two- and three-dimensional problems. Structural mechanics and energy methods. Credit will not be awarded for MEGR 8141 where credit has been awarded for MEGR 6141.

MEGR 8142. Theory of Elasticity II. (3) Cross-listed as MEGR 7142. Prerequisite: MEGR 6141 and MATH 6172. Continuation of MEGR 8141 with additional topics in three-dimensional analyses. Topics include: complex variable techniques, variational methods and numerical techniques. Credit will not be awarded for MEGR 8142 where credit has been awarded for MEGR 7142.

MEGR 8143. Inelastic Behavior of Materials. (3) Cross-listed as MEGR 7143. Prerequisite: MEGR 8141 or permission of department. Introduction to plasticity and linear viscoelasticity. Topics include: a study of yield criteria, plastic stress-strain relations, plastic hinge analysis, discrete viscoelastic models, the hereditary integral and selected boundary value problems. Credit will not be awarded for MEGR 8143 where credit has been awarded for MEGR 7143.

MEGR 8145. Advanced Topics in Dynamics. (3) Cross-listed as MEGR 7145. Prerequisite: permission of department. Selected advanced topics in dynamics such as Lagrangian dynamics, vibrations of continuous media, stress wave propagation, and motion measurement. Credit will not be awarded for MEGR 8145 where credit has been awarded for MEGR 7145.

MEGR 8146. Experimental Stress Analysis. (3) Cross-listed as MEGR 7146. Prerequisite: MEGR 8141 or permission of department. Theoretical and experimental techniques of stress and strain analysis, with experimental emphasis on strain gages and instrumentation. Brittle coatings and photoelasticity are also considered. Two lectures and a two-hour lab per week. Credit will not be awarded for MEGR 8146 where credit has been awarded for MEGR 7146.

MEGR 8161. Atomic Processes in Solids. (3) Cross-listed as MEGR 7161. Prerequisite: MEGR 2144 or permission of department. Processes dependent on

large- and small-scale atomic motions leading to changes in material structures and properties. Theories of diffusion controlled and diffusionless transformations. Modern concepts in structure and property control. Credit will not be awarded for MEGR 8161 where credit has been awarded for MEGR 7161.

MEGR 8164. Diffraction/Spectroscopic Studies of Matter. (3) Cross-listed as MEGR 7164. Prerequisite: permission of department. Atomic arrangements in crystalline and non-crystalline forms of matter. Symmetry properties of crystals. Treatment of diffraction theory and experimental methods. X-ray diffraction and spectroscopic analysis of matter. Credit will not be awarded for MEGR 8164 where credit has been awarded for MEGR 7164.

MEGR 8165. Diffraction and NDE Methods in Materials Science. (3) Cross-listed as MEGR 7165. Prerequisites: MEGR 3161 or equivalent or permission of department. Principles of diffraction and non-destructive evaluation methods and their applications to material problems; characterization of atomic and microstructural features and process induced defects in materials; evaluation of residual stress and texture effects; phase and elemental analysis; experimental methodologies. Credit will not be awarded for MEGR 8165 where credit has been awarded for MEGR 7165.

MEGR 8166. Mechanical Behavior of Materials I. (3) Cross-listed as MEGR 6166. Prerequisite: MEGR 3161 or equivalent or permission of department. Macroscopic and microscopic aspects of elastic and plastic deformation and fracture of engineering materials; applications of dislocation theory to an interpretation and control of mechanical properties; temperature, strain rate and texture effects. Credit will not be awarded for MEGR 8166 where credit has been awarded for MEGR 6166.

MEGR 8167. Mechanical Behavior of Materials II. (3) Cross-listed as MEGR 7167. Prerequisite: MEGR 6166 or equivalent. Continuation of MEGR 8166. Topics include: further treatments of dislocation theory and its applications; analysis of fatigue and creep phenomena; strength of polymers and composites; statistical treatment of strength; materials design and failure analysis. Credit will not be awarded for MEGR 8167 where credit has been awarded for MEGR 6167.

MEGR 8168. Deformation and Fracture of Materials. (3) Cross-listed as MEGR 7166. Prerequisite: permission of department. Macroscopic and microscopic aspects of elastic and plastic deformation and fracture; applications of dislocation theory to an interpretation and control of mechanical properties; temperature, strain rate and texture effects. Credit will

not be awarded for MEGR 8168 where credit has been awarded for MEGR 7166.

MEGR 8172. Computational Methods in Engineering.

(3) Cross-listed as MEGR 7172. Prerequisite: MATH 6171 or permission of department. Numerical linear algebra, solution of systems of equations, numerical integration, differentiation and interpolation, root finding, numerical solution of partial differential equations by finite difference and finite element methods. Credit will not be awarded for MEGR 8172 where credit has been awarded for MEGR 7172.

MEGR 8181. Engineering Metrology. (3) Cross-listed as MEGR 6181, OPTI 6381, and OPTI 8381.

Prerequisite: MEGR 3282 or equivalent. Introduction to metrology and standards. Uncertainty, precision and accuracy in metrology. Measurement of size and form, computational methods in measurement of form. Measurement of surface texture and out of roundness. Machine tool and robot accuracy and calibration. Evaluation of screw threads and gears. Introduction to design of precision instruments. Credit will not be awarded for MEGR 8181 where credit has been awarded for MEGR 6181.

MEGR 8182. Machine Tool Metrology. (3) Cross-listed as MEGR 7182. Prerequisites: MEGR 2180, MEGR 3281, and MEGR 6181. Machine tool accuracy and performance testing. Modeling and measurement of volumetric accuracy using parametric error separation and quasi-static error models. Use of homogeneous transformations for error mapping. Linear and higher order thermal models. Error budgeting and management. Axis of rotation metrology, spindle accuracy, and cutting performance tests. Laboratory experience on CNC machine tools using heterodyne laser interferometers, capacitance gages, and other computer assisted sensor systems for machine checking. Credit will not be awarded for MEGR 8182 where credit has been awarded for MEGR 7182.

MEGR 8183. Design of Precision Machines and Instrument I. (3) Cross-listed as MEGR 7183.

Prerequisites: MEGR 3221 and MEGR 8182. Basic patterns in the design of precision machines and instruments. Design process, error assessment and examples, materials, sensors, drives, and controls for precision machines. Machine frames, sliding and rolling element bearings, flexures, hydrostatic bearings. Design methodology, analysis of potential design, design case studies, and modeling of design alternatives. Credit will not be awarded for MEGR 8183 where credit has been awarded for MEGR 7183.

MEGR 8184. Design of Precision Machines and Instrument II. (3) Cross-listed as MEGR 7184.

Prerequisite: MEGR 8183. Continuation of MEGR

8183. Application of principles, methodology, and analysis to specific design problems. Management of design. Students design machine components, subsystems or whole instruments either individually or as members of design teams. Critical design reviews are conducted. Designs are quantitatively analyzed for conformance to design specifications and intent. Credit will not be awarded for MEGR 8184 where credit has been awarded for MEGR 7184.

MEGR 8281. Theory and Application of Computer-Aided Tolerancing. (3) Cross-listed as MEGR 7281.

Prerequisite: permission of department. Theory of geometric tolerance representation, analysis, and synthesis. Applications of geometric tolerances for design function and efficient metrology. Laboratory experience with mechanical design and tolerance analysis software. Implementation projects for tolerance analysis and synthesis. Credit will not be awarded for MEGR 8281 where credit has been awarded for MEGR 7281.

MEGR 8282. Computer-Aided Process Planning. (3)

Cross-listed as MEGR 7282. Prerequisite: permission of department. Theory and computing methods for the specification, manufacture, and verification of manufactured artifacts with a particular emphasis on precision engineering applications. Representation of engineering designs. Feature recognition. Generation of manufacturing and metrology instructions. Computer software implementation projects. Credit will not be awarded for MEGR 8282 where credit has been awarded for MEGR 7282.

MEGR 8283. Advanced Coordinate Metrology. (3)

Cross-listed as MEGR 7283. Prerequisite: MEGR 6181 or permission of department. Error compensation of coordinate measuring machines, algorithms and sampling methods used in data analysis. Probing systems, compensation of probing errors. Scanning coordinate measuring machines and their dynamic behavior. Performance testing of coordinate measuring machines. Credit will not be awarded for MEGR 8283 where credit has been awarded for MEGR 7283.

MEGR 8284. Advanced Surface Metrology. (3)

Cross-listed as MEGR 7284, OPTI 6384, and OPTI 8384. Prerequisite: MEGR 6181 or permission of department. Constituents of surface texture, stylus, optical, atomic force microscope and other advanced methods of measuring surface texture. Two and three dimensional measurement of surfaces. Separation of form, waviness and roughness. Random process analysis techniques, use of transforms for filtering. Numerical evaluation of surface texture. Use of surface texture as fingerprint of the process. Relationship between function and surface texture.

Credit will not be awarded for MEGR 8284 where credit has been awarded for MEGR 7284.

MEGR 8380. Tribology. (3) Cross-listed as MEGR 7380. Prerequisite: permission of department. Surface properties and study of surfaces in contact. Friction and wear of materials. Tribological properties of solid materials. Fluid lubricated journal bearings, lubrication of highly loaded contacts, lubricating systems and bearing selection. Credit will not be awarded for MEGR 8380 where credit has been awarded for MEGR 7380.

MEGR 8480. Advanced Manufacturing Processes and Equipment. (3) Cross-listed as MEGR 7480. Prerequisite: permission of department. Detailed analytical treatment of manufacturing materials and processes. Forming processes (forging, extrusion, rolling, drawing, bending, shearing), casting processes, metal cutting processes (turning, boring, drilling, shaping, milling), tool materials, joining processes, automation. Credit will not be awarded for MEGR 8480 where credit has been awarded for MEGR 7480.

MEGR 8892. Individual Study and Projects. (1-6) Cross-listed as MEGR 7892. Individual investigation and exposition of results. *May be repeated for credit.*

MEGR 8893. Advanced Topics in Precision Engineering. (3) Cross-listed as MEGR 7893. Prerequisite: permission of department. Topics include: precision control, materials for precision engineering, precision manufacturing, precision measurement, advanced analytical and numerical methods used in precision engineering. *May be repeated for credit with change of topic and permission of department.* Credit will not be awarded for MEGR 8893 where credit has been awarded for MEGR 7893.

MEGR 8990. Industrial Internship. (1-3) Cross-listed as MEGR 6990. Prerequisite: Completion of nine hours of graduate coursework. Full- or part-time academic year internship in engineering complementary to the major course of studies and designed to allow theoretical and course-based practical learning to be applied in a supervised industrial experience. Each student's program must be approved by their graduate program director. Requires a mid-term report and final report to be graded by the supervising faculty.

MEGR 8999. Doctoral Dissertation Research. (1-9) Individual investigation culminating in the preparation and presentation of a doctoral dissertation. *Graded on a Pass/Unsatisfactory basis. May be repeated for credit.*

Systems Engineering and Engineering Management

- **M.S. in Engineering Management**
- **Graduate Certificate in Energy Analytics**
- **Graduate Certificate in Lean Six Sigma**
- **Graduate Certificate in Logistics and Supply Chains**
- **Graduate Certificate in Systems Analytics**

Department of Systems Engineering and Engineering Management
seem.uncc.edu

Graduate Program Director
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Dr. Alfred D'Ambrosio, Adjunct Professor
Dr. Arnie de Castro, Adjunct Professor
Dr. Tao Hong, Assistant Professor
Dr. Simon Hsiang, Department Chair and Professor
Dr. Churlzu Lim, Associate Professor
Dr. Srijib Mukherjee, Adjunct Professor
Dr. Mike Ogle, Assistant Professor
Dr. Agnes Galambosi Ozelkan, Adjunct Professor
Dr. Ertunga C. Ozelkan, Professor
Dr. Yesim Sireli, Associate Professor
Dr. S. Gary Teng, Professor

MASTER OF SCIENCE IN ENGINEERING MANAGEMENT

The Master of Science Degree in Engineering Management (MSEM) program prepares professionals for careers in managing projects, programs, systems, and organizations. Industrial, research, consulting, and commercial firms now demand engineering managers with both cutting-edge technical competence and the management skills necessary to forge linkages with the systems and business sides of these organizations. These managers must be able to form and manage high performance teams and

manage business and technological operations. The program of study is necessarily multidisciplinary, combining elements of advanced study in various engineering disciplines with studies of business and system operations and organizational behavior.

Admission Requirements

In addition to the general requirements for admission to the Graduate School, the Engineering Management program seeks the following from applicants to the M.S. in Engineering Management program:

- 1) Either a bachelor's degree in engineering or a closely related technical or scientific field, or a bachelor's degree in business, provided relevant technical course requirements have been met
- 2) Undergraduate coursework in engineering economics, calculus, or statistics
- 3) An average grade of 3.0 (on a 4.0 scale)
- 4) GRE or GMAT*

*GRE Waiver conditions:

- Applicants with more than 2 years of relevant industry experience and a bachelor's degree in engineering from a U.S. ABET accredited school
- Applicants who have completed an SEEM Graduate Certificate Program with a GPA of 3.6 or above

Documents to be Submitted for Admission

- 1) Transcript(s) showing a baccalaureate degree in engineering, engineering technology, or a scientific discipline, or a baccalaureate degree in business administration from an accredited college or university
- 2) A satisfactory score on the General Test of the GRE or GMAT
- 3) Written descriptions of any relevant and significant work experience
- 4) Applicants whose native language is not English will need to satisfy the UNC Charlotte Graduate School's English proficiency requirements

Early Entry Program

Undergraduate students with a GPA of 3.2 or above and with at least 75 credit hours completed toward a baccalaureate degree in Engineering or Engineering Technology at UNC Charlotte may be admitted to the M.S. in Engineering Management program as an Early Entry student provided they meet all other requirement of admission except the first item of the admission requirements.

Entry from SEEM Graduate Certificate Programs

Students who have completed one of the graduate certificates in Systems Engineering and Engineering

Management (SEEM) at UNC Charlotte can apply for admission for the MSEM Program. They are eligible to transfer their graduate certificate course credits if they received a B or above. The GRE requirement is waived for students who graduated from the SEEM Graduate Certificate Program with a GPA of 3.6 or above.

Degree Requirements

A total of 31 credit hours of approved graduate work is required, within one of two options:

Option 1: Project

Successful completion of 28 credit hours of graduate-level coursework and 3 credit hours of engineering management project work.

- 1) **Coursework** - The 28 credit hours of graduate-level coursework must include four core courses (10 credit hours) and six additional courses (18 credit hours) from an approved list of electives.
- 2) **Plan of Study** - students must meet with their advisor to formulate a plan of study and get the committee's approval. The plan of study must be submitted after completing at least 9 but no more than 18 credit hours. Students may declare up to two concentrations such as Energy Systems, Systems Engineering, Lean Six Sigma, or Logistics and Supply Chains.
- 3) **Admission to Candidacy**
- 4) **Oral Exam** - Students must pass an oral exam during the presentation of the project that is administered by the project committee.

Students who do not have the required background in fundamental concepts in engineering economics and/or statistics are required to take the following course in addition to the 31 credit hours required for an M.S. in Engineering Management degree:

EMGT 6101 Engineering Management Fundamentals
(3) (*Course credit does not count towards degree requirement*)

Option 2: Thesis

Successful completion of 25 credit hours of graduate-level coursework and 6 credit hours of thesis research.

- 1) **Coursework** - The 25 credit hours of graduate-level coursework must include four core courses (10 credit hours) and five additional courses (15 credit hours) from an approved list of electives.
- 2) **Plan of Study** - Students must meet with their advisor to formulate a plan of study and get the committee's approval. The plan of study must be submitted after completing at least 9 but no more than 18 credit hours. Students may declare up to two concentrations such as Energy Systems,

Systems Engineering, Lean Six Sigma, or Logistics and Supply Chains.

3) **Admission to Candidacy**

- 4) **Thesis Defense** - a copy of the thesis should be distributed to each member of the program committee at least two weeks prior to the defense. Students should make a public announcement of the defense within the department to allow attendance by interested faculty members and students.

Students who do not have the required background in fundamental concepts in engineering economics and/or statistics are required to take the following course in addition to the 31 credit hours required for an M.S. in Engineering Management degree:

EMGT 6101 Engineering Management Fundamentals (3) *(Course credit does not count towards degree requirement)*

Required Core Courses (10 credit hours)

EMGT 6980 Industrial and Technology Management Seminars (1) *(Students should complete this course within the first or second semester of the program)*

Core A – Systems Management

Select 1-2 of the following:

- EMGT 6142 Quality and Manufacturing Management (3)
 EMGT 6901 Advanced Project Management (3)
 EMGT 6904 Product and Process Design (3)
 EMGT 6920 Logistics Engineering and Management (3)
 EMGT 6924 Lean Six Sigma Practice and Management (3)
 EMGT 6930 Capital Cost Estimating (3)
 EMGT 6950 Engineering Systems Integration (3)

Core B – Systems Analytics

Select 1-2 of the following:

- EMGT 6905 Designed Experimentation (3)
 EMGT 6906 Processing Systems Simulation (3)
 EMGT 6910 Technological Forecasting and Decision-Making (3)
 EMGT 6912 Techniques and Intelligent Tools for Engineering Decision Support (3)
 EMGT 6915 Engineering Decision and Risk Analysis (3)
 EMGT 6952 Engineering Systems Optimization (3)
 EMGT 6955 Systems Reliability Engineering (3)
 EMGT 6965 Energy Analytics (3)

Concentration Courses (12 credit hours)

Energy Systems Concentration

EMGT 5961 Introduction to Energy Systems (3)

Plus three of the following:

- EMGT 5962 Energy Markets (3)
 EMGT 5963 Energy Systems Planning (3)
 EMGT 5964 Case Studies in the Energy Industry (3)
 EMGT 6965 Energy Analytics (3)

Lean Six Sigma Concentration

- EMGT 6905 Designed Experimentation (3)
 EMGT 6924 Lean Six Sigma Practice and Management (3)
 EMGT 6926 Lean Supply Networks (3)

Plus one of the following:

- EMGT 6901 Advanced Project Management (3)
 EMGT 6904 Product and Process Design (3)
 EMGT 6142 Quality and Manufacturing Management (3)

Logistics and Supply Chains Concentration

- EMGT 6920 Logistics Engineering and Management (3)
 EMGT 6926 Lean Supply Networks (3)

Plus two of the following:

- EMGT 5963 Energy Systems Planning (3)
 EMGT 6142 Quality and Manufacturing Management (3)
 MBAD 6193 Global Business Environment (3)
 MBAD 6208 Supply Chain Management (3)

Note: Based on department approval, students may request to take other graduate courses related to their selected concentration. Students are responsible for fulfilling the prerequisites of the courses they plan to take from other graduate programs.

Systems Analytics Concentration

Four courses from the following:

- EMGT 6905 Designed Experimentation (3)
 EMGT 6906 Processing Systems Simulation (3)
 EMGT 6910 Technological Forecasting and Decision-Making (3)
 EMGT 6912 Techniques and Intelligent Tools for Engineering Decision Support (3)
 EMGT 6915 Engineering Decision and Risk Analysis (3)
 EMGT 6952 Engineering Systems Optimization (3)
 EMGT 6955 Systems Reliability Engineering (3)
 EMGT 6965 Energy Analytics (3)

Interdisciplinary Elective Courses

Depending on the degree and concentration options selected, remaining credit hours may be filled by taking elective courses. Any course from the Engineering Management Program, including the ones below, may be taken as an elective course.

- EMGT 5090 Special Topics (3)
 EMGT 5150 Leadership For Engineers (3)
 EMGT 5961 Introduction to Energy Systems (3)

EMGT 5962 Energy Markets (3)
 EMGT 5963 Energy Systems Planning (3)
 EMGT 5964 Case Studies in the Energy Industry (3)
 EMGT 6090 Financial Management for Global Engineering Operations (3)
 EMGT 6090 Special Topics (3)
 EMGT 6142 Quality and Manufacturing Management (3)
 EMGT 6901 Advanced Project Management (3)
 EMGT 6902 Legal Issues in Engineering Management (3)
 EMGT 6904 Product and Process Design (3)
 EMGT 6905 Designed Experimentation (3)
 EMGT 6906 Processing Systems Simulation (3)
 EMGT 6910 Technological Forecasting and Decision-Making (3)
 EMGT 6912 Techniques and Intelligent Tools for Engineering Decision Support (3)
 EMGT 6915 Engineering Decision and Risk Analysis (3)
 EMGT 6920 Logistics Engineering and Management (3)
 EMGT 6924 Lean Six Sigma Practice and Management (3)
 EMGT 6926 Lean Supply Networks (3)
 EMGT 6930 Capital Cost Estimating (3)
 EMGT 6950 Engineering Systems Integration (3)
 EMGT 6952 Engineering Systems Optimization (3)
 EMGT 6955 Systems Reliability Engineering (3)
 EMGT 6965 Energy Analytics (3)
 EMGT 6985 Engineering Management Project (3)

Two relevant graduate courses from other programs may be taken as elective courses for the engineering management degree with approval of the SEEM program. Courses completed from other departments as part of the M.S. concentrations count towards the two allowed electives. Students are responsible for fulfilling the prerequisites of the courses they plan to take from other graduate programs.

The following are recommended MBAD courses for electives:

MBAD 6141 Operations Management (3)
 MBAD 6161 Human Behavior in Organizations (3)
 MBAD 6164 Executive Communications (3)
 MBAD 6165 Negotiation and Conflict Management (3)

Note: Students are required to have adequate preparation prior to taking the required MBAD (Master of Business Administration) courses. Traditionally, this consists of at least completing courses in engineering economics, foundations of economics, and mathematics through differential and integral calculus. Students are advantaged by having completed courses in foundations of accounting and statistics.

Admission to Candidacy

Each student is required to submit a Plan of Study to the Graduate Program Director.

Application for Degree

Students preparing to graduate must submit an online Application for Degree by the filing date specified in the University Academic Calendar. If a student does not graduate in the semester identified on the Application for Degree, then the student must update his/her Admission to Candidacy and submit a new Application for Degree for graduation in a subsequent semester.

GRADUATE CERTIFICATE IN ENERGY ANALYTICS

The Graduate Certificate in Energy Analytics is an industry-relevant certificate that provides professionals with the opportunity to reach a demonstrated level of competence in energy systems planning and deployment. Students are introduced to topics directly related to the energy industry, energy markets, and energy value chain dynamics along with planning techniques and case studies from the energy industry. The graduate certificate may act as a standalone graduate option for post-baccalaureate and post-master's students, or may be pursued concurrently with a related graduate degree program at UNC Charlotte. The 12 credit hours in the certificate may be applied toward the M.S. in Energy Management with the approval of the Program Director.

Admission Requirements

In addition to the general requirements for admission to the Graduate School, the Department of Systems Engineering and Engineering Management seeks the following:

- Either a bachelor's degree in engineering or a closely related technical or scientific field, or a bachelor's degree in business, provided relevant technical course requirements have been met
- Undergraduate coursework in engineering economics, calculus, and statistics
- Students missing any of the prerequisite courses should register for EMGT 6101 (Engineering Management Fundamentals). This course satisfies the prerequisite requirement but does not count toward the 12 credit hours in the certificate.
- An average GPA of 3.0 (out of 4.0)
- Applicants should submit written description of any relevant and significant work experience
- Applicants whose native language is not English will need to satisfy the UNC Charlotte Graduate School's English proficiency requirements

This program accepts students in Fall, Spring, and Summer semesters.

Certificate Requirements

The certificate is awarded upon completion of four graduate level courses (12 credit hours) in the area of energy analytics. The cumulative GPA must be at least 3.0 and at most one course with a grade of C may be allowed toward the certificate. Requests for related course substitutions may be approved at the discretion of the Program Director.

Course Requirements (12 credit hours)

Select four of the following:

- EMGT 5961 Introduction to Energy Systems (3)
- EMGT 5962 Energy Markets (3)
- EMGT 5963 Energy Systems Planning (3)
- EMGT 5964 Case Studies in the Energy Industry (3)
- EMGT 6965 Energy Analytics (3)

Early Entry Program

Undergraduate students with a GPA of 3.2 or above and with at least 75 credit hours completed toward a baccalaureate degree in Engineering or Engineering Technology at UNC Charlotte may be admitted as an Early Entry student provided they meet all other requirements of admission except the earned bachelor's degree.

GRADUATE CERTIFICATE IN LEAN SIX SIGMA

Addressing the need to ensure quality, the Graduate Certificate in Lean Six Sigma provides professionals with the opportunity to reach a demonstrated level of competence in the lean manufacturing and Six Sigma quality management techniques. Students learn techniques to identify and eliminate waste systematically to help companies improve their bottom line. The graduate certificate may act as a standalone graduate option for post-baccalaureate and post-master's students, or may be pursued concurrently with a related graduate degree program at UNC Charlotte. The 12 credit hours in the certificate may be applied toward the M.S. in Energy Management with the approval of the Program Director.

Admission Requirements

In addition to the general requirements for admission to the Graduate School, the Department of Systems Engineering and Engineering Management seeks the following:

- Either a bachelor's degree in engineering or a closely related technical or scientific field, or a

bachelor's degree in business, provided relevant technical course requirements have been met

- Undergraduate coursework in engineering economics, calculus, and statistics
- Students missing any of the prerequisite courses should register for EMGT 6101 (Engineering Management Fundamentals). This course satisfies the prerequisite requirement but does not count toward the 12 credit hours in the certificate.
- An average GPA of 3.0 (out of 4.0)
- Applicants should submit written description of any relevant and significant work experience
- Applicants whose native language is not English will need to satisfy the UNC Charlotte Graduate School's English proficiency requirements

This program accepts students in Fall, Spring, and Summer semesters.

Certificate Requirements

The certificate is awarded upon completion of four graduate level courses (12 credit hours) in the area of Lean Six Sigma process design, planning, and execution. The cumulative GPA must be at least 3.0, and at most one course with a grade of C may be allowed toward the certificate. Requests for related course substitutions may be approved at the discretion of the Program Director.

Course Requirements (12 credit hours)

- EMGT 6924 Lean Six Sigma Practice and Management (3)
- EMGT 6926 Lean Supply Networks (3)
- EMGT 6905 Designed Experimentation (3)

Plus one of the following:

- EMGT 6901 Advanced Project Management (3)
- EMGT 6904 Product and Process Design (3)
- EMGT 6142 Quality and Manufacturing Management (3)

Early Entry Program

Undergraduate students with a GPA of 3.2 or above and with at least 75 credit hours completed toward a baccalaureate degree in Engineering or Engineering Technology at UNC Charlotte may be admitted as an Early Entry student provided they meet all other requirements of admission except the earned bachelor's degree.

GRADUATE CERTIFICATE IN LOGISTICS AND SUPPLY CHAINS

The Graduate Certificate in Logistics and Supply Chains is a dynamic certificate that provides professionals with the opportunity to reach a demonstrated level of competence in tools and

techniques to make better decisions related to logistics and supply chain design, planning and execution. The graduate certificate may act as a standalone graduate option for post-baccalaureate and post-master's students, or may be pursued concurrently with a related graduate degree program at UNC Charlotte. The 12 credit hours in the certificate may be applied toward the M.S. in Energy Management with the approval of the Program Director.

Admission Requirements

In addition to the general requirements for admission to the Graduate School, the Department of Systems Engineering and Engineering Management seeks the following:

- Either a bachelor's degree in engineering or a closely related technical or scientific field, or a bachelor's degree in business, provided relevant technical course requirements have been met
- Undergraduate coursework in engineering economics, calculus, and statistics
- Students missing any of the prerequisite courses should register for EMGT 6101 (Engineering Management Fundamentals). This course satisfies the prerequisite requirement but does not count toward the 12 credit hours in the certificate.
- An average GPA of 3.0 (out of 4.0)
- Applicants should submit written description of any relevant and significant work experience
- Applicants whose native language is not English will need to satisfy the UNC Charlotte Graduate School's English proficiency requirements

This program accepts students in Fall, Spring, and Summer semesters.

Certificate Requirements

The certificate will be awarded upon completion of four graduate level courses (12 credit hours) in the area of logistics and supply chains. The cumulative GPA must be at least 3.0 and at most one course with a grade of C may be allowed toward the certificate. Requests for related course substitutions may be approved at the discretion of the Program Director.

Course Requirements (12 credit hours)

EMGT 6920 Logistics Engineering and Management (3)

EMGT 6926 Lean Supply Networks (3)

Plus two of the following:

EMGT 5963 Energy Systems Planning (3)

EMGT 6142 Quality and Manufacturing Management (3)

MBAD 6193 Global Business Environment (3)

MBAD 6208 Supply Chain Management (3)

Early Entry Program

Undergraduate students with a GPA of 3.2 or above and with at least 75 credit hours completed toward a baccalaureate degree in Engineering or Engineering Technology at UNC Charlotte may be admitted as an Early Entry student provided they meet all other requirements of admission except the earned bachelor's degree.

GRADUATE CERTIFICATE IN SYSTEMS ANALYTICS

This industry-relevant certificate provides professionals with the opportunity to reach a demonstrated level of competence in tools and techniques to make better decisions related to systems modeling, analysis and problem solving. The graduate certificate may act as a standalone graduate option for post-baccalaureate and post-master's students, or may be pursued concurrently with a related graduate degree program at UNC Charlotte. The 12 credit hours in the certificate may be applied toward the M.S. in Energy Management with approval of the Program Director.

Admission Requirements

In addition to the general requirements for admission to the Graduate School, the Department of Systems Engineering and Engineering Management seeks the following:

- Either a bachelor's degree in engineering or a closely related technical or scientific field, or a bachelor's degree in business, provided relevant technical course requirements have been met
- Undergraduate coursework in engineering economics, calculus, and statistics
- Students missing any of the prerequisite courses should register for EMGT 6101 (Engineering Management Fundamentals) offered online in the Second Summer session. This course satisfies the prerequisite requirement but does not count toward the 12 credit hours in the certificate.
- An average GPA of 3.0 (out of 4.0)
- Applicants should submit written description of any relevant and significant work experience.
- Applicants whose native language is not English, will need to satisfy the UNC Charlotte Graduate School's English proficiency requirements.

This program accepts students in the Fall, Spring, and Summer. Students should complete the online Graduate Application for Admission.

Certificate Requirements

The certificate is awarded upon completion of four graduate level courses (12 credit hours) in the area of systems analytics. The cumulative GPA must be at least 3.0 and at most one course with a grade of C may be allowed toward the certificate. Requests for related course substitutions may be approved at the discretion of the Program Director.

Course Requirements (12 credit hours)

Select four of the following:

- EMGT 6905 Designed Experimentation (3)
- EMGT 6906 Processing Systems Simulation (3)
- EMGT 6910 Technological Forecasting and Decision-Making (3)
- EMGT 6912 Techniques and Intelligent Tools for Engineering Decision Support (3)
- EMGT 6915 Engineering Decision and Risk Analysis (3)
- EMGT 6952 Engineering Systems Optimization (3)
- EMGT 6955 Systems Reliability Engineering (3)
- EMGT 6965 Energy Analytics (3)

Early Entry Program

Undergraduate students with a GPA of 3.2 or above and with at least 75 credit hours completed toward a baccalaureate degree in Engineering, or Engineering Technology at UNC Charlotte may be admitted as an early-entry student provided they meet all other requirements of admission except the earned bachelor's degree.

COURSES IN SYSTEMS ENGINEERING AND ENGINEERING MANAGEMENT (EMGT)

EMGT 5090. Special Topics. (1-6) Directed study of current topics of special interest. *May be repeated for credit.*

EMGT 5150. Leadership Skills for Engineers. (3)

Prerequisite: Junior standing. Overview of the skills needed to practice the most popular leadership styles in industry today. The first half of the course covers an introduction to the different styles of leadership and how they are applied by Engineers within an organization. The second half of the course covers the critical leadership skills and competencies needed to build and lead powerful teams in a global environment.

EMGT 5961. Introduction to Energy Systems. (3)

Prerequisite: Junior standing, Basic math, economics, or consent of instructor. Overview of energy systems: energy types, generation, conversion, storage, transportation/transmission, and utilization. Principles, physical structure, processes, and

utilization of fossil fuel, nuclear, and renewables for transportation, thermal, and electrical energy generation are discussed along with associated performance metrics. Also provides an introduction to environmental impacts of energy production, life-cycle analysis, energy efficiency concepts and metrics, transmission systems, grid reliability, and the impact of smart grid technologies. All topics are presented in the context of industry standards as well as federal and state regulations.

EMGT 5962. Energy Markets. (3)

Cross-listed as MBAD 6962. Prerequisite: Basic math and economics, or permission of instructor. Pre- or corequisite: ECON 5181, EMGT 5961, or SEGR 4961. Energy and power systems in regulated and competitive environments and implications on business decisions for firms in these industries. Topics include: mechanism of energy markets; comparative market systems; determination of prices under different market structures; gas, oil, coal, and electricity market architecture; electricity market design; dispatch and new build decisions; smart grid and renewable energy in electricity markets; risk and risk management in energy including demand and price volatility and use of financial derivatives; and the impact of financial market trends and current and proposed policies on the energy industry.

EMGT 5963. Energy Systems Planning. (3)

Prerequisite: Basic math and economics, or permission of instructor. Pre- or corequisite: ECON 5181, EMGT 5961, or SEGR 4961. Also recommended is EMGT 5962 or SEGR 4962. Optimal planning of resources, logistics, distribution and storage in the end to end energy value chain from upstream natural gas production through mid-stream transportation and storage to downstream power generation, utility distribution and consumption. Smart Grid Optimization. Supplier and customer relationship management, contracts management. Lean-Six Sigma energy system process design. Power systems reliability and control, preventive maintenance, predictive maintenance, process and service quality control.

EMGT 5964. Case Studies in the Energy Industry. (3)

Prerequisite: Basic math and economics or consent of instructor. Pre- or corequisite: EMGT 5961 or SEGR 4961. Also recommended is EMGT 5962 or SEGR 4962. Introduce students to interpret and analyze real world business cases in the energy sector. Cases explore the concepts behind natural monopolies, utility ownership, regulation and de-regulation, utility rates and service standards. Additionally, economic concepts such as supply and demand, market pricing, producer surplus, monopolistic pricing, and ratemaking (regulatory goals, revenue requirements and the rate base and rate cases) are applied. Some

cases explore decision-making strategies surrounding marginal prices, congestion management, congestion revenue, electric and gas transmission rights both in terms of physical versus financial markets, locational marginal prices (LMP), financial transmission rights in terms of revenue adequacy and auction revenue rights and typical energy trading hedging practices.

EMGT 6090. Special Topics. (1-6) Directed study of current topics of special interest. *May be repeated for credit.*

EMGT 6101. Engineering Management

Fundamentals. (3) The fundamental skills for engineering managers in the area of engineering economics, probability and statistical analysis. Utilization of spreadsheet models and statistical packages to apply these skills in the analysis of engineering management problems. Course credit does not count towards the MSEM degree requirement.

EMGT 6142. Quality and Manufacturing

Management. (3) Provides an in-depth study of current issues and advances in manufacturing management. Topics include: just-in-time inventory management, total quality management, statistical process control, continuous improvement, flexible manufacturing systems, computer-integrated manufacturing, technology evaluation and selection, and manufacturing strategy. Emphasis on use of computers for decision support.

EMGT 6890. Individual Study. (1-6) Individual investigation and exposition of results. *May be repeated for credit.*

EMGT 6901. Advanced Project Management. (3)

Prerequisite: Permission of Instructor. Study of various aspects of project management including project types and organizations, regulatory and liability issues, planning, budget, risk assessment, and conflict resolution. Exercises involve research into emerging management processes, use of computerized techniques, and application of management theories in team-based projects.

EMGT 6902. Legal Issues in Engineering

Management. (3) Survey of legal issues surrounding engineering products and services, including warranty, liability, contracting, intellectual property, codes, and accepted practice. Legal principles, precedents, case studies, and research projects.

EMGT 6904. Product and Process Design. (3)

Application of principles of creative problem solving to design of products and processes by multi-disciplinary teams. Taking as the definition of design "the communication of a set of rational decisions for

accomplishing stated objectives within prescribed constraints," the teams produce elements of designs for various products and services at points in the sequential stages of design. Teams make periodic reports and presentations to the class on design assignments.

EMGT 6905. Designed Experimentation. (3)

Prerequisites: Statistics and permission of instructor. Design of quality into products and processes using statistically designed experimentation (DOE), a systematic and efficient method of design optimization for enhanced performance, quality, and cost. Emphasis on designing and conducting useful experiments rather than the basis in statistical theory. Includes robust parameter design and tolerance design techniques. Review and comparison of Taguchi methods with conventionally designed experimentation. Extensive use of specialized computer software to design experiments and analyze results in team projects; screening experiments, and sequential response surface methods.

EMGT 6906. Processing Systems Simulation. (3)

Prerequisite: Statistics. Principles and application of selecting, planning, and executing simulation projects for processing systems, and developing and experimenting with simulation models. Discrete event simulation is particularly powerful for modeling and experimenting with systems exhibiting interdependencies and variability - such as manufacturing and service systems. Students learn simulation project management, modeling, and experimenting using commercial simulation software products.

EMGT 6910. Technological Forecasting and

Decision-Making. (3) Prerequisite: Permission of instructor. Several techniques for engineering product design, development and improvement. A variety of decision making techniques such as several forecasting methods and quality function deployment are discussed specifically in the context of systems engineering applications, based on engineering design philosophy of cross-functional cooperation in order to create high quality products. Students learn how to use these techniques for making effective engineering decisions in a technological environment.

EMGT 6912. Techniques and Intelligent Tools for Engineering Decision Support. (3)

Prerequisite: Permission of instructor. Surveys and introduces techniques and automated tools to support complex engineering decision-making, as well as methods for evaluating and selecting appropriate tools. Reviews and introduces decision-making processes and techniques; traditional automated decision support tools such as CAD, FEA, CFD, and other conventional modeling and simulation tools; decision support tools

based on soft-computing technologies such as knowledge based expert systems, fuzzy logic, artificial neural nets, and genetic algorithms; and methods to evaluate and select tools appropriate for specific applications. Students introduced to an overview of the underlying technologies used in the tools, learn the characteristics of applications appropriate for the tools, learn how to evaluate and select the decision support tools appropriate for an application, and demonstrate their understanding by preparing examples in applications.

EMGT 6915. Engineering Decision and Risk Analysis.

(3) Prerequisites: Integral and Differential Calculus, Statistics, Probability, or permission of instructor. Useful tools for analyzing difficult decisions and making the right choice. After introducing components and challenges of decision making, the course proceeds with the discussion of structuring decisions using decision trees and influence diagrams. Decision making under uncertainty is emphasized including maximax, maximin, and minimax regret techniques. Modeling of different risk attitudes based on risk and return tradeoffs are analyzed through utility theory. Finally, decisions under conflicting objectives and multiple criteria are discussed along with some introduction to game theory.

EMGT 6920. Logistics Engineering and Management.

(3) Prerequisite: Permission of instructor. Introduces logistics systems from a systems engineering perspective. It starts from the design of effective and efficient systems with their respective maintenance and support infrastructures to the coordination of the production and distribution of systems and products for customer use at different stages of a final product's life cycle. The emphasis is on the design and implementation of effective and efficient logistics systems and supply chains. Contents also include the current management issues in logistics systems implementation and supply chain operations.

EMGT 6924. Lean Six Sigma Practice and Management.

(3) Provides an understanding of the Lean Six Sigma system design principles and tools. Discusses the lean continuous improvement cycle: 1) defining value using tools such Quality Function Deployment; 2) proceeding with identifying value streams using Value Stream Mapping; 3) making the value stream flow through the elimination of 7 wastes, line balancing, 5S, cellular layouts, SMED; 4) pulling resources JIT based on demand; and 5) achieving perfection through Kaizen events and statistical process control. Six Sigma improvement cycles DMAIC (Define, Measure, Analyze, Measure and Control) and DMADV (Define, Measure, Analyze, Design and Verify) are also discussed and synergies with lean principles are reviewed to create a Lean Six Sigma system. Students are exposed to industry cases

from major companies that illustrate the challenges and best practices of implementing a Lean Six Sigma system.

EMGT 6926. Lean Supply Networks. (3) Builds fundamental lean systems skills to effectively design, plan, and execute lean supply networks that deliver value to customers. With the ongoing global pressure of cost cutting and quality focus, many companies have been implementing "lean manufacturing" concepts to survive in this competitive marketplace. While this is a good start, lean concepts need to be implemented beyond the four walls of a company across its supply chain. Lean principles do not only apply to manufacturing but to service organizations as well. This course helps students understand the principles of lean, supply chain management, and provide you with the related tools and techniques to make supply chains and companies deliver goods and services successfully. Students are exposed to industry cases from major companies that illustrate the challenges of managing lean supply networks.

EMGT 6930. Capital Cost Estimating. (3)

Prerequisite: Permission of instructor. Provides in-depth study of cost management issues in a technological business environment. It covers cost concepts including project evaluation techniques based on cost, capital planning and budgeting, investment evaluation under risk and uncertainty, rate of return methods, estimating for economic analyses, inflation effects, depreciation and income taxes, and capital investment decision analysis. Private and public sector cost issues are also discussed. The tools and techniques presented are useful for engineering, business, or management professionals of any organization. Students learn how to use the course material for effective project management, budgeting, and decision making.

EMGT 6950. Engineering Systems Integration. (3)

Prerequisite: Permission of instructor. An introduction to the relevant issues and required techniques for successful systems design development, integration, management, and implementation. Principles and methods for system life-cycle analysis, system planning and management, and systems integration. Interfaces between the system, subsystems, the environment, and people. Students learn the factors to control the total system development process designed to ensure a high quality and effective system.

EMGT 6952. Engineering Systems Optimization. (3)

Prerequisite: Calculus and Linear Algebra or permission of instructor. The main objective of this course is to develop fundamental problem solving skills for engineers and engineering managers using techniques for optimizing engineering systems. A

systems engineering approach is followed to analyze practical applications from different engineering disciplines and to optimize complex systems. Model formulation, sensitivity analysis, special cases, solutions using commercially available software applications and practical implementation considerations are emphasized.

EMGT 6955. Systems Reliability Engineering. (3)

Prerequisites: Calculus and Statistics. Introduction of concepts and methods for the design, testing and estimation of component and system reliabilities. Topics include: reliability mathematics; analysis of reliability data; reliability prediction and modeling; reliability testing; maintainability and availability; failure mode and effects analysis and failure rates; reliability design and implementation; application of concurrent engineering and reliability methods to integrate reliability tests into the overall system development cycle to reduce overall life cycle costs.

EMGT 6965. Energy Analytics. (3) Pre- or corequisite: EMGT 5961, SEGR 4961, STAT 5123, ECON 6113, or permission of instructor; also recommended are EMGT 5962 and EMGT 5963. Energy analytics is an interdisciplinary area applying techniques and methodologies of engineering management, economics, statistics and electrical engineering to solve real-world analytical problems in the energy industry. Designed for current and future analysts, operators, planners and their managers in the energy industry. Covers major energy-related applications of descriptive, predictive and prescriptive analytics. Topics include: energy data analysis, load forecasting, price forecasting, renewable generation forecasting, energy trading and risk management, demand response and customer analytics, and utilities outage analytics.

EMGT 6980. Industrial and Technology Management Seminars. (1)

Prerequisite: Permission of instructor. A series of seminars covering current management issues, challenges and practices in industrial, government, and business sectors of industry. *May be repeated for credit.* (All students in the M.S. in Engineering Management program are required to take this course within the first or second semester of the program.)

EMGT 6985. Engineering Management Project. (3)

Prerequisites: EMGT 6980 and two other program required EMGT courses. A hands-on real world industrial/business project. Emphasizes the design and implementation of effective methods on the development and/or improvement of products, processes, procedures, or systems. A 3-member project committee which includes at least two faculty members from the Department of Systems Engineering and Engineering Management has to be established

before taking this project course. This project is a capstone project for the students in the M.S. in Engineering Management program.

EMGT 6990. Industrial Internship. (1-3)

Prerequisite: Completion of nine hours of graduate coursework. Full- or part-time academic year internship in engineering complementary to the major course of studies and designed to allow theoretical and course-based practical learning to be applied in a supervised industrial experience. Each student's program must be approved by their graduate program director. Requires a mid-term report and final report to be submitted. (This course cannot be counted as part of the 31 credit hours required for the M.S. in Engineering Management degree.)

EMGT 6991. Graduate Master Thesis Research. (1-6)

Individual investigation culminating in the preparation and presentation of a thesis. *May be repeated for credit.*



College of Health and Human Services

health.uncc.edu

Dean: Dr. Nancy Fey-Yensan

Associate Dean: Dr. Jane Neese

In the College of Health and Human Services at the University of North Carolina at Charlotte, students and faculty help chart the course for healthcare and social services throughout the region. With excellence in educational programs, research, community service, and clinical practice, the college plays an important role in developing and implementing high quality healthcare and social service practices. As an interdisciplinary college, many opportunities exist for student and faculty collaboration in teaching and research. Within the college's diverse graduate curricula, faculty and student research also is a key component to successful student-learning outcomes. Additionally, the college incorporates information technology standards in all courses and offers online learning opportunities in many of its graduate programs.

Graduate Degree Programs

- Doctor of Nursing Practice
- Doctor of Philosophy in Health Services Research
- Doctor of Philosophy in Public Health Sciences
- Master of Health Administration (MHA)
- MHA/MBA Dual Degree (*see Belk College of Business section*)
- MHA/JD Dual Degree (*in conjunction with the Charlotte School of Law*)
- Master of Science in Kinesiology
- Master of Science in Nursing: Adult-Gerontology Acute Care Nurse Practitioner
- Master of Science in Nursing: Community/Public Health Nursing

- Master of Science in Nursing: Family Nurse Practitioner Across the Lifespan
- Master of Science in Nursing: Nurse Administrator
- Master of Science in Nursing: Nurse Anesthesia Across the Lifespan
- Master of Science in Nursing: Nurse Educator
- Master of Public Health
- Master of Public Health /Juris Doctor Dual Degree (*in conjunction with the Charlotte School of Law*)
- Master of Social Work
- Professional Science Master's in Health Informatics (*see College of Computing and Informatics section*)

Graduate Non-Degree Programs

- Graduate Certificate in Community Health
- Graduate Certificate in Public Health Core Concepts
- Graduate Certificate in Nursing Administration
- Graduate Certificate in Nursing Education
- Post-Master's Certificate in Adult-Gerontology Acute Care Nurse Practitioner
- Post-Master's Certificate in Advanced Practice Registered Nursing: Family Nurse Practitioner Across the Lifespan
- Post-Master's Certificate in Nurse Anesthesia Across the Lifespan
- Graduate Certificate in Health Informatics (*see College of Computing and Informatics section*)

The master's programs in the School of Nursing are accredited by the Commission on Collegiate Nursing

Education, One Dupont Circle, NW, Suite 530, Washington, DC 20036, 202-887-6791. The Nursing Anesthesia program is accredited by the Council on Accreditation of Nurse Anesthesia Education Programs (COA). The Master of Science in Kinesiology is accredited by the Commission on Accreditation of Allied Health Education Programs (CAAHEP). The Master of Health Administration program is accredited by the Commission on Accreditation of Healthcare Management Education (CAHME). The Master of Public Health in the Department of Public Health Sciences is accredited by the Council on Education for Public Health (CEPH). The Master of Social Work program is accredited by the Council on Social Work Education (CSWE). The Doctor in Nursing Practice program is seeking accreditation by the Commission on Collegiate Nursing Education (CCNE).

Health Administration

- **Master of Health Administration (MHA)**
- **MHA/MBA Dual Degree** (*see the Belk College of Business section*)
- **MHA/JD Dual Degree** (*in conjunction with the Charlotte School of Law*)
- **MHA/M.S. in Health Informatics Dual Degree**

Department of Public Health Sciences
publichealth.uncc.edu

Graduate Program Director
Dr. Michael E. Thompson

Program Administrator
Ms. Melissa Smith

Graduate Faculty

Dr. Christopher Blanchette, Associate Professor
Dr. Larissa R. Brunner Huber, Professor
Dr. John Fisher, Research Assistant Professor
Dr. Lyndie Forthofer, Professor and Department Chair
Dr. L. Michele Issel, Professor
Dr. James N. Laditka, Associate Professor
Dr. Sarah B. Laditka, Associate Professor
Dr. Crystal N. Piper, Associate Professor
Dr. Elena Platonova, Associate Professor
Dr. William Saunders, Assistant Professor
Dr. James Studnicki, Professor and Irwin Belk
Endowed Chair of Health Services Research
Dr. Jennifer Troyer, Adjunct Professor and Associate
Dean for Research and Graduate Programs, Belk
College of Business
Dr. Pilar Zuber, Lecturer

MASTER OF HEALTH ADMINISTRATION (MHA)

The Master of Health Administration (MHA) degree prepares students for exciting careers in health services management for a variety of health related institutions in an evolving healthcare delivery system. Structured to meet the highest professional and accreditation standards the program is designed to address the needs of current healthcare managers, clinical professionals who anticipate future administrative responsibilities, and pre-professionals who wish to prepare for an entry-level career in healthcare administration.

The Master of Health Administration is a 51 credit hour degree program. Students take 45 credit hours of core courses, including a 3 credit hours internship, and 6 credit hours of elective courses.

Administratively located within the Department of Public Health Sciences, it is an interdisciplinary program with courses taught by faculty from the College of Liberal Arts & Sciences, the Belk College of Business and the College of Health and Human Services. The Master of Health Administration degree program is fully accredited by the Commission on Accreditation of Healthcare Management Education (CAHME); and the Department of Public Health Sciences is a full graduate member of the Association of University Programs in Health Administration.

Students may enroll in the Master of Health Administration program on a full-time or part-time basis. Classes are scheduled primarily in the evenings at the UNC Charlotte main campus and at UNC Charlotte Center City.

Master's prepared health service managers may work as chief or executive administrators, assistants to chief executives, or as directors and managers of departments and units. Examples of the settings where MHA graduates work include: hospitals and hospital systems, physician practices and clinics, long term care facilities, managed care organizations, consulting firms, pharmaceutical and biotechnology companies, local/state/federal health agencies, health insurance companies, and medical supply and equipment manufacturers.

Additional Admission Requirements

To be considered for admission to graduate study in health administration, a student must present the following requirements in addition to those required by the Graduate School.

- 1) Acceptable scores on the verbal and quantitative portions of the Graduate Record Exam (GRE) or the Graduate Management Admission Test (GMAT).
- 2) An essay describing the applicant's experience and objective in undertaking graduate study in health administration.
- 3) Basic computer skills including word processing and use of spread sheets.

Applicants with a variety of undergraduate degree specializations have the potential to be successful in the program. Individuals with records of high quality professional experience who do not fulfill the formal requirements should discuss with the Graduate Director of the Health Administration Program other factors that may have a bearing on admission.

Early Entry Program

An Early Entry Program is available for well qualified UNC Charlotte undergraduate students majoring or minoring in Public Health. The Early Entry Program allows students in the undergraduate BSPH degree or Minor in Public Health programs to begin work toward the MHA graduate degree before completion of the baccalaureate degree. For details, see the *UNC Charlotte Undergraduate Catalog*.

Degree Requirements

Each student is required to complete 45 credit hours (15 courses including the Internship) in the core curriculum. These courses offer a basic body of knowledge, skills, and values relevant to health services administration. Additionally, students select 6 credit hours (2 graduate courses) in elective studies. Students are encouraged to select courses that meet individual professional needs. Electives are available in several areas including health information technology, management specialties, long term care, community health, and non-profit organization.

Core Courses (45 credit hours)

- HADM 6100 Introduction to the U.S. Healthcare System (3)
- HADM 6104 Health and Disease (3)
- HADM 6108 Decision Analysis in Healthcare (3)
- HADM 6116 Accounting for Healthcare Management (3)
- HADM 6120 Health Economics (3)
- HADM 6124 Marketing in Healthcare (3)
- HADM 6128 Human Resources Management (3)
- HADM 6134 Quality and Outcomes Management in Healthcare (3)
- HADM 6138 Healthcare Finance (3)
- HADM 6142 Health Policy Development (3)
- HADM 6145 Organization Behavior in Healthcare (3)
- HADM 6146 Information Resources Management (3)
- HADM 6150 Health Law and Ethics (3)
- HADM 6154 Strategic Management of Health Services Organizations (3)
- HADM 6400 Health Internship Project (3)

Sample Elective Courses (6 credit hours)

- HADM 6200 Health Insurance and Managed Care (3)
- HADM 6212 Health, Aging and Long Term Care (3)
- HADM 6216 Long Term Care Administration (3)
- HADM 6204 Trends and Issues in Health Administration (3)
- GRNT 6211 Administration of Aging Programs (3)
- SOCY 6138 Social Organization of Healthcare (3)

Assistantships

Positions as a graduate administrative assistant may be available. Grant funded assistantships may be available as well. Students seeking assistantships

should contact the Office Assistant assigned to the Department of Public Health Sciences.

Internships

Each student in the program is required to demonstrate professional experience in the healthcare delivery system through an approved internship. HADM 6400 is graded on a Pass/Unsatisfactory basis.

Note: A criminal background check and drug screen are among the internship requirements. Students who fail these screening measures and who are unable to be placed in an internship face dismissal from the program.

Electives

Students will enroll in two elective courses and are encouraged to select courses that will complement their professional interest and educational goals. Elective courses are offered each semester by the Health Administration program or may be selected from other graduate programs to meet particular student interest.

Advising

Each student is assigned a faculty advisor. In addition, the MHA Director serves as the back-up advisor for all students. Students are expected to meet with their advisor on a regular basis to plan their progression through their program of study. Any course substitutions and selection of electives must be endorsed by the advisor and approved by the MHA Director in writing.

Financial Aid/Financial Assistance

A wide range of opportunities for financial aid/assistance is available to qualifying students, which may be accessed through the Office of Student Financial Aid. See the Financial Information section of this Catalog for more information on the opportunities that are available, and how to contact the Office of Student Financial Aid.

MHA/MBA DUAL DEGREE

This dual degree program allows students to earn a Master of Health Administration (MHA) degree from the College of Health and Human Services and a Master of Business Administration (MBA) degree from the Belk College of Business. For details, see the Belk College of Business section of this *Catalog*.

MHA/JD DUAL DEGREE

This dual degree program allows students to earn a Master of Health Administration (MHA) degree from the College of Health and Human Services at UNC

Charlotte and a Juris Doctor (JD) degree from the Charlotte School of Law (CSL).

This dual degree program is for students who wish to add specialization in law and its application to health administration to the extensive interdisciplinary curriculum of design, delivery, quality, and costs of healthcare for individuals and populations, gained in the MHA program. Full-time students typically spend their first two years of study at CSL. The entire third year is spent at UNC Charlotte. For the remainder of the program, students take classes at both UNC Charlotte and CSL. Each school grants up to twelve (12) units of credit for courses taken at the other school.

Visit publichealth.uncc.edu and charlottelaw.edu for additional information. Contact the MHA Program Director and the CSL Associate Dean for Academics before submitting applications.

MHA/M.S. IN HEALTH INFORMATICS DUAL DEGREE

The Dual Master of Health Administration (MHA) and Professional Science Master's in Health Informatics (HI PSM) degree program allows students to earn both a Master of Health Administration and a M.S. in Health Informatics degree. The dual MHA and HI PSM program (outlined below) consists of 65 credit hours of coursework, as opposed to the 86 required if pursuing these degrees separately.

Both programs' admissions committees will review applicants to the dual program. Applicants might be offered admission into only the individual MHA or HI PSM programs instead of the dual program. Similarly, students admitted into the dual program may opt to matriculate into only the MHA or HI PSM program. Students having matriculated into either the MHA or HI PSM program desiring to add the dual degree must apply and gain admission to the dual degree no later than the end of their first semester of matriculation into either program.

Degree Requirements

GRAD 6002 Responsible Conduct of Research (2)
HADM 6100 Introduction to the U.S. Healthcare System (3)
HADM 6104 Health and Disease (3)
HADM 6116 Accounting for Healthcare Management (3)
HADM 6120 Health Economics (3)
HADM 6124 Marketing in Healthcare (3)
HADM 6128 Human Resource Management (3)
HADM 6138 Health Care Finance (3)
HADM 6142 Health Policy Development (3)

HADM 6145 Organizational Behavior in Healthcare (3)
 HADM 6146 Information Resources (3)
 HADM 6150 Health Law and Ethics (3)
 HADM 6154 Strategic Management of Health Services (3)
 HCIP 5375 Computer Vocabularies & Classification Systems (3)
 HCIP 6102 Healthcare Data Analysis (3)
 HCIP 6108 Decision Analysis in HealthCare (3)
 HCIP 6134 Quality and Outcomes in Healthcare (3)
 HCIP 6380 Introduction to Health Informatics (3)
 HCIP 6400 Health Internship Project (3)
 HCIP XXXX Restricted Elective - Data Science Concentration (3)
 HCIP XXXX Restricted Elective - Data Science Concentration (3)

Plus one of the following:

HCIP 6200 Principles of Information Security and Privacy (3)
 HCIP 6201 Computer Security, Privacy, and Legal Issues (3)

Note: Under the MHA and HI PSM dual degree option, students must take a minimum of 10 HCIP courses (29 credit hours) and 12 HADM courses (36 credit hours). Additionally, the Graduate School considers any deviation from the approved plan of study as requiring a Special Request approval.

COURSES IN HEALTH ADMINISTRATION (HADM)

HADM 6000. Topics in Health Administration. (3)
 Intensive study of a topic in health administration. The topic of investigation may vary from semester to semester. *May be repeated for credit.*

HADM 6100. Introduction to the U.S. Healthcare System. (3) Cross-listed as HCIP 6100. Overview of healthcare delivery in the United States including organizational structures, financing mechanisms and delivery systems, with particular attention to program formation.

HADM 6104. Health and Disease. (3) Cross-listed as HCIP 6104. Principles and methods of epidemiology including definitions and models of health, illness, and disease; modes of transmission of clinically important infectious agents; risk factors and chronic diseases; and insights into existing studies and paradigms of health promotion and disease prevention.

HADM 6108. Decision Analysis in Healthcare. (3)
 Cross-listed as HCIP 6108. The study of selected quantitative management tools useful in the analysis

of managerial decisions. Includes a review of basic descriptive and inferential statistics, applied probability distributions, forecasting methods, statistical process control, queuing, transportation and assignment modeling, and linear programming. The emphasis is on applying quantitative decision making methods to the operational problems facing healthcare organizations. Familiarity with computers and computer software will be important for success in this course.

HADM 6116. Accounting for Healthcare Management. (3) Basic concepts and techniques of collecting, processing and reporting financial information relevant to healthcare institutions. Emphasizes a conceptual understanding of financial accounting, technical tools of cost accounting, including budget preparation and analysis, and interpretation of financial statements.

HADM 6120. Health Economics. (3) Examination of the economic context of health services delivery and policies, and application of economic concepts to the healthcare sector including supply and demand, elasticity, regulation, competition, and cost effectiveness analysis.

HADM 6124. Marketing in Healthcare. (3) Provides an in-depth understanding of the essential concepts of marketing and their application to healthcare. Students gain a working knowledge of marketing tools and how to use them in the context of healthcare. Students build practical applied skills in analyzing healthcare marketing problems and developing healthcare marketing programs and strategies. Students also expand their understanding of the differences and similarities between health services and social marketing.

HADM 6128. Human Resources Management. (3)
 Examines human resources management as it applies to health services institutions, including compensation benefits, personnel planning, recruitment, selection, training and development, employee appraisal and discipline, union-management relations, and quality management.

HADM 6134. Quality and Outcomes Management in Healthcare. (3) Cross-listed as HCIP 6134. Examination of the concepts and practices of quality management, performance improvement, and assessment of outcomes in healthcare delivery settings. Designed to provide an in-depth understanding of basic concepts and frameworks and of their applicability and relevance in specific situations. Examples of topics to be covered include: process reengineering, service improvement, continuous quality improvement, accreditation

standards, patient satisfaction, outcome measurement, teamwork, and case management.

HADM 6138. Healthcare Finance. (3) Prerequisite: HADM 6116. Fundamental financial management concepts and tools for healthcare institutions, including financial statements and attributes, capital acquisition and allocation, investment analysis, capital and cash flow management, and contractual relationships.

HADM 6142. Health Policy Development. (3) Cross-listed as MPAD 6174. Prerequisite: HADM 6100/MPAD 6172. Examination of the formulation, adoption and implementation of public policy for health services delivery and healthcare through federal, state, and local political processes.

HADM 6145. Organization Behavior in Healthcare. (3) Introduction to organizational theory with applications to healthcare systems, including organizational design and inter-organizational networks/alliances. Examination of communication and leadership skills development, including conflict, labor, and dispute management.

HADM 6146. Information Resources Management. (3) Cross-listed as HCIP 6146 and NURS 6162. A study of the use of information management to improve the delivery of healthcare. Information resource management includes methods and practices to acquire, disseminate, store, interpret, and use information to provide healthcare in a more efficient, effective and economical manner. Emphasis is placed upon information as central to the ongoing operations and strategic decisions of healthcare organizations.

HADM 6150. Health Law and Ethics. (3) Cross-listed as HCIP 6150. Analysis of ethical and bioethical problems confronting healthcare delivery systems. Selected legal principles and their application to the healthcare field, including corporate liability, malpractice, informed consent, and governmental regulation of health personnel and health facilities.

HADM 6154. Strategic Management of Health Services Organizations. (3) Prerequisite: Permission of department. Analysis of strategic planning, managing and marketing concepts, techniques and tools within the healthcare industry, including organizational capability analysis and business plan development. This is the Master of Health Administration (MHA) Capstone Course that should be taken during the MHA student's final semester.

HADM 6200. Health Insurance and Managed Care. (3) Fundamentals of managed healthcare systems, including risk arrangements, compensation,

incentives, quality assurance, financing, and public programs.

HADM 6204. Trends and Issues in Health Administration. (3) Cross-listed as MPAD 6176. Examination of current issues confronting healthcare managers and an assessment of programs and management responses to emerging trends in the healthcare field, including delivery systems, marketing/competition, financing, and/or epidemiological changes.

HADM 6208. Research Methods for Healthcare Administration. (3) Prerequisite: undergraduate statistics course. Study of selected statistical techniques useful in the analysis of managerial decisions and interpretation and evaluation of research. Introduction to systems analysis and selected operations research techniques as applied to problem solving and decision making in healthcare institutions.

HADM 6210. Medical Practice Management. (3) Cross-listed as HCIP 6330. A comprehensive study of medical practice management and the issues, tools, and techniques to resolve those issues. Provides the student with an understanding of the financial and regulatory issues that influence today's medical practice with an insight into the cultural, human resource, and governance issues that make physician practices unique among healthcare organizations.

HADM 6212. Health, Aging, and Long Term Care. (3) Overview of the health status of an aging U.S. population, with a focus on long-term care. Topics include: demographics of an aging society, health status of older people, societal values related to aging and long-term care, informal care giving, the formal service provision system, relevant public policies, and challenges for the future.

HADM 6216. Long Term Care Administration. (3) Overview of the long-term care system, with an emphasis on older persons. Class content includes the exploration of issues surrounding the provision of long-term care, identification of the various components of the long-term care system, and discussion of the role of health administration within the long-term care system.

HADM 6400. Health Internship Project. (3) Cross-listed as HCIP 6400. Prerequisite: HADM 6100 and 15 additional hours of core course requirements. Offers administrative experience in a healthcare setting for students. The initial assumption is made that students participating in the internship experience have had limited hands-on exposure to healthcare administration. *Graded on a Pass/Unsatisfactory basis.*

HADM 6800. Health Administration Independent Study. (1-3) Guided individual study in an issue related to health administration arranged with a faculty member or supervised experience in an administrative setting in a program or entity within the healthcare delivery system. *Graded on a Pass/Unsatisfactory basis. May be repeated for credit.*

Health Services Research

• Ph.D. in Health Services Research

College of Health and Human Services
health.uncc.edu

Graduate Program Interim Director
Dr. Yvette Huet

Graduate Teaching Faculty

Ahmed Arif, Ph.D., M.D., Public Health Sciences
Dee Baldwin, Ph.D., RN, FAAN, Nursing
Suzanne Boyd, Ph.D., Social Work
William Brandon, Ph.D., Public Policy, PHS Adjunct
Andrew Harver, Ph.D., Public Health Sciences
Larissa Brunner Huber, Ph.D., Public Health Sciences
James Laditka, Ph.D., D.A., Public Health Sciences
Sarah Laditka, Ph.D., Public Health Sciences
Jane Neese, Ph.D., Nursing
Theresa Scheid, Ph.D., Sociology
Jim Studnicki, Ph.D., Public Health Sciences
Michael Thompson, Dr.PH, Public Health Sciences
Rosemarie Tong, Ph.D., Philosophy
Lucille Lombardi Travis, Ph.D., RN, NE-BC, Nursing
Jennifer Troyer, Ph.D., Economics

PH.D. IN HEALTH SERVICES RESEARCH

This interdisciplinary program in Health Services Research includes coursework in biostatistics, health economics, healthcare organizational structures and processes, epidemiology, health policy, personal behaviors, and social factors that affect access to healthcare, quality and cost of healthcare, and health outcomes. Graduates are prepared to conduct interdisciplinary research utilizing quantitative methods supplemented with qualitative methods to advance knowledge to support innovations in healthcare delivery systems and health policy. All students are required to complete a series of core and special emphasis courses individually developed between the student and their advisor. The cornerstone of the program is the student's dissertation, which is expected to be a significant contribution based on original and independent research leading to publications in peer reviewed, indexed journals. Graduates are prepared to work in healthcare delivery systems, academia, or government positions.

Additional Admission Requirements

In addition to the general requirements for admission to the graduate school, the following are required for study in the Ph.D. Program in Health Services Research:

- 1) Master's Degree from an accredited university in a health-related field
- 2) An overall graduate grade point average (GPA) of at least 3.5 out of 4.0 from an accredited graduate program
- 3) The Graduate Record Examination (GRE) is required; visit the website for the Ph.D. in Health Services Research program for details.
- 4) Completed at least one graduate level course with a grade of B or above in each of the following areas:
 - a. Statistics or biostatistics
 - b. Health policy
 - c. Epidemiology

Note: Applicants will be considered for admission if they have not completed one or more of the above three prerequisite graduate courses. Admitted students lacking any of these courses are able to be admitted; however, the prerequisite courses must be successfully completed before enrolling in the corresponding doctoral level course. Master's level courses in these areas that are taken to fulfill the prerequisite requirements are not counted toward the 57 credit total for the Ph.D.

- 5) An essay addressing professional and academic experiences, motivation for pursuing the degree, specialty area of emphasis to pursue in the program, and how the program fits the applicant's career plans. The essay should also identify at least two members of the HSR PhD Program Faculty or Participating Faculty with whom the applicant would like to work, based on shared research interests. The applicant must include a statement indicating how his or her specific research interests align with those of at least two specific member of the HSR PhD Program Faculty or Participating Faculty that the applicant may wish to have as a mentor.
- 6) A current curriculum vitae (CV)
- 7) A score on the Test of English as a Foreign Language (TOEFL) examination, which meets university requirements for those applicants whose native language is not English
- 8) An interview with the Director or the Director's designee and possibly potential mentor(s) either in person or by telephone. Before the interviews, the applicant should provide the Program Director and potential mentor(s) with a current curriculum vitae and a record of completed degrees, with their grade averages.

- 9) Three letters of reference, at least one of which is from a former graduate faculty member and one from a former supervisor

Degree Requirements

The Ph.D. acknowledges the value of coursework for background and preparatory to conducting research. The program requires 57 post-master's credit hours. This program emphasizes courses in research methods and analysis, as well as experiences working with faculty on research to support the development of research skills in order to carry out the dissertation on a significant research problem in the area of health services research.

Core Courses (6 credit hours)

Because of the interdisciplinary nature of the program, all students are required to take the general curriculum that includes this sequence of core courses.

- HSRD 8200 Seminar in Health Services Research (1)
(this course must be taken every Spring semester for the first four years)
 GRAD 8002 Professionalism and the Responsible Conduct of Research (2)

Interdisciplinary Theoretical Base (9 credit hours)

Select three courses from the list below. Some courses below have required prerequisite courses. If the prerequisite courses are not completed before admission, these courses must be completed before the student takes the course for which each is a prerequisite. These courses cannot be applied toward the Area of Interest requirement.

- HSRD 8001 Introduction to Health Services Research (3)
 HSRD 8002 Healthcare Systems and Delivery (3)
 HSRD 8003 Analytic Epidemiology (3)
 HSRD 8004 Economics of Health and Healthcare (3)
 HSRD 8005 Health Policy (3)

Methods and Methodological Issues Courses (15 credit hours)

Select five of the following:

- HSRD 8101 Design of Health Services Research (3)
 HSRD 8102 Advanced Design of Health Services Research (3)
 HSRD 8103 Large Data Sets and Health Services Research (3)
 HSRD 8104 Healthcare Program Evaluation, Outcomes, and Quality (3)
 HSRD 8106 Advanced Data Analysis for Health Services Research (3)
 HSRD 8110 Applied Biostatistics: Regression (3)
 HSRD 8111 Applied Biostatistics: Multivariate Methods (3)
 HSRD 8612 Seminar in Grant Proposal Writing (3)

Area of Interest Courses (6 credit hours)

Students each develop a set of courses in a chosen Area of Interest that is designed mutually with their advisor. These courses may be at the Master's or Doctoral level in areas such as research methods, mental health, gerontology, public policy, or health disparities. These may be selected from courses with the following prefixes: GRNT, HADM, HCIP, HLTH, HSRD, PPOL, and PSYC.

Elective Course (3 credit hours)

Select a course outside the Area of Interest. Students each determine the appropriate elective courses mutually with their advisor. This course may be at the master's or doctoral level, and may be from programs with the following prefixes: GRNT, HADM, HCIP, HLTH, HSRD, PPOL, and PSYC.

Dissertation (18 credit hours)

HSRD 8801 Dissertation Research

Proportion of Courses Open Only to Doctoral Students

Health Services Research Program courses are only open to doctoral students, except with written approval of the instructor and the Director. Students from other university doctoral programs may enroll.

Grade Requirements

A student must maintain a cumulative average of 3.0 in all coursework taken in the program. The seminars will be graded on a Pass/Unsatisfactory basis and therefore will not be included in the cumulative average. An accumulation of two C grades will result in termination of the student's enrollment in the doctoral program. A second failure in any of the following results in dismissal from the program the candidacy examination; the dissertation proposal defense; or final dissertation defense. If a student makes a grade of U or NC on any course, enrollment will be terminated. A doctoral student whose enrollment has been terminated because of grades is ineligible to register in any semester or summer session.

Transfer Credit

Only courses with grades of A or B may be accepted for transfer credit. With approval of the student's advisor, the Doctoral Program Director and the Doctoral Program Committee, a maximum of six hours of transfer credit for post-Master's coursework earned at a regionally or nationally accredited university within the previous five years is accepted. The date for the first of these courses becomes the starting date for the 8-year period for completing the Ph.D. degree. Only courses appropriate for the

program and curriculum in which the student is enrolled may be transferred.

Seminars

Doctoral students are expected to attend seminars sponsored by the College of Health and Human Services.

Dissertation Process

Dissertation Chair Selection

The student selects a Dissertation Chair. The Chair must be a member of the HSR Ph.D. Program Faculty, or a member of the HSR Ph.D. Participating Faculty with a co-Chair who is a member of the Program Faculty. Students should consult with their faculty advisor and the Program Director as they develop their plans for selecting the dissertation committee chair, and for forming the dissertation committee. The student should work closely with the Chair on identifying other committee members, and typically should approach other faculty about serving on the committee only after consulting with the Chair.

Dissertation Committee Selection

The student selects the Dissertation Committee, which must be at least 5 members. Four must be from the HSR Ph.D. Program Faculty or Participating Faculty (one of whom is the Chair). The student submits the "Appointment of Doctoral Committee" form. The Graduate School appoints the 5th member. The five members of the dissertation committee will serve as the student's committee for the refinement of the dissertation topic, the development and defense of the dissertation proposal, the development of the dissertation, and dissertation defense.

Dissertation Topic Selection

The Chair of the dissertation committee and the student together select the dissertation topic. The Chair is responsible to ensure that all members of the committee are actively involved and agree to the direction and the specifics of the proposal (e.g., data, methods). Ensuring this involvement and agreement is a major goal of the Topic Approval Meeting. When the Chair approves the topic and approach to the dissertation, the student schedules the Topic Approval Meeting with the Dissertation Committee. The student submits a 2-3 page description of the dissertation plan to the Dissertation Committee at least 2 weeks prior to the Topic Approval Meeting. This single-spaced description of the topic includes the following sections: (1) Specific Aims, (2) Background and Significance, (3) Research Design and Methods. The topic approval meeting is not typically open to visitors. Students will present a brief oral summary of: the dissertation topic, the context of related research literature, data and methods, and implications for policy and practice, followed by

questions and discussion among the committee and the student. The topic approval meeting may be repeated as needed.

Dissertation Proposal

Following the topic approval, the student writes the dissertation proposal and prepares for the Oral Proposal Defense. The proposal is written in the form of a grant proposal. The student is expected to use NIH PHS398 format, except that she or he is not required to use the NIH forms, and that the proposal does not require preliminary data, biographical sketches, letters of collaboration, or budgets. Thus, the proposal includes the following standard NIH sections:

- a) Specific Aims
- b) Background and Significance
- c) Research Design and Methods
- d) Human Subjects

The entire proposal (not including the Literature Cited section) is limited to 15 single-spaced pages (12 point font). At the discretion of the Chair, additional material may be included in appendices, such as additional details about the analysis, table shells, and so forth. However, it is the expectation of the HSR Ph.D. program that the central elements of the dissertation proposal should be embodied in the 15 page maximum. This requirement is designed to ensure that students have experience writing the dense prose required for a successful grant narrative. It also provides a narrative that is appropriate for submission for funding the dissertation work. All members of the committee must receive the full proposal at least 2 weeks before the Proposal Defense.

Oral Defense of the Dissertation Proposal

The submission of the proposal is followed by the Oral Proposal Defense. In the HSR Ph.D. program, the Oral Proposal Defense is open to HSR Ph.D. faculty and HSR Ph.D. students. The student must provide the title of the proposed dissertation, and the date, time, and location of the Oral Proposal Defense to the Program Director no later than two weeks prior to the Oral Proposal Defense.

The student should prepare a PowerPoint presentation approximately 20 minutes in length summarizing the research proposal. Following the student's presentation, the committee will ask questions about the research plan. The student will be excused from the meeting to permit the committee to discuss the merits of the proposal, after which the student will return to the meeting to receive the committee's comments and required modifications to the research plan. After successful completion of the Oral

Proposal Defense, the student submits two forms: (1) "Proposal Defense for Doctoral Dissertation and/or Master's Thesis/Project" and (2) "Report of Comprehensive/Qualifying Exam, Portfolio Presentation, and Study Report for Doctoral and/or Master's Students."

Advancement to Candidacy

A doctoral student advances to candidacy after the dissertation topic and approach has been approved by the student's advisory committee and the Dean of the Graduate School. NOTE: Completing the topic approval meeting does not constitute advancement to candidacy. Advancement to candidacy requires approval of both the topic and the detailed dissertation plan at the time of the oral proposal defense, including any required plan for the protection of human subjects. If Human Subjects are involved, the Petition for Topic Approval requires the attachment of the IRB approval.

In addition to the oral examination on the dissertation proposal, the Qualifying Examination includes an oral examination on the HSR Ph.D. student's doctoral portfolio. The doctoral portfolio presents all work completed by the student in the program, including:

- A detailed cover letter
- Current curriculum vitae
- Papers completed during courses taken in the HSR Ph.D. program
- Research papers published or in press since admission to the program
- Abstracts representing research presented at professional conferences since admission to the program
- A professional personal statement (typically 2 to 3 pages) covering, at a minimum, the student's research focus area(s), and the student's 2- to 3-year research plan
- Additional manuscripts under development
- Syllabi developed by the student since admission to the program (where relevant)
- Student and faculty evaluations of the HSR Ph.D. student's teaching (where relevant)
- A statement of teaching philosophy (where relevant to the student's career plan)

Retake of the Qualifying Examination

A student who fails to complete the Oral Proposal Defense / Qualifying Examination satisfactorily may be given the opportunity to revise components of the research proposal and/or the doctoral portfolio under the direction of the Chair and/or to repeat the Oral Proposal Defense, at the discretion of the Dissertation Committee; a second failure results in dismissal from the Ph.D. program.

Dissertation Research

Completion of the dissertation is the final component of the doctoral degree. A doctoral dissertation must demonstrate the candidate's ability to conceive, design, conduct, and interpret independent, original, and creative research, and must make a unique contribution to knowledge in the field of health services research. Under the direct supervision of the Dissertation Committee Chairs, students are encouraged to consult regularly with their Dissertation Committee members during the planning, conducting, and writing of the dissertation. The dissertation defense is a public defense. Notice of the location and time will go to the campus community.

Following the approval of the dissertation topic and advancement to doctoral candidacy, students are required to maintain continuous enrollment in HSRD 8801 for dissertation study until work is completed. Continuous enrollment begins in the semester after the dissertation topic is approved.

Evaluation

A student must maintain a cumulative average of 3.0 in all coursework taken in the program. The seminars will be graded on a Pass/Unsatisfactory basis and therefore will not be included in the cumulative average. An accumulation of two C grades results in termination of the student's enrollment in the doctoral program. Students are allowed to repeat the Candidacy Exam, proposal defense, dissertation defense only once. A second failure of the candidacy examination, the dissertation proposal defense, or the final dissertation defense results in dismissal from the program. If a student makes a grade of U or NC on any course, enrollment is terminated. A doctoral student whose enrollment has been terminated due to inadequate grades is ineligible to register in any semester or Summer session. Please also see the "Degree Requirements and Academic Policies" section of the *Graduate Catalog*.

UNC Charlotte Residency Requirement

The student must satisfy the UNC Charlotte residency requirement for the program by completing 21 credit hours. Residence is considered to be continuous if the student is enrolled in one or more courses in successive semesters until 21 hours are earned.

Time Limits for Completion

All requirements for the degree must be completed within 8 years after the first registration as a doctoral student or the registration for any course transferred into the program toward degree requirements. The student must receive admission to candidacy within 6 years after admission to the program and complete all requirements within 6 years of admission to candidacy for the Ph.D. degree. These time limits are

maximums; students will be typically expected to complete the degree requirements within 5 years.

COURSES IN HEALTH SERVICES RESEARCH (HSRD)

HSRD 8000. Topics in Health Services Research. (1-4) Prerequisite: Full graduate standing in the Ph.D. in Health Services Research program or permission of the instructor. Study of selected topics in health services research. *May be repeated for credit. Graded on a Pass/Unsatisfactory basis.*

HSRD 8001. Introduction to Health Services Research. (3) Introductory course in models, theoretical frameworks and key components of health services research. Historical development of health services research will be traced. An in-depth study of social determinants of health will be explored.

HSRD 8002. Healthcare Systems and Delivery. (3) Prerequisite: Enrollment in the Ph.D. in Health Services Research program or permission of the instructor. Doctoral seminar to provide a theoretical and empirical basis for understanding major organizational, delivery, and financing structures and related health outcomes comprising present day healthcare in the United States and globally. Evidence from health services research studies will be discussed as part of the identification of key areas for future research.

HSRD 8003. Analytic Epidemiology. (3) Cross-listed as HCIP 6260, HLTH 6260, HLTH 8260, and PPOL 8665. Pre- or corequisite: a graduate introductory course in epidemiology such as HADM 6104 or HLTH 6202. Principles and methods of studying advanced epidemiology, with emphasis on the analytic approach, including advanced techniques in the establishment of disease causation in groups and communities. Topics include: risk assessment, environmental exposures, stratification and adjustment, and multivariate analysis in epidemiology. Emphasis is also placed on quality assurance and control and communicating results of epidemiological studies in professional publications and settings.

HSRD 8004. Economics of Health and Healthcare. (3) Cross-listed as ECON 6260 and PPOL 8667. Prerequisite: Enrollment in the interdisciplinary Ph.D. in Health Services Research program or the Ph.D. in Public Policy program, or permission of the instructor. Uses economic theory and econometrics to analyze the functioning of the healthcare sector and appropriate public policy. Topics include: how markets for medical care differ from other markets, the

demand for medical care, the demand and supply of health insurance, the role of competition in medical markets, managed care, managed competition, and the role of the public sector in regulating and financing healthcare. The topic list is flexible and student input will be solicited and welcomed.

HSRD 8005. Health Policy. (3) Cross-listed as PPOL 8663. Prerequisites: Full graduate standing in the Ph.D. in Public Policy or Health Services Research programs and a graduate level course providing an adequate introduction to the U.S. healthcare system such as HADM 6100, MPAD 6172, or permission of instructor. Examines the formulation, adoption, implementation, and evaluation of health policy at national, state, and local levels through extensive readings in relevant health and policy literatures.

HSRD 8101. Design of Health Services Research. (3) Cross-listed as HLTH 8201. Prerequisites: Master's level Applied Biostatistics course or equivalent, and enrollment in Ph.D. in Health Services Research program or permission of instructor. An overview of quantitative and qualitative methods as applied to design and analysis of health services research problems. Qualitative topics: overview of philosophies of qualitative inquiry, characteristics of qualitative research design, managing qualitative data, and qualitative methods. Quantitative topics: categories and levels of quantitative research, characteristics of a good research design, relationship between theory and research, selection process for measurement tools, power analysis, sampling techniques, design sensitivity, and human subject protection.

HSRD 8102. Advanced Design of Health Services Research. (3) Prerequisites: HSRD 8101, and enrollment in Ph.D. in Health Services Research program or permission of instructor. Corequisite: HSRD 8110 or STAT 8110. An overview of advanced quantitative methods as applied to design and analysis of health services research problems. Topics include: cost-effectiveness analysis, missing data, endogenous variables, panel data methods, and duration analysis. Other current topics in the design and analysis of health services research will also be considered.

HSRD 8103. Large Data Sets and Health Services Research. (3) Cross-listed as HLTH 8272. Prerequisites: HSRD 8102; HSRD 8111 or STAT 8111; and enrollment in the Ph.D. in Health Services Research program or permission of the instructor. Health quality and outcomes issues addressed through secondary data analysis using large, public data sets will be examined. Issues related to secondary analysis and drawing items from multiple data sets will be discussed. Analytical techniques such as

adjustments for missing data, transformations of data, and risk adjustment is applied using public data sets.

HSRD 8104. Healthcare Program Evaluation, Outcomes, and Quality. (3) Corequisite: STAT 8110, HSRD 8110, or permission of the instructor. Introductory course in evaluation research in healthcare settings. Emphasis is on conceptual, methodological, organizational, political, and ethical problems in evaluating programs. Tasks of identifying quality and outcome indicators, choosing methods, assessing feasibility, assuring quality data, addressing population and program diversity, project management, and incorporating context into reports of findings are also examined.

HSRD 8106. Advanced Data Analysis for Health Services Research. (3) Prerequisite: Enrollment in the Ph.D. in Health Services Research program or permission of the instructor. Provides students with skills that will enable them to efficiently conduct advanced health services research with complex and multiple health-related databases.

HSRD 8110. Applied Biostatistics: Regression. (3) Cross-listed as HLTH 8270 and STAT 8110. Prerequisites: Graduate level Introduction to Biostatistics or approved Statistics course; basic knowledge of statistical software; or permission of the instructor. To understand and apply concepts and principles of regression based statistical methods (regression, linear models, logistic regression, Poisson regression) to health related studies. Selection of appropriate methods for analysis, development of skills to conduct the analysis of the data and capability to write in scientific language the results of the study will be studied.

HSRD 8111. Applied Biostatistics: Multivariate Methods. (3) Cross-listed as HLTH 8271 and STAT 8111. Pre- or corequisite: HLTH 8270, HSRD 8110, STAT 8110, or permission of the instructor. Includes study of the concepts, principles and statistical methods of analysis of discrete and continuous multivariate data. Students learn to use the most popular methods of multivariate data reduction, classification and clustering such as principal components, factor analysis and canonical correlation analysis. Design issues, verification of the assumptions and interpretation of the results are discussed. Skills for concise presentation of the results of statistical analysis are developed.

HSRD 8200. Seminar in Health Services Research. (1) Prerequisite: Enrollment in the Ph.D. in Health Services Research program or permission of the instructor. Guided reading and presentation course introducing the peer reviewed literature in health services research. Students are introduced to reading,

reviewing, and presenting literature. *Graded on a Pass/Unsatisfactory basis.*

HSRD 8612. Seminar in Grant Proposal Writing. (3)

Prerequisite: Enrollment in the Ph.D. in Health Services Research program or permission of the instructor. Seminar to develop a grant proposal using existing funding mechanisms from governmental or private funding agencies. This course uses a step-wise approach to writing all major sections of a grant proposal. Proposal development familiarizes students with governmental guidelines, grant submissions and the peer review process.

HSRD 8800. Independent Study in Health Services Research. (1-6)

Prerequisite: Full graduate standing in the Ph.D. in Health Services Research program or permission of the instructor. Guided individual study in topics or issues related to health services research arranged with a faculty advisor. *Graded on a Pass/Unsatisfactory basis. May be repeated for credit.*

HSRD 8801. Dissertation Research. (1-9)

Prerequisite: Passage of comprehensive examination and approval of dissertation topic by student's advisory committee. Investigation of a topic in health services research which makes a substantial addition to the field. Maximum of 18 hours allowed under this course designation. *Graded on a Pass/Unsatisfactory basis.*

HSRD 8882. Seminar in Health Disparities. (1)

Prerequisites: HSRD 8001 and enrollment in Ph.D. in Health Services Research Program. A review of current research documenting disparities and an examination of research design and methods sensitive to cultural issues in health services research. Study includes work from a variety of health services research disciplinary perspectives. *Graded on a Pass/Unsatisfactory basis.*

HSRD 8883. Seminar in Grant Proposal Writing. (1)

Pre- or corequisites: HSRD 8103, permission of dissertation advisor, and enrollment in Ph.D. in Health Services Research Program. Seminar to develop a dissertation grant proposal using existing dissertation funding mechanisms from government agencies and foundations. Uses a step-wise approach to writing all major sections of a grant proposal. Proposal examples are presented. *Graded on a Pass/Unsatisfactory basis.*

HSRD 8884. Seminar in Research Implementation and Dissemination. (1)

Pre- or corequisites: Passed comprehensive examination and enrollment in Ph.D. in Health Services Research Program. Seminar on implementation of a funded research project. The infrastructure for successful implementation and reporting is discussed with specific examples. Pitfalls

in technology, communication, natural history of a study and budgeting are also discussed. Case studies based on studies by faculty are used to illustrate the range of approaches to the research process. Students develop an application to present and a manuscript for publication. *Graded on a Pass/Unsatisfactory basis.*

Kinesiology

• M.S. in Kinesiology

Department of Kinesiology

kinesiology.uncc.edu

Graduate Program Director

Dr. Susan T. Arthur

Graduate Faculty

Dr. Susan T. Arthur, Associate Professor

Dr. Scott Gordon, Department Chair and Professor

Dr. Reuben Howden, Associate Professor

Dr. Trudy Moore-Harrison, Lecturer

Dr. Yvette M. Huet, Professor

Dr. Joseph S. Marino, Assistant Professor

Dr. Abbey C. Thomas (Fenwick), Assistant Professor

Dr. Michael J. Turner, Associate Professor

Dr. Tricia H. Turner, Associate Professor

MASTER OF SCIENCE IN KINESIOLOGY

The Master of Science in Kinesiology program prepares graduate students to advance the fields of Kinesiology through evidenced-based patient care and translational research. The program emphasizes basic and clinical interdisciplinary education and research in areas of Kinesiology.

The Department of Kinesiology has two concentrations within the M.S. in Kinesiology program that include a clinical (thesis optional) and research (thesis required) degree option.

Applied Physiology and Neuromechanics Concentration (Thesis required)

The Applied Physiology and Neuromechanics (APN) concentration is excellent preparation for those planning to continue their education through the PhD, either in Kinesiology or a related field (Biology, Rehabilitation Sciences, Biomechanics, Motor Control, Physiology, etc). Students selecting this concentration will also be well qualified for employment in aspects of the health industry or in research labs.

Clinical Exercise Physiology Concentration (Thesis optional)

The Clinical Exercise Physiology (CEP) concentration is a CAAHEP-accredited program that is designed to prepare students to become Registered Clinical Exercise Physiologists. Clinical Exercise Physiologists are employed in inpatient and outpatient

clinical/rehabilitation settings (e.g., Cardiopulmonary Rehab programs), general wellness/fitness commercial and corporate settings, and industrial settings that provide health care services for both diseased and healthy populations. Through a blend of classroom instruction and clinical experience, the degree program teaches a wide variety of specific health care skills, knowledge, and behaviors within the cardiovascular, pulmonary, metabolic, neoplastic, musculoskeletal, neuromuscular, and immunologic practice areas.

Early Entry Program

An Early Entry Program is available for well qualified UNC Charlotte undergraduate students majoring in Athletic Training or Exercise Science. The Early Entry Program allows students to begin work toward the M.S. in Kinesiology graduate degree before completion of the baccalaureate degree. For details, see the *UNC Charlotte Undergraduate Catalog*.

Degree Requirements

Both concentrations require 36 credit hours approved by the Department of Kinesiology and a minimum of 15 credit hours presented for the degree must be in the courses numbered 6000 and above. Both concentrations require the same 12 hours of core courses but differ in their specific courses and the number of elective hours. Courses for which undergraduate credit has been awarded may not be repeated for graduate credit. A minimum grade point average of 3.0 is required on all coursework attempted for the degree. At the time of admission, up to 6 credit hours of graduate transfer credit may be accepted if approved by the Department of Kinesiology and the Graduate School.

Core Courses for Both Concentrations (12 credit hours)

KNES 5232 Physiology of Human Aging (3)

KNES 6115 Research Methods in Kinesiology (3)

KNES 6280 Advanced Exercise Physiology (3)

KNES 6285 Advanced Cardiopulmonary Physiology (3)

Applied Physiology and Neuromechanics Concentration-Specific Courses (15 credit hours)

RSCH 6110 Descriptive and Inferential Statistics (3)

KNES 6170 Neuromechanics of Gait and Posture (3)

KNES 6800 Directed Independent Study (3)

KNES 6900 Research and Thesis in Kinesiology (6)

Applied Physiology and Neuromechanics Elective Courses (9 credit hours)

Acceptable elective courses include any KNES course or GRAD course at or above the 6000 level, as well as any graduate level course at or above the 6000 level offered within the College of Health and Human

Services or any of the other colleges.

Clinical Exercise Physiology Concentration-Specific Courses (18 credit hours)

- KNES 6120 Advances in Clinical Exercise Physiology (3)
 KNES 6121 Clinical Practice in Exercise Physiology (3)
 KNES 6134 Exercise Prescription for
 Cardiopulmonary and Metabolic Disorders (3)
 KNES 6151 Exercise Testing Methods (3)
 KNES 6292 Exercise Prescription for Musculoskeletal
 Disorders (3)
 KNES 6490 Advanced Practicum in Clinical Exercise
 Physiology (1) (*taken 3 times*)

Each Practicum credit is equivalent to 200 clinical hours. Clinical practicum usually begins in the third semester of the student's program and are arranged through the Practicum Coordinator within the Department of Kinesiology.

Clinical Exercise Physiology Elective Courses (6 credit hours)

Acceptable elective courses include any KNES course or GRAD course at or above the 6000 level, as well as any graduate level course at or above the 6000 level offered within the College of Health and Human Services or any of the other colleges.

A complete description of the program, concentrations, and course offerings sequence of courses can be found at kinesiology.uncc.edu.

Comprehensive Examination

All candidates for the degree must pass a comprehensive examination. A student selecting the Applied Physiology and Neuromechanics concentration must present credit for at least 6 credit hours of KNES 6900 and pass a thesis defense. A student selecting the Clinical Exercise Physiology concentration must pass the Registered Clinical Exercise Physiologist examination (RCEP), administered by the American College of Sports Medicine as this concentration prepares students to become Clinical Exercise Physiologists.

Additional Admission Requirements

In addition to fulfilling the University's general requirements for graduate admission at the Master's level, applicants seeking admission in to the M.S. in Kinesiology program must also:

- 1) Present satisfactory scores on the Graduate Record Examination (GRE)
- 2) Possess an overall cumulative GPA of 2.5 or above in all college coursework and possess an

overall GPA of 3.25 on all upper division coursework (courses completed in the Junior and Senior year of the undergraduate program)

- 3) Present satisfactory grades (C or above) on specific prerequisite courses:
 - a) The Applied Physiology and Neuromechanics concentration requires a minimum of 4 credit hours of Anatomy and Physiology, 3 credit hours of Exercise Physiology, 3 credit hours of Biomechanics or Motor Control, and 3 credit hours of Statistics.
 - b) The Clinical Exercise Physiology concentration requires a minimum of 4 credit hours of Anatomy and Physiology, 3 credit hours of Exercise Prescription, and 3 credit hours of Statistics.
- 4) Present satisfactory scores on the Test of English as a Foreign Language (TOEFL), if the applicant is from a non-English speaking country.
- 5) Demonstrate evidence of sufficient interest, ability, and preparation in Kinesiology to adequately profit from graduate study, as determined by the Kinesiology Graduate faculty. This information should be included in the statement of purpose and specifically speak to the following: a) strengths, b) concentration of interest, c) career aspirations, and d) research interests (if pursuing the Applied Physiology and Neuromechanics concentration).

Assistantships

Positions as a graduate assistant or teaching assistant may be available. Grant funded assistantships may be available as well. Students seeking assistantships should contact the Graduate Program Director of the Kinesiology program. In general, applications for graduate assistantship awards for the academic year are made by the preceding February 1.

Tuition Waivers

Tuition waivers may be available through a variety of sources. Students interested in pursuing tuition waivers should contact the Graduate Program Director in the semester prior to enrolling for courses.

Financial Aid/Financial Assistance

A wide range of opportunities for financial aid/assistance is available to qualifying students, which may be accessed through the Office of Student Financial Aid. See the Financial Information section of this *Catalog* for more information on the opportunities that are available, and how to contact the Office of Student Financial Aid.

Advising

Each student in the MS in Kinesiology program must have a major advisor. Students in the Applied Physiology and Neuromechanics concentration work with their major advisor to develop an advisory committee. The advisory committee must have at least 3 members (including the major advisor) and the majority of which must be from the Department of Kinesiology. Students in the Clinical Exercise Physiology concentration will be advised by the Graduate Program Director and Practicum Coordinator. Any course substitution must be approved by the academic advisor.

Research Opportunities/Experiences

A range of research opportunities exist in the Department of Kinesiology for qualified students. Students are encouraged to become engaged in the research focus of the department.

Program Certifications/Accreditations

The Clinical Exercise Physiology concentration of the M.S. in Kinesiology program is currently a CoAES and CAAHEP accredited program. Completion of the Clinical Exercise Physiology concentration qualifies the graduate to take the Clinical Exercise Physiology Registry Examination (RCEP) administered by the American College of Sports Medicine.

COURSES IN KINESIOLOGY (KNES)

KNES 5232. Physiology of Human Aging. (3) Focuses on the normal physiological alterations that occur as the human progresses from a young adult to the latter stages of life. Special attention is given to interventions commonly promoted to combat the physiological changes that result from aging.

KNES 6099. Special Topics in Kinesiology. (1-3)

Topics and special problems related to issues, practices or sufficient trends in kinesiology. Institutes, workshops, seminars, and independent studies. *Course May be repeated for credit with change of topic.*

KNES 6115. Research Methods in Kinesiology. (3)

Methods of inquiry for research are explored and critiqued within the fields of kinesiology. Emphasis is on developing skills useful for conducting and evaluating basic, applied, and clinical.

KNES 6120. Advances in Clinical Exercise Physiology. (3)

This course introduces students to concepts and topics associated with Clinical Exercise Physiology, including areas of practice in Clinical Exercise Physiology and professional development.

KNES 6121. Clinical Practice in Exercise Physiology. (3)

Knowledge and skills required in the clinical setting including operational standards, examination of current drug therapies, and legal and social considerations related to practice as a Clinical Exercise Physiologist.

KNES 6134. Exercise Prescription for Cardiopulmonary and Metabolic Disorders. (3)

Study of responses and adaptations to exercise, assessment techniques, exercise prescription, leadership and programming.

KNES 6151. Exercise Testing Methods. (3)

Introduces the basic Exercise Testing methods used by Clinical Exercise Physiologists. Focuses on the theory and application of specific skills, as well as developing clinical proficiency in assessing outcomes of physiologic function and fitness.

KNES 6170. Neuromechanics of Gait and Posture. (3)

The influence of central and peripheral mechanisms on gait and posture are emphasized by reviewing experimental protocols that have perturbed human movement. Instruction includes both normal and pathological studies, and the effect that interventions may have on disturbances in gait and posture.

KNES 6260. Clinical Exercise Nutrition. (3)

Principles of nutrition, dietary guidelines, dietary relationships to diseases and health, special populations, computerized dietary analysis.

KNES 6280. Advanced Exercise Physiology. (3)

Advanced study of the functioning of physiological systems during exercise with emphasis on current literature and research.

KNES 6285. Advanced Cardiopulmonary Physiology. (3)

This course is designed to develop a thorough understanding of cardiovascular physiology, ECG interpretation, and health-related applications. This course examines in detail, the various parameters of the cardiovascular system, the implication of disease and structural abnormalities to these parameters, and the relationship of cardiovascular function to exercise adaptation. Emphasis will be placed on usage of the information in the clinical setting.

KNES 6292. Exercise Prescription for Musculoskeletal Disorders. (3)

Advanced study of the clinical applications of common therapeutic modalities and rehabilitation in the treatment of injuries and illnesses associated with physical activity.

KNES 6490. Advanced Practicum in Clinical Exercise Physiology. (1)

Prerequisite: Permission of instructor. Acquisition and application of knowledge, skills, and abilities necessary for the Registered Clinical Exercise

Physiologist while gaining experiential hours in an appropriate clinical setting. *May be repeated for credit up to 6 credits.*

KNES 6800. Directed Independent Study. (1-3)

Directed study in areas of specialization in kinesiology and related fields. *Graded on a Pass/Unsatisfactory basis.*

KNES 6900. Research and Thesis in Kinesiology. (3)

Prerequisite: KNES 6115 and permission of instructor overseeing thesis research. Design, implementation, presentation, and evaluation of an approved research project in student's specialty area. The applied project is under the supervision of an advisor and graduate committee. *Graded on a Pass/Unsatisfactory basis.*

KNES 7999. Master's Degree Graduate Residency Credit. (1)

Meets Graduate School requirement for continuous enrollment during final term prior to graduation when all coursework has been completed.

Nursing

- **Doctor of Nursing Practice (DNP)**
- **Master of Science in Nursing (MSN)**
- **Graduate Certificates**
- **Post-Master's Certificates**

School of Nursing

nursing.uncc.edu

Graduate Program Directors

Dr. Dee M. Baldwin, Associate Dean and Director, School of Nursing

Dr. Ilana Chertok, Associate Director, Graduate Division, School of Nursing

Graduate Faculty

Willie Mae Able, Ph.D., Assistant Professor

Heather Tonya Anderson, MSN, Lecturer

Dee M. Baldwin, Ph.D., Professor

Allison H. Burfield, Ph.D., Associate Professor

Ilana Chertok, Ph.D., Professor

Maren Coffman, Ph.D., Associate Professor

Judith Cornelius, Ph.D., Associate Professor

Dena Evans, Ed.D., Associate Professor

Christine Elnitsky, Ph.D., Associate Professor

Kathy Jordan, DNP, Clinical Assistant Professor

Donna Kazemi, Ph.D., Associate Professor

Susan Kennerly, Ph.D., Professor

David Langford, Ph.D., Associate Professor

Karen Lucisano, Ph.D., Director of CRNA Clinical Program

Jane Neese, Ph.D., Associate Professor

Marie Thomas, Ph.D., Clinical Assistant Professor

Lucille Travis, Ph.D., Professor

Meredith Troutman-Jordan, Ph.D., Associate Professor

Charlene Whitaker-Brown, DNP, Clinical Assistant Professor

Stephanie Woods, Ph.D., Professor

DOCTOR OF NURSING PRACTICE (DNP)

The Post-Master's Doctor of Nursing Practice (DNP) degree prepares graduates to analyze systems of care and provide transformational leadership to improve patient safety, quality of care, and implement evidence-based culturally competent care practices. Graduates from this program will be able to interpret and apply research findings to practice settings, determine and measure system and population outcomes, manage information systems, and use

appropriate technology for health and risk communication.

The DNP Program is a Dual DNP Program offered with Western Carolina University. Courses alternate between campuses and are taught in an executive format. Students are expected to travel to either campus and participate in the campus immersion activities that occur at the beginning of each semester.

Upon completion of the DNP program, graduates will be able to:

- Analyze and integrate evidence from nursing science with evidence from other relevant scientific disciplines to form a scientific foundation for advanced practice in nursing.
- Apply clinical scholarship, scientific evidence, and analytical methods to improve health care outcomes.
- Develop and evaluate systems to enhance safety and quality of healthcare.
- Advocate and participate in collaborative interdisciplinary efforts to improve health outcomes at the practice/organization, community, state, and national levels.
- Engage in culturally competent and ethically sound advanced nursing practice.
- Demonstrate leadership in the improvement of patient outcomes and transformation of health care delivery.
- Manage directly the complex problems of clients/populations and systems to facilitate access and navigation of the health care system to improve health outcomes.

Program Accreditation

The DNP Program is seeking accreditation by the Commission on Collegiate Nursing Education (CCNE) in accordance with CCNE procedures and timelines.

Admission and Progression Requirements

- An overall GPA of at least 3.5 (on a 4.0 scale) in the MSN program as documented by official transcripts.
- Earned master's in nursing in an advanced nursing practice specialty from a nationally accredited program. Current RN licensure in the U.S. at time of application with eligibility for NC licensure. NC licensure must be obtained prior to clinical practice experiences in NC.
- GRE/MAT scores are not required for applicants to the Post-Master's DNP Program who already hold a graduate degree in nursing or applicable graduate program in an advanced nursing

practice specialty from a nationally accredited program.

- Advanced Practice Registered Nurses must provide evidence of current national certification and meet the state requirements for practice in their state of licensure.
- An essay that addresses: 1) advanced practice expertise, 2) career goals, 3) how earning the DNP degree will foster achievement of these goals, and 4) plans for DNP project.
- Resume/curriculum vitae.
- Three professional recommendations that address the practice capabilities of the candidate.
- For international students, submission of TOEFL scores with a minimum score of 557 for the paper test and 220 for the computer test.
- Additional evidence for consideration of the application can be uploaded (e.g., publications, posters, evidence-based practice projects).
- Evidence of 500 supervised clinical hours within the MSN program. Applicants who do not meet the clinical hours criteria can meet with the Program Coordinator to discuss a plan to meet the requirement.

Degree Requirements

The DNP program requires 42 post-master's graduate credit hours and completion of a total of 1000 clinical practice hours (includes 500 hours from the MSN program). All students will be required to complete the curriculum that includes a sequence of courses as listed below:

Theoretical Base (15 credit hours)

NUDN 8160 Global Health and Social Justice (3)
 NUDN 8220 Healthcare Policy and Ethics (3)
 NUDN 8230 Economic and Financial Aspects of Healthcare System (3)
 NUDN 8260 Leadership and Healthcare Systems (3)
 NUDN 8270 Technology for Communication and Transforming Healthcare (3)

Methodological Issues (15 credit hours)

NUDN 8140 Foundations and Applications of Evidence-Based Practice (3)
 NUDN 8145 Leadership and Project Planning (3)
 NUDN 8147 Applied Biostatistics (3)
 NUDN 8150 Healthcare Program Evaluation and Quality (3)
 NUDN 8202 Community Epidemiology (3)
 or HLTH 6202 Community Epidemiology (3)

Elective Courses (3 credit hours)

One elective in a chosen area of interest selected mutually with the advisor.

Clinical Residency and Project (9 credit hours)

- NUDN 8441 Clinical Residency and Project Development I (2)
- NUDN 8442 Clinical Residency and Project Development II (2)
- NUDN 8443 Clinical Residency and Project Development III (3)
- NUDN 8444 Clinical Residency and Project Development IV (2)

Proportions of Courses Open to Doctoral Students

DNP courses are open to all nursing doctoral students enrolled in the UNCC/WCU dual degree program. All students from other University doctoral programs must seek written approval of the instructor, the DNP Program Director, and Associate Director of the Graduate Division to enroll in courses.

Grades Required

A student must maintain a cumulative GPA of 3.0 in all coursework taken in the program. A student who accumulates two grades of C or any grade of U will automatically be terminated from the DNP Program.

Transfer Credit

DNP students may transfer in 6 graduate credit hours (with a grade of B or above) with approval of the DNP Program Director and Associate Director of the Graduate Nursing Division. No course may be older than 6 years at the time of graduation.

Research

DNP students are expected to complete the required Graduate School Course on Ethical and Responsible Conduct of Research as a prerequisite for the Clinical Residency Project.

Clinical Residency and DNP Scholarly Project

Project Description

Students complete a DNP Scholarly Project in conjunction with their clinical residency courses. The DNP Scholarly Project is a project that brings together the practice and scholarship aspects of the Doctor of Nursing Practice degree. It is designed to address complex practice issues that affect groups of patients, healthcare organizations, or healthcare systems while utilizing informatics, technology, and in-depth knowledge of the clinical and behavioral sciences. The clinical scholarship required in the DNP Scholarly Project reflects mastery and competency in the student's area of expertise.

The DNP Scholarly Project begins in the first semester of study and continues throughout the program, culminating in a scholarly public defense. The DNP

Scholarly Project requires students to demonstrate expert practice, the use of evidence based practice, translational research, and use of skills necessary to lead interdisciplinary teams to improve patient/client outcomes and health status individually, organizationally, or within a community. Students may choose to work in private practices, clinics, inpatient units, hospital systems, and other institutions and communities in the assessment, planning, implementation, and evaluation of outcomes for the DNP Scholarly project.

Project Approval

The DNP Scholarly Project is guided by the DNP Scholarly Project Committee. The composition of the DNP Scholarly Project committee includes: 1) a chair who is a doctoral prepared faculty member with regular graduate faculty status at UNC Charlotte; 2) an expert clinical mentor (Ph.D., DNP, M.D. or other doctoral prepared individual; 3) one additional faculty member; and 4) a faculty member appointed by the Graduate School at UNC Charlotte. It is the responsibility of the DNP Scholarly Project Committee to guide the student through project planning, implementation, and evaluation process.

Upon approval of the DNP Scholarly Project topic, the student begins to develop the project. Once the project development is complete, the student presents to the committee and DNP faculty the final proposal for the project. The student's DNP Scholarly Project proposal serves as the primary component of the qualifying examination for the DNP program. To be eligible to defend the DNP Scholarly Project proposal, a student must have completed the written proposal and orally presented the proposal to the committee. This written and oral presentation is used to evaluate if the student is prepared and qualified to begin work on the project.

Institutional Review Board Approval

The DNP Scholarly Project must be collectively agreed upon by the student, the practice setting, and the student's DNP Scholarly Project Committee. Prior to beginning the DNP Scholarly Project, the project must be submitted to the UNC Charlotte Institutional Review Board (IRB) and/or WCU IRB for review and approval. Further, all IRB requirements for medical review and/or clinical agency IRB review that are pertinent to the DNP Scholarly Project must be fulfilled prior to launching the project. Any additional agency requirements must be completed prior to beginning implementation of the project.

Project Implementation

During NUDN 8443 (Clinical Residency and Project Development III), the student begins implementation and documentation of outcomes of the project with

oversight from the clinical mentor and the Project Committee.

Project Defense

After completion of the DNP Scholarly Project, the student defends the project to the Project Committee in a public defense. The student is allowed two attempts to present/defend the DNP scholarly project. Failure to successfully defend after two attempts results in termination from the program.

Time Limits for Degree Completion

All graduation requirements must be completed within 6 years after enrollment in the first course.

MASTER OF SCIENCE IN NURSING (MSN)

The Commission on Collegiate Nursing Education (CCNE) accredited Master of Science in Nursing degree is designed to prepare nurses for advanced practice in Nurse Anesthesia Across the Lifespan, Advanced Clinical Nursing, or Systems/Populations Nursing. Active specialties in Advanced Clinical Practice include Family Nurse Practitioner Across the Lifespan and Adult-Gerontology Acute Care Nurse Practitioner. Inactive specialties include Psychiatric Mental Health Nursing. Specialties in Systems/Population include Community/Public Health Nursing; Nurse Administrator; and Nurse Educator. Three post-master's certificates are available: Nurse Anesthesia Across the Lifespan, Adult-Gerontology Acute Care Nurse Practitioner, and Family Nurse Practitioner Across the Lifespan. Two graduate certificates are available: Nurse Administrator and Nurse Educator. Offerings of specific specialties are dependent on sufficient enrollment. Each specialty is individually described.

Program Accreditation

The MSN Program is accredited by the Commission on Collegiate Nursing Education (CCNE). Graduates of the program will be eligible to take the American Nurses Credentialing Center (ANCC) advanced examination for relevant specialties and/or other professional certification exams. The Nurse Anesthesia program is accredited by the Council on Accreditation of Nurse Anesthesia Education Programs (COA) and graduates will be eligible to take the American Association of Nurse Anesthetist Certification exam.

Majors

- **Nurse Anesthesia Major**
 - Nurse Anesthesia Across the Lifespan
- **Advanced Clinical Nursing Major**

- Adult-Gerontology Acute Care Nurse Practitioner
- Adult Psychiatric Mental Health Nursing (*inactive; not currently being offered*)
- Family Nurse Practitioner Across the Lifespan

- **Systems/Population Nursing Major**

- Nurse Administrator
- Community/Public Health Nursing
- Nurse Educator

Additional Admission and Progression Requirements

In addition to the general requirements for admission to the Graduate School, the following are required for graduate study in Nursing (*see additional requirements for specific major*):

- 1) Current unrestricted licensure as a Registered Nurse. Current license in North Carolina or a compact state or the state identified by faculty for clinical practice before enrollment.
- 2) Baccalaureate degree from an accredited university. If the degree is not in Nursing and courses in Research, Leadership/Management, Aging and Health and Community Health are lacking, they will be required as part of the program of study (option available only to Nurse Administration, Community/Public Health Nursing, and Nurse Educator majors).
- 3) Satisfactory performance on the Graduate Record Examination or the Miller Analogies Test or a previous Graduate degree with documentation of test scores.
- 4) One year of professional nursing practice is recommended.
- 5) An essay (statement of purpose) describing the applicant's experience and objective in undertaking graduate study in the chosen specialty.
- 6) Overall GPA of at least 3.0 in the last degree earned.
- 7) Completion of a statistics course with a grade of C or above.
- 8) See specialty track admission requirements for application dates that vary from those published by the Graduate School.

Degree Requirements

The MSN degree requires completions of 36 to 67 graduate credit hours, depending on the specialty. All specialties require a Capstone Project. Specific requirements and prerequisites for each specialty are listed below. Nurse Practitioner and Nurse Anesthesia are designed to accommodate full-time study. Part-time study is available for some majors. Many classes are held in the late afternoon or evening.

Up to a total of six graduate credit hours may be accepted from another accredited institution or from a post-baccalaureate program at UNC Charlotte. All courses must be approved prior to transfer by the student's advisor, the Associate Director of the Graduate Division, and the Dean of the Graduate School. All coursework, including accepted transfer credits, must be completed within a six-year period prior to graduation.

Assistantships

A limited number of graduate assistantships are available. Information is available in the School of Nursing, and from the Associate Dean for Academic Affairs, College of Health and Human Services.

Additional Financial Aid

Scholarships from the North Carolina Nurse Scholars Program – Master's Program (M-NSP) are available to part-time or full-time students admitted to the nursing program for up to two years of study. The M-NSP scholarships are competitive and preference will be given to full-time students. Awards are not based on financial need. The application deadline is early May. Further information and application forms are available on the School of Nursing webpage for Student Resources or in the College of Health and Human Services Advising Center.

A limited number of Professional Nurse Traineeships are available to full-time nurse practitioner students. The traineeship awards fund a portion of tuition and fees. Students in the nurse anesthesia major are eligible for Nurse Anesthesia Traineeships. Further information and application forms are available from the School of Nursing.

Early Entry Program

An Early Entry Program is available for well-qualified UNC Charlotte undergraduate students majoring in Nursing. The Early Entry Program allows students in the RN-to-BSN degree program to begin work toward the MSN graduate degree before completion of the baccalaureate degree. For details, see the *UNC Charlotte Undergraduate Catalog*.

Nurse Anesthesia

MASTER OF SCIENCE IN NURSING (MSN) - NURSE ANESTHESIA ACROSS THE LIFESPAN

The Nurse Anesthesia Across the Lifespan specialty is offered in conjunction with Carolinas Medical Center, and is also accredited by the Council on Accreditation

of Nurse Anesthesia Education Programs (COA). It provides both the theory and clinical practice required to qualify to take the national certifying examination upon graduation. The program consists of 67 credit hours and can be completed in 27 months of full-time study. In addition to MSN core courses, students complete cognate and clinical courses in nurse anesthesia. Clinical experiences are offered at Carolinas Medical Center and other affiliated sites.

Additional Admission Requirements

In addition to the requirements of the Graduate School and College, applicants to the Nurse Anesthesia Across the Lifespan program must have:

- 1) Baccalaureate degree in nursing (BSN) from an accredited nursing program.
- 2) A grade point average (GPA) of 3.0 on a 4.0 scale for all undergraduate work after high school
- 3) A grade point average of 3.0 on a 4.0 scale for all basic undergraduate science courses (Chemistry, Biology, Anatomy and Physiology, Pathophysiology, and Microbiology).
- 4) Satisfactory performance on the Graduate Record Exam (GRE); a score of 293 on the revised GRE or 950 on the old GRE is preferred (MAT scores are not accepted).
- 5) A minimum of 18 months of current full time critical care experience with adult clients prior to matriculation.
 - a) Acceptable experience includes:
Intensive Care Unit, Coronary Care Unit, Trauma Intensive Care Unit, Neuro Intensive Care Unit, Surgical Intensive Care Unit, Cardio-vascular Intensive Care Unit.
 - b) Experiences not acceptable include:
Flight Team, Emergency Room, Pediatric Intensive Care Unit, Neonatal Intensive Care Unit, and Post Anesthesia Care Unit.
- 6) Current certification in Basic Cardiac Life Support, Advanced Cardiac Life Support, and Pediatric Life Support with documentation provided only to Carolinas Medical Center Nurse Anesthesia Clinical Program.
- 7) Statement of Purpose in application packet describing the applicant's experience and objective in undertaking certificate study. Limited to a single page.
- 8) Applicants who meet the academic admission requirements will be eligible to be invited for an interview with the Clinical Program Admissions Committee.
 - a) Interviews are conducted twice a year: November and February.
 - b) All application materials must be submitted to the Graduate School and the

Nurse Anesthesia program no later than six weeks prior to the interviews. For November interviews, the deadline is September 15; for February interviews, the deadline is January 15.

- 9) The application process requires two applications – one to UNC Charlotte and one to Carolinas Medical Center. Only after a successful interview, will the applicant be admitted.

Degree Requirements

The program requires completion of 67 credit hours in approved courses as listed below and a capstone which is met with residency IV.

Core Courses (19 credit hours)

- NURS 6101 Theoretical Basis for Nursing Practice (3)
 NURS 6115 Health Policy and Planning in the U.S. (3)
 NURS 6160 Research in Nursing and the Health Professions (3)
 NURS 6230 Advanced Health Assessment and Diagnostic Reasoning for Advanced Practice (3)
 NURS 6430 Advanced Health Assessment and Diagnostic Reasoning Practicum (1)
 STAT 6127 Introduction to Biostatistics (3)
 BIOL 6273 Advanced Human Physiology (3)

Specialty Courses (48 credit hours)

- NUAN 6151 Principles of Nurse Anesthesia I (3)
 NUAN 6152 Principles of Nurse Anesthesia II (3)
 NUAN 6153 Principles of Nurse Anesthesia III (3)
 NUAN 6154 Advanced Pharmacology of Non-Anesthetic Agents (4)
 NUAN 6155 Advanced Pharmacology of Anesthetic Agents (4)
 NUAN 6156 Applied Physics and Chemistry in Nurse Anesthesia (3)
 NUAN 6157 Advanced Applied Pathophysiology in Nurse Anesthesia I (3)
 NUAN 6158 Advanced Applied Pathophysiology in Nurse Anesthesia II (3)
 NUAN 6171 Professional Aspects of Nurse Anesthesia I (1)
 NUAN 6172 Professional Aspects of Nurse Anesthesia II (1)
 NUAN 6485 Clinical Residency in Nurse Anesthesia I (5)
 NUAN 6486 Clinical Residency in Nurse Anesthesia II (5)
 NUAN 6487 Clinical Residency in Nurse Anesthesia III (5)
 NUAN 6489 Clinical Residency in Nurse Anesthesia IV (5)

Application Process

The application process requires two applications – one to UNC Charlotte and one to Carolinas Medical

Center.

- 1) The UNC Charlotte application is completed online and information can be obtained from:

Graduate Admissions
 UNC Charlotte
 210 Cato Hall
 9201 University City Blvd.
 Charlotte, NC 28223-0001
 704-687-5503 (phone)
 704-687-7254 (fax)
graduateschool.uncc.edu

- 2) The Carolinas Medical Center application forms and materials can be obtained from:

Carolinas Medical Center
 Nurse Anesthesia Program
 P.O. Box 32861
 Charlotte, NC 28232-2861
 704-355-2375 (Phone)
 704-355-7263 (Fax)

carolinashealthcare.org/school-of-nurse-anesthesia

POST-MASTER'S CERTIFICATE IN NURSE ANESTHESIA ACROSS THE LIFESPAN

The Post-Master's Certificate in Nurse Anesthesia Across the Lifespan requires 52 graduate credit hours and is awarded to students who have completed a Master of Science in Nursing (MSN) from an accredited program and wish to function as a Certified Registered Nurse Anesthetist (CRNA). The full-time course of study plan allow for certificate completion within 27 months. Courses must be taken in the order outlined in the master's curriculum. In addition, students must complete all requirements outlined by the Council on Certification of Nurse Anesthetists (CCNA).

Additional Admission Requirements

In addition to the requirements of the Graduate School and College, applicants to the Nurse Anesthesia Across the Lifespan program must have:

- 1) Current unrestricted licensure as a Registered Nurse, current license in North Carolina or a compact state or the state identified by faculty for clinical practice before enrollment
- 2) Master's degree in Nursing from an accredited nursing program
- 3) Evidence of a GRE score. Score of 293 on the revised GRE or 950 on the old GRE is preferred (MAT scores are not accepted)
- 4) Application to CMC accompanied by current fee

- 5) An essay (statement of purpose) in application package describing the applicant's experience and objective in undertaking certificate study. Limited to a single page.
- 6) For the three letters of recommendation required by the Graduate School, all must be from persons familiar with the applicant's professional qualifications, such as clinical manager or supervisor, academic professor, or physician.
- 7) A grade point average (GPA) of 3.0 on a 4.0 scale for all undergraduate work after high school
- 8) A grade point average of 3.0 on a 4.0 scale for all basic undergraduate science courses (Chemistry, Biology, Anatomy and Physiology, Pathophysiology, and Microbiology)
- 9) Current certification in Advanced Cardiac Life Support (ACLS), Basic Cardiac Life Support (BCLS), Pediatric Advanced Life Support (PALS)
- 10) A minimum of 18 months of current full time critical care experience with adult clients prior to matriculation
 - a) Acceptable experience includes:
Intensive Care Unit, Coronary Care Unit, Trauma Intensive Care Unit, Neuro Intensive Care Unit, Surgical Intensive Care Unit, Cardiovascular Intensive Care Unit
 - b) Experiences not acceptable include:
Flight Team, Emergency Room, Pediatric Intensive Care Unit, Neonatal Intensive Care Unit, and Post Anesthesia Care Unit
- 11) Completion of an Advanced Human Physiology within the past 3 years
- 12) Applicants who meet the academic admission requirements will be eligible to be invited for an interview with the Clinical Program Admissions Committee. Only after a successful interview will the applicant be admitted.
 - a) Interviews are conducted twice a year: November and February.
 - b) All application materials must be submitted to the Graduate School and the Nurse Anesthesia program no later than six weeks prior to the interviews. The final application deadline is January 15.
- 13) The application process requires two applications – one to UNC Charlotte and one to Carolinas Medical Center. Only after a successful interview, will the applicant be admitted.

Certificate Requirements

Core Courses (4 credit hours)

- NURS 6230 Advanced Health Assessment and Diagnostic Reasoning for Advanced Practice (3)
- NURS 6430 Advanced Health Assessment Practicum (1)

Specialty Courses (48 credit hours)

- NUAN 6151 Principles of Anesthesia I (3)

- NUAN 6152 Principles of Anesthesia II (3)
- NUAN 6153 Principles of Anesthesia III (3)
- NUAN 6154 Advanced Pharmacology of Non-Anesthetic Agents (4)
- NUAN 6155 Advanced Pharmacology of Anesthetic Agents (4)
- NUAN 6156 Applied Physics and Chemistry in Nurse Anesthesia (3)
- NUAN 6157 Advanced Applied Pathophysiology in Nurse Anesthesia I (3)
- NUAN 6158 Advanced Applied Pathophysiology in Nurse Anesthesia II (3)
- NUAN 6171 Professional Aspects of Nurse Anesthesia I (1)
- NUAN 6172 Professional Aspects of Nurse Anesthesia II (1)
- NUAN 6485 Clinical Residency in Nurse Anesthesia I (5)
- NUAN 6486 Clinical Residency in Nurse Anesthesia II (5)
- NUAN 6487 Clinical Residency in Nurse Anesthesia III (5)
- NUAN 6489 Clinical Residency in Nurse Anesthesia IV (5)

Application Process

The application process requires two applications – one to UNC Charlotte and one to Carolina Medical Center.

- 1) The UNC Charlotte application is completed online and information can be obtained from:

Graduate Admissions
UNC Charlotte
210 Cato Hall
9201 University City Blvd.
Charlotte, NC 28223-0001
704-687-5503 (phone)
704-687-7254 (fax)
graduateschool.uncc.edu

- 2) The Carolinas Medical Center application forms and materials can be obtained from:

Carolinas Medical Center
Nurse Anesthesia Program
P.O. Box 32861
Charlotte, NC 28232-2861
704-355-2375 (phone)
704-355-7263 (fax)

carolinashealthcare.org/school-of-nurse-anesthesia

Applicants who meet academic admission requirements will be eligible to be invited for an interview with the Admission Committee. Interviews are conducted in Late October/November and February. The application process requires two applications – one to UNC Charlotte and one to

Carolinas Medical Center to be submitted no later than six weeks prior to the interviews.

Advanced Clinical Specialties

ADULT-GERONTOLOGY ACUTE CARE NURSE PRACTITIONER (AGACNP)

These advanced practice registered nurses will be prepared to function as Adult-Gerontology Acute Care Nurse Practitioners (AGACNP). Adult-Gerontology Acute Care Nurse Practitioners provide evidence-based care to acutely ill adults with urgent and emergent complex health issues and critically ill adults with life threatening, rapidly changing physiological and pathophysiological conditions. Graduates with this concentration will be eligible to take the American Nurses Credentialing Center (ANCC) or American Academy of Nurse Practitioner (AANP) examination for Adult-Gerontology Acute Care Nurse Practitioners. The AGACNP program is a full-time, campus-based program.

Additional Admission Requirements

- 1) Unencumbered license as a Registered Nurse in North Carolina
- 2) BSN degree from nationally accredited program; the RN-to-MSN option is not available to NP applicants
- 3) One year of professional nursing practice in acute or critical care
- 4) Overall GPA of 3.0 on a 4.0 scale in the last degree and 60 hours of nursing coursework
- 5) Completion of an undergraduate statistics course with a grade of C or above
- 6) Statement of Purpose explaining the applicant's career goal and preparation in relation to primary care and family practice, and qualities making them a strong applicant (see nursing.uncc.edu for required elements of the Statement of Purpose). *(Note: Statement of Purpose should not exceed two double-spaced typed pages.)*
- 7) References should be from professional colleagues and should speak to clinical knowledge and expertise and one's ability to function as a member of the healthcare team. At least one reference from a supervisory person is preferred.

Application is competitive. Students are admitted annually in the Fall semester. See the School of Nursing website at nursing.uncc.edu for application deadline.

Degree Requirements

The program requires completion of 47 credit hours in approved courses including:

Core Courses (9 credit hours)

- NURS 6101 Theoretical Basis for Nursing Practice (3)
- NURS 6160 Research in Nursing and Health Professions (3)
- NURS 6115 Health Policy and Planning in the U.S. (3)

Cognate Courses (6 credit hours)

- STAT 6127 Introduction to Biostatistics (3)
- BIOL 6274 Pathophysiology (3)

Advanced Clinical Core (9 credit hours)

- NURS 6210 Family Health in Advanced Practice Nursing (2)
- NURS 6220 Pharmacotherapeutics in Advanced Nursing Practice (3)
- NURS 6230 Advanced Health Assessment and Diagnostic Reasoning for Advanced Practice (3)
- NURS 6430 Advanced Health Assessment Practicum (1)*

AGACNP Specialty Courses (20 credit hours)

- NUNP 6202 Complex Healthcare Management of Adults (3)
- NUNP 6203 Advanced Care of Critically Ill Adults (3)
- NUNP 6250 Advanced Primary Care and Health Promotion of Adults Across the Lifespan (3)
- NUNP 6401 Advanced Care and Health Promotion Adults Practicum (2)*
- NUNP 6402 Advanced Practice Nursing in Complex Care Practicum (4)*
- NUNP 6403 Advanced Care of Critically Ill Adults Practicum (4)*
- NUNP 6431 Advanced Acute Care Skills Lab (1)*

Synthesis Project (3 credit hours)

- NURS 6601 Synthesis and Integration in Advanced Nursing Practice I (1)
- NURS 6602 Synthesis and Integration in Advanced Nursing Practice II (2)

**Clinical Course that requires 60 credit hours practice for each 1 credit hour. Clinical courses may require travel to clinical sites outside Charlotte and Mecklenburg County.*

Additional Degree Requirements

- 1) A minimum of 600 hours of supervised clinical experience as a Nurse Practitioner student is required.
- 2) Students may receive no more than one C grade in any graduate course. The second C will result in suspension from the program.

- 3) In order to progress in the specialty, a grade of B or above is required in the following courses:
 - BIOL 6274 Pathophysiology
 - NURS 6220 Pharmacotherapeutics in Advanced Nursing Practice (3)
 - NURS 6230 Advanced Health Assessment and Diagnostic Reasoning for Advanced Practice (3)
 - NURS 6430 Advanced Health Assessment Practicum (1)*
 - All required courses with a NUNP prefix
- 4) Faculty advising is required.

Research Opportunities

Students who choose to do so have the opportunity to serve as Research Assistants on faculty research projects. Students may have an opportunity to choose a mentored research experience in their Synthesis courses.

POST-MASTER'S CERTIFICATE IN ADULT-GERONTOLOGY ACUTE CARE NURSE PRACTITIONER (AGACNP)

The Post-Master's Certificate consists of specialty courses in advanced practice nursing (minimum 20 graduate credit hours). This certificate program will prepare nurses holding master's degrees in nursing to enter advanced practice nursing as an Adult-Gerontology Acute Care Nurse Practitioner. Nurses already certified as Psych NPs, Women's Health or Pediatric NPs will be evaluated for possible exclusion of respective specialty courses and practica from their program. The recipients of this certificate will be eligible to take the American Nurses Credentialing Center (ANCC) or American Academy of Nurse Practitioners (AANP) examination for Adult-Gerontology Acute Care Nurse Practitioners. Coursework must be completed within four years and a 3.0 GPA is required. The AGACNP program is a full-time, campus-based program.

Admission Requirements

- 1) A master's degree in nursing from a nationally accredited nursing program
- 2) Unencumbered North Carolina License as a Registered Nurse
- 3) Minimum overall GPA of 3.0 in MSN degree
- 4) Statement of Purpose explaining the applicant's career goal and preparation in relation to acute care nurse practitioner role, and qualities making them a strong applicant (See School of Nursing website for required elements of the Statement of

Purpose). (Note: Statement of Purpose should not exceed two double-spaced typed pages.)

- 5) References should be from professional colleagues and should speak to clinical knowledge and expertise and one's ability to function as a member of the healthcare team. At least one reference from a supervisory person is preferred.
- 6) Graduate Health Assessment course equivalent within the last 5 years**
- 7) Graduate Pharmacology course equivalent within the last 5 years**
- 8) Graduate Pathophysiology within the last 5 years**

***Nurses certified as Adult or Family, Psych, or Pediatric nurse practitioners may have these courses waived from the admission requirements after assessment of transcripts. Nurses with other backgrounds will be evaluated on an individual basis.*

Application is competitive. Students are admitted annually in the Fall semester. See the School of Nursing website at nursing.uncc.edu for application deadline. Plan of Study is individualized based on course availability.

Certificate Requirements

- NUNP 6202 Complex Healthcare management of Adults (3)
- NUNP 6203 Advanced Care of Critically Ill Adults (3)
- NUNP 6250 Advanced Primary Care and Health Promotion of Adults Across the Lifespan (3)
- NUNP 6401 Advanced Care and Health Promotion Adults Practicum (2)***
- NUNP 6402 Advanced Practice Nursing in Complex Care Practicum (4)***
- NUNP 6403 Advanced Care of Critically Ill Adults Practicum (4)***
- NUNP 6431 Advanced Acute Care Skills Lab (1)***

Note: Nurses with other backgrounds will be evaluated on an individual basis.

****Clinical Course that requires 60 hours practice for each 1 credit hour. Clinical courses may require travel to clinical sites outside Charlotte and Mecklenburg County.*

FAMILY NURSE PRACTITIONER ACROSS THE LIFESPAN

This specialty leads to a MSN with a specialty in Family Nurse Practitioner Across the Lifespan. These Advanced Practice Registered Nurses (APRN) will be prepared to function as Nurse Practitioners providing primary care to families across the lifespan. The

graduates of this program will be eligible to take the American Nurses Credentialing Center (ANCC) or American Academy of Nurse Practitioners (AANP) examination for Nurse Practitioner Across the Lifespan certification. The Family Nurse Practitioner program is a full-time, campus-based program.

Additional Admission Requirements

- 1) Unencumbered license as a Registered Nurse in North Carolina
- 2) BSN degree from a nationally accredited program. The RN-to-MSN option is not available to NP applicants.
- 3) One year of professional nursing practice
- 4) Overall GPA of 3.0 on a 4.0 scale in the last degree and in the last 60 hours of nursing coursework
- 5) Completion of an undergraduate statistics course with a grade of C or above
- 6) Statement of Purpose explaining the applicant's career goal and preparation in relation to primary care and family practice, and qualities making them a strong applicant (see nursing.uncc.edu for required elements of the Statement of Purpose). *(Note: Statement of Purpose should not exceed two double-spaced typed pages.)*
- 7) References should be from professional colleagues and should speak to clinical knowledge and expertise and one's ability to function a member of the healthcare team. At least one reference from a supervisory person is preferred.

Application is competitive. Students are admitted annually in the Fall semester. See the School of Nursing website at nursing.uncc.edu for application deadline.

Degree Requirements

The program requires completion of 46 credit hours in approved courses.

Core Courses (9 credit hours)

- NURS 6101 Theoretical Basis for Nursing Practice (3)
 NURS 6160 Research in Nursing and Health Professions (3)
 NURS 6115 Health Policy and Planning in the U.S. (3)

Cognate Courses (6 credit hours)

- BIOL 6274 Advanced Human Pathophysiology (3)
 STAT 6127 Introduction to Biostatistics (3)

Advanced Clinical Core (7 credit hours)

- NURS 6220 Pharmacotherapeutics in Advanced Nursing Practice (3)
 NURS 6230 Advanced Health Assessment and Diagnostic Reasoning for Advanced Practice (3)

- NURS 6430 Advanced Health Assessment Practicum (1)*

FNP Specialty Courses (21 credit hours)

- NUNP 6240 Advanced Primary Care Reproductive Health (3)
 NUNP 6250 Advanced Primary Care and Health Promotion of Adults Across the Lifespan (3)
 NUNP 6260 Advanced Primary Care of Children and Adolescents (3)
 NUNP 6400 Internship in Family Health Nursing (4)*
 NUNP 6440 Advanced Primary Care Reproductive Health Practicum (2)*
 NUNP 6450 Advanced Primary Care and Health Promotion of Adults Practicum (2)*
 NUNP 6460 Advanced Primary Care of Children and Adolescents Practicum (2)*
 NURS 6210 Family Health In Advanced Practice Nursing (2)

Synthesis Project (3 credit hours)

- NURS 6601 Synthesis and Integration in Advanced Nursing Practice I (1)
 NURS 6602 Synthesis and Integration in Advanced Nursing Practice II (2)

Additional Degree Requirements

- 1) A minimum of 600 hours of supervised clinical experience as a Nurse Practitioner is required.
- 2) Students may receive no more than one C grade in any graduate course. The second C will result in suspension from the program.
- 3) In order to progress in the specialty, a grade of B is required in the following courses:
 - a) BIOL 6274 Advanced Human Pathophysiology (3)
 - b) NURS 6220 Pharmacotherapeutics in Advanced Nursing Practice (3)
 - c) NURS 6230 Advanced Health Assessment and Diagnostic Reasoning for Advanced Practice (3)
 - d) NURS 6430 Advanced Health Assessment Practicum (1)*
 - e) All required courses with a NUNP prefix.
- 4) Faculty advising is required.

**Clinical Course that requires 60 hours practice for each 1 credit hour. Clinical courses may require travel to clinical sites outside Charlotte and Mecklenburg County.*

Research Opportunities

Students who choose to do so will have the opportunity to serve as Research Assistants on faculty research projects. Students will have an opportunity to choose a mentored research experience in their Synthesis courses.

POST-MASTER'S CERTIFICATE IN ADVANCED PRACTICE REGISTERED NURSING: FAMILY NURSE PRACTITIONER ACROSS THE LIFESPAN

The certificate consists of specialty courses in advanced practice nursing (minimum 21 credit hours). This certificate program prepares nurses holding master's degrees in nursing to enter advanced practice nursing in primary care as a Family Nurse Practitioner. Nurses already certified as Psych NPs, Women's Health or Pediatric NPs will be evaluated for possible exclusion of respective specialty courses and practica from their program. The recipients of this certificate will be eligible to take the American Nurses Credentialing Center (ANCC) or the American Academy of Nurse Practitioner (AANP) examination for Family Nurse Practitioner Across the Lifespan certification. Coursework must be completed within four years and a 3.0 (B) grade point average is required. The Family Nurse Practitioner program is a full-time, campus-based program.

Admission Requirements

- 1) A master's degree in nursing from a nationally accredited nursing program
- 2) Unencumbered North Carolina License as a Registered Nurse
- 3) Overall GPA of 3.0 on a 4.0 scale in the MSN degree
- 4) Statement of Purpose explaining the applicant's career goal and preparation in relation to primary care and family practice, and qualities making them a strong applicant (See School of Nursing website for required elements of the Purpose Statement). *(Note: Statement of Purpose should not exceed two double-spaced typed pages.)*
- 5) References should be from professional colleagues and should speak to clinical knowledge and expertise and one's ability to function as a member of the healthcare team. At least one reference from a supervisory person is preferred.
- 6) Applicants who meet admission requirements will be eligible to be invited for an interview with the nurse practitioner sub-committee.
- 7) Graduate Health Assessment course equivalent within the last 5 years**
- 8) Graduate Pharmacology course equivalent within the last 5 years**
- 9) Graduate Pathophysiology within the last 5 years**

Application is competitive. Students are admitted annually in the Fall semester. See the School of

Nursing website at nursing.uncc.edu for application deadline.

***Nurses certified as adult nurse practitioners, women's health nurse practitioners, or pediatric nurse practitioners may have these courses waived from the admission requirements after assessment of transcripts. Nurses with other backgrounds will be evaluated on an individual basis.*

Certificate Requirements

- NUNP 6240 Advanced Primary Care Reproductive Healthcare (3)***
- NUNP 6250 Advanced Primary Care and Health Promotion of Adults Across the Lifespan (3)**
- NUNP 6260 Advanced Primary Care of Children and Adolescents (3)****
- NUNP 6400 Internship in Family Health Nursing (4)
- NUNP 6440 Advanced Primary Care Reproductive Healthcare Practicum (2)***
- NUNP 6450 Advanced Primary Care and Health Promotion of Adults Practicum (2)**
- NUNP 6460 Advanced Primary Care of Children and Adolescents Practicum (2)****
- NURS 6210 Family Health in Advanced Practice Nursing (2)

**Clinical Course that requires 60 hours practice for each 1 credit hour. Clinical courses may require travel to clinical sites outside Charlotte and Mecklenburg County.*

***Nurses certified as Adult nurse practitioners will not be required to take these courses.*

****Nurses certified as Women's Health nurse practitioners will not be required to take these courses.*

*****Nurses certified as Pediatric nurse practitioners will not be required to take these courses.*

MASTER OF SCIENCE IN NURSING (MSN): ADULT PSYCHIATRIC MENTAL HEALTH *(inactive; not currently being offered)*

The Adult Psychiatric Mental Health Clinical Nurse Specialist track focuses on the role of the advanced practice PMHN in the assessment and management of individuals, groups, and communities. Graduates of this program will be prepared to complete requirements for certification as a Clinical Specialist in Adult Psychiatric and Mental Health Nursing.

Additional Admission Requirements

- 1) A Graduate Record Exam (GRE) (score of 500 on each of 2 of the 3 sections) or the Miller Analogy (MAT) (score of 400 or above) is required
- 2) Rolling admissions: applicants may apply any time

- 3) A GPA of at least 3.0 on the last 60 credit hours
- 4) Computer competency

Degree Requirements

This program requires 43 credit hours as follows:

Core Courses (15 credit hours)

- NURS 6101 Theoretical Basis for Nursing Practice (3)
 NURS 6115 Health Policy and Planning in the U.S. (3)
 NURS 6160 Research in Nursing and Health Professions (3)
 NURS 6210 Family Health in Advanced Practice Nursing (2)

Specialty Courses (22 credit hours)

- NURS 6220 Pharmacotherapeutics for Advanced Nursing Practice (3)
 NURS 6230 Advanced Health Assessment and Diagnostic Reasoning (2)
 NURS 6430 Advanced Health Assessment Practicum (1)
 NUMH 6200 Psychiatric Mental Health Theories and Constructs of Mental Healthcare (3)
 NUMH 6130 Advanced Psychiatric Mental Health Nursing Practice with Individuals (2)
 NUMH 6430 Practicum in Advanced Practice Psychiatric Mental Health Nursing with Individuals (2)
 NUMH 6135 Advanced Psychiatric Mental Health Nursing Practice with Groups and Communities (2)
 NUMH 6435 Practicum in Advanced Practice Psychiatric Mental Health Nursing with Groups and Communities (2)
 NUMH 6201 Seminars in Advanced Practice Psychiatric Mental Health Nursing (1)
 NUMH 6401 Internship in Advanced Psychiatric Mental Health Nursing Practice (4)

Cognate Courses (6 credit hours)

- STAT 6127 Introduction to Biostatistics (3)
 BIOL 6273 Advanced Human Physiology (3)

Additional Degree Requirements

- 1) A total of 540 hours of supervised clinical practice experience is required to complete the program
- 2) Faculty advising is required each semester

Systems/Populations Specialties

MASTER OF SCIENCE IN NURSING (MSN): NURSE ADMINISTRATION (distance education)

This specialty prepares nurses for advanced practice in administrative roles such as Nurse Executive, Nurse Manager, Quality Improvement Manager, Ambulatory Care Manager or other system level nursing positions in community agencies, healthcare facilities, health departments and schools of nursing. Graduates will meet the educational requirements for the American Nurses Credentialing Center (ANCC) certification in Nursing Administration or Nursing Administration Advanced (CNAA).

Additional Admission Requirements

- 1) Current unrestricted licensure as a Registered Nurse. Current license in North Carolina or a compact state or the state identified by faculty for clinical practice before enrollment.
- 2) Baccalaureate degree from an accredited university. If the degree is not in Nursing and courses in Research, Leadership/Management, Aging and Health and Community Health are lacking, they will be required as part of the program of study (option available only to Nurse Administration, Community/Public Health Nursing, and Nurse Educator majors).
- 3) One year of professional nursing practice is recommended.
- 4) An essay (statement of purpose) describing the applicant's experience and objective in undertaking graduate study in the chosen specialty including the qualities making them a strong applicant (See SON webpage for required elements of the Purpose Statement).
- 5) Overall GPA of at least 3.0 in the last degree earned.
- 6) Completion of a statistics course with a grade of C or above.
- 7) See School of Nursing website for admission deadlines.

Degree Requirements

This program requires completion of 36 credit hours in approved courses including:

Core Courses (9 credit hours)

- NURS 6101 Theoretical Basis for Nursing Practice (3)
 NURS 6160 Research in Nursing and Health Professions (3)
 NURS 6115 Health Policy and Planning in the U.S. (3)

System Core Courses (6 credit hours)

NURS 6211 Health Disparities and Nursing (3)

- OR -

NURS 6090 Selected Topics (Study Abroad)

NURS 6212 Program Improvement and Evaluation (3)

Specialty Courses (18 credit hours)

NURS 6185 Theory and Application in the Organizational Behavior to Nursing Systems (3)

NURS 6187 Health Informatics and Financial Management for Nurses (3)

NURS 6188 Strategic Planning and Decision Making in Nursing (3)

NURS 6301 Curriculum Planning and Instruction (3)

NURS 6485 Advanced Practicum in Nursing Administration and Leadership (3)

NURS 6303 Instructional Technology in Nursing Education (3)

- OR -

NURS 6302 Trends and Issues in Nursing Education (3)

Capstone Courses (3 credit hours)

NURS 6601 Synthesis in Advanced Nursing Practice I (3)

NURS 6602 Synthesis in Advanced Nursing Practice II (3)

Additional Degree Requirements

- 1) Nursing Administration specialty courses are only offered online through Distance Education. Core and System/Population Core courses can be taken on campus or online as published in the Schedule of Courses.
- 2) Courses in the Nursing Administration specialty are offered every other year.
- 3) A total of 360 clinical hours is required to complete the program.
- 4) Students must maintain a minimum 3.0 (B) GPA in their graduate courses, and may not accumulate more than two C grades.
- 5) Faculty Advising is required.
- 6) Access to computer within minimum requirements for online courses. Current minimum computer hardware specifications are listed by Distance Education online at distanceed.uncc.edu.

GRADUATE CERTIFICATE: NURSE ADMINISTRATION (distance education)

The Certificate in Nursing Administration is designed for nurses who hold a bachelor's degree and desire to enhance their administrative skills and advanced practice nurses with master's degree who desire

additional knowledge to be competitive in managing personnel or groups.

The Nursing Administration certificate program of study consists of specialty courses in nursing administration (12 graduate credit hours). Students will complete four specialty courses. The certificate can be completed in one year through part-time study.

Admission Requirements

- 1) Baccalaureate degree from an accredited college or university
- 2) Graduation from a post-secondary level Nursing Program (United States RN Registration not required)
- 3) An essay (statement of purpose) in application packet that includes a description of a selected area of specialization in nursing practice
- 4) Three letters of professional recommendation
- 5) GRE or MAT is not required for certificate program

Certificate Requirements (12 hours)

NURS 6185 Theory and Application in the

Organizational Behavior to Nursing Systems (3)

NURS 6187 Health Informatics and Financial Management for Nurses (3)

NURS 6188 Strategic Planning and Decision Making in Nursing (3)

NURS 6212 Program Improvement and Evaluation (3)

Additional Certificate Requirements

- 1) Completion of 12 hours of required coursework within four years
- 2) Students must maintain a minimum 3.0 (B) GPA in their graduate courses and may not accumulate more than two C grades
- 3) Access to a computer with minimum requirements for online courses. Current minimum computer hardware specifications are listed by Distance Education online at distanceed.uncc.edu

MASTER OF SCIENCE IN NURSING (MSN): NURSE EDUCATOR (distance education)

This specialty focuses on preparing nurses for advanced practice as a Nurse Educator in a selected area of expertise. Students declare their specialty in their application and develop a portfolio from their graduate work demonstrating their expertise. Graduates are prepared for academic positions teaching nursing at the entry into practice or RN-BSN levels. Graduates who have two years of full-time

teaching experience will be prepared to take the NLN certification exam for Nurse Educators.

Additional Admission Requirement

- 1) Current unrestricted licensure as a Registered Nurse. Current license in North Carolina or a compact state or the state identified by faculty for clinical practice before enrollment.
- 2) Baccalaureate degree from an accredited university. If the degree is not in Nursing and courses in Research, Leadership/Management, Aging and Health and Community Health are lacking, they will be required as part of the program of study (option available only to Nurse Administration, Community/Public Health Nursing, and Nurse Educator majors).
- 3) One year of professional nursing practice is recommended.
- 4) An essay (statement of purpose) describing the applicant's experience and objective in undertaking graduate study in the chosen specialty including the qualities making them a strong applicant (See SON webpage for required elements of the Purpose Statement)..
- 5) Overall GPA of at least 3.0 in the last degree earned.
- 6) Completion of a statistics course with a grade of C or above.
- 7) See School of Nursing website for admission deadlines.

Degree Requirements

This program requires completion of 39 credit hours in approved courses. Including:

Core Courses (12 credit hours)

- NURS 6101 Theoretical Basis for Nursing Practice (3)
 NURS 6160 Research in Nursing and Health Professions (3)
 NURS 6115 Health Policy & Planning in the U.S. (3)
 STAT 6127 Introduction to Biostatistics (3)

System Core Courses (6 credit hours)

- NURS 6211 Health Disparities and Nursing (3)
 or NURS 6090 Selected Topics (Study Abroad) (3)
 NURS 6212 Program Improvement and Evaluation (3)

Specialty Courses (18 credit hours)

- NURS 6495 Clinical Nurse Specialist Practicum (3)
 NURS 6301 Curriculum and Instruction in Nursing Education (3)
 NURS 6302 Trends and Issues in Nursing Education (3)
 NURS 6303 Instructional Technology in Nursing Education
 NURS 6304 Teaching Nursing Practicum (3)

Elective Course

Select one of the following:

- NURS 6185 Theory and Application in the Organizational Behavior to Nursing Systems (3)
 NURS 6187 Health Informatics and Financial Management for Nurses (3)
 NURS 6188 Strategic Planning and Decision Making in Nursing (3)
 NURS 6275 Health Promotion, Nutrition, and Wellness for Older Adults (3)
 NURS 6301 Curriculum and Instruction in Nursing Education (3)
 NURS 6302 Trends and Issues in Nursing Education (3)
 NURS 6303 Instructional Technology in Nursing Education (3)
 EIST 5100 Technology Integration in Education (3)
 EIST 6000 Topics in Instructional Systems Technology (16)
 EIST 6100 Foundations of Instructional Systems Technology (3)
 EIST 6101 Learning Principles in Instructional Systems Technology (3)
 EIST 6110 Instructional Design (3)
 EIST 6135 Learning Media, Resources, and Technology (3)

Capstone Courses (3 credit hours)

- NURS 6601 Synthesis in Advanced Nursing Practice I (1)
 NURS 6602 Synthesis in Advanced Nursing Practice II (2)

Additional Degree Requirements

- 1) It is expected that the student will develop a portfolio demonstrating expertise in a specialization during this program of study.
- 2) A total of 180 hours in a clinical specialty and 180 hours of supervised teaching experience, individually arranged, is required.
- 3) Faculty Advising is required.
- 4) Access to computer within minimum requirements for online courses. Current minimum computer hardware specifications are listed by Distance Education online at distanceed.uncc.edu.

GRADUATE CERTIFICATE: NURSE EDUCATOR (distance education)

The Graduate Certificate in Nursing Education is designed to prepare nurses who have a BSN or MSN to become educational leaders in academic and clinical settings. This certificate consists of four courses, for a total of 12 credit hours and can be completed within one calendar year. The Graduate Certificate provides students with the coursework

needed to enhance the student's professional teaching skills.

Admission Requirements

- 1) A BSN or Master of Science in Nursing (MSN) degree from a nationally accredited program
- 2) Current unrestricted licensure as a Registered Nurse
- 3) An essay (statement of purpose) in application packet that includes a description of a selected area of specialization in nursing practice. It is expected that the student will develop a portfolio demonstrating expertise in a specialization during this program of study.
- 4) Three letters of professional recommendation
- 5) GRE or MAT is not required for certificate program

Certificate Requirements (12 credit hours)

- NURS 6301 Curriculum and Instruction in Nursing Education
 NURS 6302 Trends and Issues in Nursing Education
 NURS 6303 Instructional Technology in Nursing Education
 NURS 6304 Teaching Practicum in Nursing Education

Additional Certificate Requirements

- 1) A total of 180 hours of supervised teaching experience, individually arranged, is required
- 2) Access to computer within minimum requirements for online courses. Current minimum computer hardware specifications are listed by Distance Education online at distanceed.uncc.edu.

MASTER OF SCIENCE IN NURSING (M.S.N.): COMMUNITY/PUBLIC HEALTH NURSING (*distance education*)

The Community/Public Health Nursing specialty prepares nurses to assume leadership in assessing communities and populations, identifying high risk groups, and in partnership with communities, consumers, and stakeholders, developing culturally sensitive, acceptable and realistic community based nursing services.

Graduates are expected to demonstrate PHN Competencies and characteristics of practice identified by the Quad Council (2004). Upon graduation, individuals will be qualified to sit for the exam leading to Board Certification by the American Nurses Credentialing Center (ANCC) as an Advanced Public Health Nurse.

Additional Degree Requirements

- 1) Current unrestricted licensure as a Registered Nurse. Current license in North Carolina or a compact state or the state identified by faculty for clinical practice before enrollment.
- 2) Baccalaureate degree from an accredited university. If the degree is not in Nursing and courses in Research, Leadership/Management, Aging and Health and Community Health are lacking, they will be required as part of the program of study (option available only to Nurse Administration, Community/Public Health Nursing, and Nurse Educator majors).
- 3) One year of professional nursing practice is recommended.
- 4) An essay (statement of purpose) describing the applicant's experience and objective in undertaking graduate study in the chosen specialty including the qualities making them a strong applicant (See SON webpage for required elements of the Purpose Statement).
- 5) Overall GPA of at least 3.0 in the last degree earned.
- 6) Completion of a statistics course with a grade of C or above.
- 7) See School of Nursing website for admission deadlines.

Degree Requirements

This specialty requires completion of 38 credit hours in approved courses including:

Core Courses (9 credit hours)

- NURS 6101 Theoretical Basis for Nursing Practice (3)
 NURS 6160 Research in Nursing and Health Professions (3)
 NURS 6115 Health Policy and Planning in the U.S. (3)

Cognate Courses (9 credit hours)

- HLTH 6202 Community Epidemiology (3)
 STAT 6127 Introduction to Biostatistics (3)

Elective Course

Select one of the following:

- NURS 6185 Theory and Application in the Organizational Behavior to Nursing Systems (3)
 NURS 6187 Health Informatics and Financial Management for Nurses (3)
 NURS 6188 Strategic Planning and Decision Making in Nursing (3)
 NURS 6275 Health Promotion, Nutrition, and Wellness for Older Adults (3)
 NURS 6301 Curriculum and Instruction in Nursing Education (3)
 NURS 6302 Trends and Issues in Nursing Education (3)

NURS 6303 Instructional Technology in Nursing Education (3)
 EIST 5100 Technology Integration in Education (3)
 EIST 6000 Topics in Instructional Systems Technology (16)
 EIST 6100 Foundations of Instructional Systems Technology (3)
 EIST 6101 Learning Principles in Instructional Systems Technology (3)
 EIST 6110 Instructional Design (3)
 EIST 6135 Learning Media, Resources, and Technology (3)

System Core Courses (6 credit hours)

NURS 6211 Health Disparities and Nursing (3)
- OR -
 NURS 6090 Selected Topics (*Study Abroad*)
 NURS 6212 Program Improvement and Evaluation (3)

Specialty Courses (11 credit hours)

NURS 6180 Community/Public Health Nursing (3)
 NURS 6480 Internship I (3)
 NURS 6481 Internship II (3)
 NURS 6210 Family Health in Advanced Practice Nursing (2)

Capstone Courses (3 credit hours)

NURS 6601 Synthesis in Advanced Nursing Practice I (1)
 NURS 6602 Synthesis in Advanced Nursing Practice II (2)

COURSES IN NURSING

Nurse Anesthesia (NUAN)

NUAN 6151. Principles of Nurse Anesthesia I. (3)

Corequisite: NUAN 6156. Overview of the principles, techniques and equipment necessary for the administration of anesthesia for the general surgical client.

NUAN 6152. Principles of Nurse Anesthesia II. (3)

Prerequisite: NUAN 6151. Provides nurse anesthesia students with specific techniques of nurse anesthesia practice for selected clients.

NUAN 6153. Principles of Nurse Anesthesia III. (3)

Prerequisite: NUAN 6152. Advanced nurse anesthesia practice for selected patients. (*Summer*)

NUAN 6154. Advanced Pharmacology of Non-Anesthetic Agents. (4) Prerequisite: NUAN 6156. An exploration of advanced pharmacological concepts and clinical application of non-anesthetic drugs and adjunct agents commonly used in the anesthetic arena.

NUAN 6155. Advanced Pharmacology in Anesthetic Agents. (4) Corequisite: NUAN 6156. An exploration of advanced pharmacological concepts and clinical application of anesthetic drugs.

NUAN 6156. Applied Physics and Chemistry in Nurse Anesthesia. (3) Prerequisite: Admission to the major. Basic laws and principles of physics, inorganic, organic, and biochemistry as they apply to the clinical practice of nurse anesthesia.

NUAN 6157. Advanced Applied Pathophysiology in Nurse Anesthesia I. (3) Prerequisite: BIOL 6273. A study of advanced concepts of the pathophysiologies of the nervous, respiratory, cardiac, renal, and endocrine systems with emphasis on their anesthetic implications.

NUAN 6158. Advanced Applied Pathophysiology in Nurse Anesthesia II. (3) Prerequisite: NUAN 6157. A study of advanced concepts of the pathophysiologies of the nervous, respiratory, cardiac, and hepatobiliary systems, emphasizing anesthetic implications and management.

NUAN 6171. Professional Aspects of Nurse Anesthesia I. (1) Corequisites: NUAN 6153 and NUAN 6485. Overview of the professional aspects of nurse anesthesia practice including history of the profession and professional associations, legal aspects, risk management, and the professional role.

NUAN 6172. Professional Aspects of Nurse Anesthesia II. (1) Prerequisite: NUAN 6171. Corequisite: NUAN 6486. Overview of the professional aspects of nurse anesthesia practice including economic considerations, political challenges, evolving role in the health care system, administrative responsibilities, practice regulations, and ethical principles.

NUAN 6485. Clinical Residency in Nurse Anesthesia I. (5) Prerequisite: NUAN 6153 and satisfactory completion of Clinical Orientation. Clinical application of didactic material from the nurse anesthesia curriculum through beginning level practice in the role of a nurse anesthetist. Conferences during the clinical residency provide opportunities to review current research and practice issues. *Graded on a Pass/Unsatisfactory basis.*

NUAN 6486. Clinical Residency in Nurse Anesthesia II. (5) Prerequisite: NUAN 6485. Continuation of the clinical application of didactic material from the nurse anesthesia curriculum with focus on utilization of additional anesthesia techniques and increased skills development. Conferences during the clinical residency provide opportunities to review current

research and practice issues. *Graded on a Pass/Unsatisfactory basis.*

NUAN 6487. Clinical Residency in Nurse Anesthesia III. (5) Prerequisite: NUAN 6486. Incorporation of the content of the nurse anesthesia curriculum with opportunities to begin synthesis of all didactic material and techniques for efficient clinical practice. Conferences during the clinical residency provide opportunities to review current research and practice issues. *Graded on a Pass/Unsatisfactory basis. (Summer)*

NUAN 6489. Clinical Residency in Nurse Anesthesia IV. (5) Prerequisite: NUAN 6487. Final residency for synthesis of all didactic material and techniques of nurse anesthesia clinical practice, promotion of professional practice, and preparation of the student for national certification examination. Conferences during the clinical residency provide opportunities to review current research and practice issues. *Graded on a Pass/Unsatisfactory basis.*

Nursing Practice – Doctoral (NUDN)

NUDN 8140. Foundations and Applications of Evidence-Based Practice. (3) An overview of models of Evidence-Based Practice, including theories and methods of translational research.

NUDN 8145. Leadership and Project Planning. (3) Introduction to advanced leadership theories to facilitate management of clinical projects.

NUDN 8147. Applied Biostatistics. (3) Emphasizes statistical literacy and develops critical statistical thinking. Students analyze data sets and communicate statistical results in a concise, cohesive, and readable manner.

NUDN 8150. Healthcare Program Evaluation and Quality. (3) An evaluation research course in healthcare settings. Emphasis is on conceptual, methodological, organizational, political, and ethical considerations in evaluating programs.

NUDN 8160. Global Health and Social Justice. (3) An interdisciplinary human rights and social justice perspective of contemporary issues, problems and controversies that effect social, economic, political, and environmental global health.

NUDN 8202. Community Epidemiology. (3) Cross-listed as HLTH 6202. Principles and methods of epidemiology including definitions and models of health, illness and disease; modes of transmission of clinically important infectious agents; risk factors and chronic diseases; and insights into existing studies and

paradigms of health promotion and disease prevention.

NUDN 8220. Healthcare Policy and Ethics. (3) Examines healthcare policy development strategies including the analysis of variables impacting policy implementation (e.g. politics and ethics).

NUDN 8230. Economic and Financial Aspects of Healthcare System. (3) Explores the study of financial and business factors related to health care delivery systems and advanced practice nursing.

NUDN 8260. Leadership and Healthcare Systems. (3) Examines challenges and political issues impacting strategies for organizational design to promote communication, collaboration, conflict management, power sharing, and innovation.

NUDN 8270. Technology for Communication and Transforming Healthcare. (3) Provides opportunities to explore current theories/practices in information systems and health communication, and develop innovative strategies for using emerging information and communication technologies to facilitate patient care and inter-professional collaboration.

NUDN 8441. Clinical Residency and Project Development I. (2) The first of a four-course series that results in a scholarly DNP project. Students negotiate learning objectives with the course instructor for the practicum.

NUDN 8442. Clinical Residency and Project Development II. (2) The second of a four-course series that results in a scholarly DNP project. Builds on NUDN 8441 with a focus on project planning and translation of new knowledge into practice.

NUDN 8443. Clinical Residency and Project Development III. (3) The third of a four-course series that results in a scholarly DNP project. Builds upon knowledge gained in NUDN 8441 and NUDN 8442. Students implement the clinical project in the practice setting.

NUDN 8444. Clinical Residency and Project Development IV. (2) The last of a four-course series that results in a scholarly DNP project. Provides a culmination of NUDN 8441, NUDN 8442, and NUDN 8443. DNP students evaluate the outcomes and impact of the project and disseminates the findings.

Mental Health Nursing (NUMH)

NUMH 6130. Advanced Psychiatric Mental Health Nursing Practice with Individuals. (2) Prerequisite: NUMH 6200. Corequisite: NUMH 6430. Provides a

framework for the examination and application of the therapeutic process by advanced psychiatric mental health nurses with emphasis on theories from nursing as well as psychiatric, behavioral, and cultural sciences. Focuses on the development of the advanced psychiatric mental health nurse in a managed care or traditional healthcare environment as an individual therapist.

NUMH 6135. Advanced Practice Psychiatric Mental Health Nursing Practice with Groups and Communities. (2). Prerequisites: NUMH 6130 and 6430. Corequisite: NUMH 6435. Examination of the therapeutic process of advanced psychiatric mental health nursing with emphasis on groups and communities. Focuses on development of the roles of the advanced practice nurse in a managed care and traditional mental healthcare environment as a group therapist in the promotion of mental health in community settings.

NUMH 6200. Psychiatric Mental Health Theories and Constructs of Mental Healthcare. (3) Pre-or corequisite: NURS 6101. Examination of theoretical frameworks underlying the practice of advanced psychiatric mental health nursing. Integration of biological, psychological, sociological and nursing theories into the student's individual theoretical framework for practice.

NUMH 6201. Seminars in Advanced Practice Psychiatric Mental Health Nursing. (1) Prerequisites: NUMH 6135 and 6435. Corequisite: NUMH 6401. Focuses on the components and professional issues of the advanced practice psychiatric mental health nurse in the care of the individuals, groups, and communities. Professional practice issues will be addressed. One hour of seminar/case presentation.

NUMH 6401. Internship in Advanced Practice Psychiatric Mental Health Nursing. (4) Prerequisite: NUMH 6135 and NUMH 6435. Corequisite NUMH 6201. Focuses on the application of the advanced practice psychiatric mental health nurse's role in the care of the individuals, groups, and communities. Professional practice issues will be addressed with preceptors and faculty. 240 clinical practice hours.

NUMH 6430. Practicum in Advanced Practice Psychiatric Mental Health Nursing with Individuals. (2) Prerequisites: NUMH 6200. Corequisite: NUMH 6130. Application of the individual psychotherapeutic process incorporating therapeutic modalities from nursing as well as psychiatric, behavioral, and cultural sciences in selected clinical experiences. Clinical seminar, clinical conference, and faculty/peer supervision provide opportunities for development of the advanced practice psychiatric

mental health nurse in a managed care or traditional healthcare environment. 120 clinical practice hours.

NUMH 6435. Advanced Psychiatric Mental Health Nursing Practice with Groups and Communities Practicum. (2) Prerequisites: NUMH 6130 and 6430. Corequisites: NUMH 6135. Examination and application of the therapeutic process with emphasis on groups and communities. Clinical seminar, clinical experience and supervision, provide opportunity for development of the advanced practice psychiatric mental health nurse as a group therapist and in promotion of mental health in community settings in a managed care and traditional healthcare environment. 120 clinical practice hours.

Nurse Practitioner (NUNP)

NUNP 6202. Complex Healthcare Management of Adults. (3) Prerequisite: NUNP 6250. Provides students with the opportunity to integrate knowledge from advanced assessment, pathophysiology, pharmacotherapeutics, theory and research to provide the advanced practice nurse with the requisite skills in the management of acutely ill adults in a variety of settings. Emphasis is placed on the use of diagnostic reasoning skills in the assessment, diagnosis, and plan of care, including pharmacological, and non-pharmacological management of acutely ill adults with urgent and emergent complex health issues. Application of models and theories to guide advanced nursing practice and planned evidence-based care of the adult with acute and/or chronic illness is expected in order to promote quality outcomes.

NUNP 6203 Advanced Care of Critically Ill Adults. (3) Prerequisites: NUNP 6202 and NUNP 6250. Provide students with the opportunity to integrate knowledge from advanced assessment, pathophysiology, pharmacotherapeutics, theory, and research to provide the advanced practice nurse with the requisite skills in the management of critically ill adults in a variety of environments. Emphasis is placed on the use of diagnostic reasoning skills in the assessment, diagnosis, and plan of care including pharmacological and non-pharmacological management of critically ill adults with life threatening, rapidly changing physiological, and pathophysiological conditions. Application of models and theories to guide advanced nursing practice and planned evidence-based care of adult with critical illness is expected in order to promote quality outcomes (240 supervised clinical hours).

NUNP 6240. Advanced Primary Care Reproductive Health. (3) Prerequisites: NURS 6220, NURS 6230, and NURS 6430. Pre- or corequisite: NUNP 6250. Focuses on the role of the nurse practitioner in the primary care of family members in the reproductive

stages. Uses a developmental approach to provide knowledge needed for advanced understanding and care of common health concerns related to the reproductive organs, including the genitourinary, and reproductive cycles of men and women. Concepts of health promotion, health maintenance, cultural competence and environmental variations are integrated throughout the course.

NUNP 6250. Advanced Primary Care and Health Promotion of Adults Across the Lifespan. (3)

Prerequisites: NURS 6220, NURS 6230, and NURS 6430. Builds on knowledge of advanced assessment, pathophysiology, pharmacotherapeutics, and theory and research to provide the advanced practice nurse with the framework to manage adults with chronic illness in healthcare settings. Emphasis is placed on a wellness focus in the care of adults throughout the life span with common reoccurring acute illnesses and stable chronic conditions. Models of health promotion, disease prevention, health education and wellness will be used to guide the advanced practice nurse in assessing, diagnosing and planning care for adults. The case study approach is used as a framework to implement the diagnostic reasoning and clinical decision making process.

NUNP 6260. Advanced Primary Care of Children and Adolescents. (3) Prerequisites: NURS 6220, NURS 6230, NURS 6430, NUNP 6250, and NUNP 6450. Corequisite: NUNP 6460. Focus is on the role of the family nurse practitioner in the primary care of families with children and adolescents. The course uses a developmental approach to providing knowledge needed for advanced clinical decision making related to children with common health problems including acute episodic illness and stable chronic disease. Concepts of health promotion and maintenance and cultural and environmental variables are integrated throughout.

NUNP 6400. Internship in Family Health Nursing. (4) Prerequisites: NUNP 6240, NUNP 6250, and NUNP 6260. Role of the family nurse practitioner in the assessment and management of the health of individuals and families across the lifespan. Implementation of clinical decision making skills in family health promotion and management of acute episodic and stable chronic conditions and consideration of professional practice issues. Includes one credit hour of seminar/case presentation and three credit hours of clinical practice. 240 clinical hours. Individually arranged. (*Summer*)

NUNP 6401. Advanced Care and Health Promotion Adults Practicum. (2) Pre- or corequisite: NUNP 6250. Emphasis on the role of the advanced practice nurse in promoting healthy life-styles to prevent or minimize the effects of chronic illness. Students

incorporate critical thinking and diagnostic reasoning in assessing, diagnosing, monitoring, coordinating, managing outcomes and communicating healthcare findings of adults and their families in individually arranged ambulatory care settings. 120 supervised clinical hours.

NUNP 6402. Advanced Practice Nursing in Complex Care Practicum. (4) Pre- or corequisite: NUNP

6202. This clinical course focuses on treatment and outcome management of acutely ill clients with multi-system problems. Emphasis on the role of the advanced practice nurse in helping acutely ill adults manage the effects of urgent and emergent complex health issues and achieve quality outcomes in individually arranged ambulatory care settings. 240 supervised clinical hours.

NUNP 6403. Advanced Care of Critically Ill Adults Practicum. (4) Prerequisite: NUNP 6402. This

clinical course focuses on the outcome management of critically ill adults with life threatening, rapidly changing physiological and pathophysiological conditions. Emphasis is on the role of the advanced practice nurse in developing, implementing and evaluating advanced care of critically ill adults. Clinical experiences are designed to provide opportunities in management and delivery of evidence-based care for the achievement of quality outcomes in a variety of healthcare environments. 240 supervised clinical hours.

NUNP 6431. Advanced Acute Care Skills Lab. (1)

Pre- or corequisites: NURS 6230 and NURS 6430. Clinical practicum provides an opportunity for students to learn and practice commonly encountered advanced critical care skills required for performing assessments and technical procedures on acutely and critically ill adults. 60 lab/clinical hours.

NUNP 6440. Advanced Primary Care Reproductive Health Practicum. (2) Pre- or corequisite: NUNP

6240. This clinical course is designed to provide the family nurse practitioner student with the opportunity to manage the reproductive and GU care in primary care settings. Uses a developmental approach to increase competence in providing care to clients from diverse backgrounds. The focus is on the synthesis of knowledge from the physical and psychosocial sciences to formulate advanced clinical decisions effective in reproductive healthcare. 120 supervised clinical hours. Individually arranged.

NUNP 6450. Advanced Primary Care and Health Promotion of Adults Practicum. (2) Pre- or

corequisite: NUNP 6250. This clinical course is designed to provide family nurse practitioner students the opportunity to manage the healthcare of adults in primary care settings. Uses a developmental

approach to manage the care of adults from diverse backgrounds. The focus is on the synthesis of knowledge from the physical and psychosocial sciences to formulate advanced clinical decisions effective in the healthcare of adults and their families. 120 supervised clinical hours. Individually arranged.

NUNP 6460. Advanced Primary Care of Children and Adolescents Practicum. (2) Prerequisites: NURS 6220, 6230, and 6430; NUNP 6250 and 6450. Corequisite: NUNP 6260. This clinical course is designed to provide family nurse practitioner students the opportunity to manage the healthcare of children and adolescents in primary care settings. Uses a developmental approach to guide management of the healthcare of children and adolescents from diverse backgrounds. The focus is on the synthesis of knowledge from the physical and psychosocial sciences to formulate advanced clinical decisions effective in the healthcare of children and adolescents and their families. 120 clinical hours. Individually arranged.

Nursing (NURS)

NURS 6090. Selected Topics in Nursing. (1-3) Prerequisite: Permission of instructor. Topics to be chosen from the specialties of nursing. *May be repeated for credit with change of topic.* No more than six hours of topics and/or independent study course credit in nursing may be applied toward degree requirements.

NURS 6100. Chronic Illness Concepts and Theories for Advanced Nursing Practice. (3) Focus on contemporary chronic illness concepts and theories relevant to individuals and families coping with long-term health deviations and their impact on society. Emphasis on knowledge and skills needed for advanced nursing practice.

NURS 6101. Theoretical Basis for Nursing Practice. (3) Philosophical foundations and knowledge development in nursing. Evaluation of theories, models and their relationships to practice.

NURS 6115. Health Policy and Planning in the U.S. (3) Prerequisite: Graduate standing. Overview of the organization and financing of the healthcare delivery system in the United States. Analysis of healthcare policy, financing, political trends, ethical, and professional issues, including the theoretical underpinning of health policy making, the empirical thrusts of policy analysis and research, and the relationship between health policy making and political process in the practice of nursing and healthcare.

NURS 6150. Health of Immigrant Populations in the United States. (3) This course examines the health of immigrant populations within the context of a nation of origin, the process of migration, and resettlement experiences. Explores theoretical frameworks that may explain socialization of groups to surrounding societies. Examines selected traditional healing modalities and essential components of culturally competent healthcare practice.

NURS 6160. Research in Nursing and Health Professions. (3) Methods of inquiry for research will be explored and critiqued nursing and the health professions. Emphasis is on translational research for evidence based developing skills useful for conducting and evaluating research, using research in practice and program evaluation.

NURS 6162. Information Resource Management. (3) Cross-listed as HADM 6146 and HCIP 6146. Adaptation of technological innovation (Informatics) to the field of nursing, including theoretical and applied computer utilization, patient acuity and quality assurance components to the professional practice of nursing.

NURS 6175. Nursing Informatics. (3) Adaptation of technological innovation (Informatics) to the field of nursing, including theoretical and applied computer utilization, patient acuity and quality assurance components to the professional practice of nursing.

NURS 6180. Community/Public Health Nursing Theory and Practice. (3) This course examines how population-based theories and practice inform advanced practice community/public nursing in communities and schools. It focuses on core public health functions and competencies, public health law and ethics, the role of C/PHN in influencing public health policies, Healthy People goals and objectives, and collaboration with communities to assess, plan, develop, implement, and evaluate culturally competent health promotion programs.

NURS 6185. Theory and Application in the Organizational Behavior to Nursing Systems. (3) Prerequisite: NURS 6101 or permission of the instructor. Examination of organization theory, management theory and their applications to critical nursing administrative leadership issues. Standards and Frameworks of competencies in Nursing Administration are reviewed as guidelines for career development. Evidence-based management and promotion of a culture of safety is explored as a basis for health related organizational development.

NURS 6187. Health Informatics and Financial Management for Nurses. (3) Emphasizes the

managerial aspects of health administration finance that nurse managers need in order to interact with the information technology applications utilized in financial and budgeting systems. Increasingly financial decisions are influenced by information gathered using multiple media and resources. Budget and internal control, including auditing concepts and techniques are introduced as management control techniques. The following financial methods are presented as decision models for creating a culture of safety: forecasting, capital budgeting, and capital access. In addition, the managerial implications of cost analysis, cost behavior, capital investment decisions, equity and debt financing, and lease/purchase decisions are included.

NURS 6188. Strategic Planning and Decision Making in Nursing. (3) Strategic decision-making and problem solving theories and techniques for analysis and forecasting with attention to the processes and context of the situation. Strategic planning addresses identifying system vulnerabilities in building safety and resilience in an organization. Students learn to apply selected descriptive and inferential statistical quantitative management tools useful in the analysis of managerial decisions and how to interpret findings. Avoiding common decision errors that occur because of faulty, ingrained mental models are explored.

NURS 6206. Health Assessment for School Nurses. (3) Provides the knowledge and skills for school nurses to incorporate concepts from growth and development in a comprehensive health assessment of diverse children and adolescents. The focus is on identifying normal parameters and providing health promotion interventions. (3)

NURS 6207. Care of the Child and Adolescent in Schools. (3) Prerequisite: NURS 6206. Provides the knowledge and skills for needed by advance practice C/PHNs to manage the health of children and adolescents in schools. Builds on knowledge base of child and adolescent growth and development. Concepts of health promotion, family theory, behavioral health, culture and environmental health are integrated throughout the course.

NURS 6210. Family Health in Advanced Practice Nursing. (2) An overview of the family as the basic unit of advanced nursing care. Focuses on strategies of family assessment, family empowerment, and family health promotion. Includes reviews of relevant theories, concepts and research for the assessment and management of family health and the analysis of the socio-cultural context of families.

NURS 6211. Health Disparities and Nursing. (3) Examines various theoretical frameworks relative to interactions of ethnic heritage, cultural environment,

and social/racial stratification, and development of cultural competence in Advanced Nursing Practice. It examines ethical, legal, regulatory standards that inform advanced practice and evaluates alternative strategies that nurses in advanced practice can use to provide culturally competent interventions to diverse populations, patients, organizations, and communities.

NURS 6212. Program Improvement and Evaluation. (3) Focuses on planning, evaluating, and improving health programs. Includes steps in problem analysis and needs assessment, logistics of program management and implementation, evaluation, and quality improvement within systems and community oriented advanced nursing practice.

NURS 6220. Pharmacotherapeutics in Advanced Nursing Practice. (3) Principles of pharmacology and drug therapy for advanced nursing practice including legal and social considerations related to prescriptive authority and prescribing patterns. Satisfies NC Board of Nursing requirements for nurse practitioner.

NURS 6230. Advanced Health Assessment and Diagnostic Reasoning for Advanced Practice. (3) Pre- or corequisite: BIOL 6273 or BIOL 6274. Corequisite: NURS 6430. Provides the knowledge and skills necessary for advanced practice nurses to synthesize concepts from nursing and the biopsychosocial sciences in the comprehensive health assessment of adults and children. The diagnostic reasoning process, differential diagnosis, advanced health evaluation techniques, laboratory tests, diagnostic studies and interpretation and evaluation of findings are incorporated into the course. Collaborative relationships between the nurse practitioner role and the nurse anesthetist role are developed through analysis of case studies.

NURS 6275. Health Promotion, Nutrition, and Wellness for Older Adults. (3) Cross-listed as GRNT 6275. Prerequisite: Graduate standing or permission of the instructor. Explores self-care measures and health promotion practices with an emphasis on nutrition, that promote a healthy lifestyle. Topics include: principles of teaching and learning adapted to diverse older adults' needs and learning styles. Common barriers to healthcare and appropriate nutrition in older adults are also examined. Current findings from research will be integrated throughout the course. A foundational knowledge of human development is expected.

NURS 6301. Curriculum and Instruction in Nursing Education. (3) Theories and principles of adult learning. Curriculum/course planning, design, implementation, and evaluation. Creative teaching approaches and technologies. Evaluation of student

learning, including test construction. Teaching/learning/evaluation in the clinical setting.

NURS 6302. Trends and Issues in Nursing Education.

(3) Examination of current trends and issues that nursing educators face: faculty roles and responsibilities, student diversity, student roles and responsibilities, scholarship of teaching, leadership in nursing education, evaluation of teaching effectiveness, curriculum evaluation/accreditation, and legal and ethical issues.

NURS 6303. Instructional Technology in Nursing Education.

(3) Introduction to instructional design using a variety of computer and technology-based media. The focus is on assisting students to gain skills in choosing appropriate instructional technologies in enhancing learning in both traditional and clinically-based educational settings.

NURS 6304. Teaching Practicum in Nursing Education.

(3) Prerequisites: NURS 6301, NURS 6302, and NURS 6303. Guided experience with a master teacher in nursing for classroom and clinical teaching and evaluation, planned in the student's locale by student and faculty, plus online discussion forum. Design of a teaching portfolio. Design, implementation, and evaluation of course/class/clinical content. Includes 180 supervised clinical hours.

NURS 6430. Advanced Health Assessment and Diagnostic Reasoning Practicum.

(1) Pre- or corequisite: BIOL 6273 or BIOL 6274. Corequisite: NURS 6230. This clinical practicum is designed to provide an opportunity for students to practice advanced health assessment skills on clients across the lifespan. Comprehensive health histories and physical examination techniques are used to complete a database on clients to formulate differential diagnoses and make advanced clinical decisions. Includes 60 lab/clinical hours.

NURS 6480. Community/Public Health Nursing Internship I.

(3) Pre- or corequisites: HLTH 6202, NURS 6180, NURS 6211, and NURS 6212. Corequisite: NURS 6601. Internship I is the first of a two-semester clinical course for students in population or school nursing options. It is competency-based and is designed to reflect population-based advanced practice nursing in multiple settings. Students work under direct supervision of an assigned MSN-prepared preceptor to assess the need for a project and then to design an intervention. The internship builds on knowledge and skills from prior courses in the program. Placement with a preceptor is determined individually in consultation with the student. Includes 180 clinical hours.

NURS 6481. Community/Public Health Nursing Internship II.

(3) Prerequisite: NURS 6480 and NURS 6601. Internship II is the second of a two-semester clinical course that builds on knowledge and skills from prior courses in Community/Public Health Nursing. It is competency-based and is designed to reflect population-based practice in multiple settings. Students work under direct supervision of an assigned MSN-prepared preceptor to assess the need for a project and then to design an intervention. Placement continues with the same preceptor from Internship I. Includes 180 clinical hours.

NURS 6485. Advanced Practicum in Nursing Administration and Leadership.

(3) Prerequisite: NURS 6185. This practicum provides a guided administrative experience in a health related agency. Designed as a course where students synthesize nursing research, practice and theory in a project for improving the culture of safety under the supervision of a selected preceptor. Includes 180 clinical hours.

NURS 6495. Clinical Nurse Specialist Practicum.

(3) This clinical course emphasizes clinical nurse specialist practice. Students advance their clinical nursing expertise within a chosen specialty including the integration and application of client assessment and management skills in diverse settings. They gain an understanding of the role of the CNS including the prevention and treatment of illness and promotion of health within the care of individuals, families, groups and communities.

NURS 6601. Synthesis in Advanced Nursing Practice I.

(1) The course sequence of NURS 6601 and NURS 6602 examines and synthesizes existing levels of evidence for practice in a selected area with application to a health-related project. Students design and conduct a mentored clinical project that builds on existing theoretical and research foundations. The course sequence is taken in the last year of the student's program of study.

NURS 6602. Synthesis in Advanced Nursing Practice II.

(2) Prerequisite: NURS 6601. The course sequence of NURS 6601 and NURS 6602 examines and synthesizes existing levels of evidence for practice in a selected area with application to a health-related project. Students design and conduct a mentored clinical project that builds on existing theoretical and research foundations. The course sequence is taken in the last year of the student's program of study.

NURS 6661. Research Seminar.

(2) Prerequisites: NURS 6160 and graduate statistics. Application of inquiry methods to nursing problems including systematic observation and critical analysis of

research methods. Submission of a written research or project proposal is required.

NURS 6895. Independent Study. (1-3) Guided individual study in topics or issues related to nursing arranged with a faculty advisor. *May be repeated for credit.* No more than six hours of topics and/or independent study courses may be counted toward degree requirements.

Public Health Sciences

- **Ph.D. in Public Health Sciences**
- **Master of Public Health (MPH)**
- **MPH/JD Dual Degree** (*in conjunction with the Charlotte School of Law*)
- **MPH/M.S. in Health Informatics Dual Degree**
- **Graduate Certificate in Community Health**
- **Graduate Certificate in Public Health Core Concepts**

Department of Public Health Sciences
publichealth.uncc.edu

Graduate Program Directors

Dr. L. Michele Issel, Ph.D. program
Dr. Jan Warren-Findlow, MPH and Graduate Certificate programs

Graduate Faculty

Dr. Ahmed A. Arif, Associate Professor
Dr. Bruce Arrigo, Adjunct Professor
Dr. Christopher Blanchette, Associate Professor
Dr. Larissa R. Brunner Huber, Professor
Dr. Mark DeHaven, Dean W. Colvard Distinguished Professor
Dr. Jacek Dmochowski, Adjunct Associate Professor
Dr. John Fisher, Research Assistant Professor
Dr. Andrew Harver, Professor
Dr. L. Michele Issel, Professor
Dr. James N. Laditka, Associate Professor
Dr. Sarah B. Laditka, Associate Professor
Dr. Crystal N. Piper, Associate Professor
Dr. Elena Platonova, Associate Professor
Dr. Sharon Portwood, Professor
Dr. Elizabeth Racine, Associate Professor
Dr. William Saunders, Assistant Professor
Dr. Teresa Scheid, Adjunct Professor
Dr. Gary S. Silverman, Professor and Department Chair
Dr. Katharine Stewart, Professor
Dr. James Studnicki, Professor and Irwin Belk Endowed Chair of Health Services Research
Dr. Michael E. Thompson, Associate Professor
Dr. Jennifer Troyer, Adjunct Professor and Associate Dean for Research and Graduate Programs, Belk College of Business
Dr. Pilar Zuber, Lecturer

Doctoral Program Affiliate Faculty

Dr. Dee Baldwin, Professor and Associate Dean,
Nursing
Dr. Suzanne Boyd, Associate Professor, Social Work
Dr. Maren Coffman, Associate Professor, Nursing
Dr. Judy Cornelius, Associate Professor, Nursing
Dr. Boyd Davis, Professor, Applied Linguistics/English
Dr. Christine S. Davis, Associate Professor,
Communication Studies
Dr. Virginia Gil-Rivas, Associate Professor,
Psychology
Dr. Shanti Kulkarni, Associate Professor, Social Work
Dr. Shelley Listwan, Associate Professor, Criminal
Justice and Criminology
Dr. Amy Peterman, Associate Professor, Psychology
Dr. Maggie Quinlan, Assistant Professor,
Communication Studies
Dr. Charlie Reeve, Professor, Psychology
Dr. Dena Shenk, Professor,
Anthropology/Gerontology
Dr. Lori Thomas, Assistant Professor, Social Work
Dr. Meredith Troutman-Jordan, Associate Professor,
Nursing
Dr. Michael Turner, Professor, Criminal Justice and
Criminology
Dr. Jennifer Webb, Assistant Professor, Psychology
Dr. Stephanie Woods, Professor, Nursing

PH.D. IN PUBLIC HEALTH SCIENCES

The focus of the Ph.D. in Public Health Sciences is to train researchers and professionals with skills essential to address contemporary public health problems at the individual, community, and population levels.

Students train to be well-rounded public health professionals: partnering with community agencies and stakeholders, learning how to disseminate research to diverse audiences, publishing in peer-reviewed formats, teaching in an academic environment, and conducting themselves with high ethical standards in all venues. Full-time students can complete the degree requirements within 4 years; however, most full-time students complete the program within 5 years depending upon the design of their dissertation research. Graduates are prepared to work in academia, conduct large-scale public health research projects, or work in government or health-related venues.

Concentration in Behavioral Sciences

The Concentration in Behavioral Sciences emphasizes investigation of health determinants related to the prevention and management of disease and disability among diverse and vulnerable populations in the United States. Working with the community in multidisciplinary teams to understand and develop programs that address the broad social-ecological

factors that influence health behavior and thus health outcomes is the primary emphasis of this concentration.

Coursework for the Ph.D. in Public Health Sciences with a Concentration in Behavioral Sciences has a dual emphasis on qualitative and quantitative methods, and the development, application, and measurement of theory to understand the social and cultural factors that influence health behavior. Graduates are prepared to work in academia, conduct large-scale behavioral research projects, or work in government or health-related venues.

Admission Requirements

All applicants must complete an online application to the Graduate School. Applications must be completed by January 10 for full consideration for the following Fall semester, or by March 15 for consideration on a space-available basis. The minimum admission requirements for the program are as follows:

- 1) Master's degree in public health or a related field with a minimum GPA of 3.5 (on a 4.0 scale) in all graduate work
- 2) Competitive GRE scores taken within the past 5 years
- 3) TOEFL if the previous degree was from a country where English is not the official language, with a minimum score of 83 (Internet-based test), 220 (computer-based test), or 557 (paper-based test)
- 4) Statement of Purpose in which the applicant details why she/he wants to pursue a Ph.D. in Public Health Sciences in the specified concentration at UNC Charlotte
- 5) Three letters of recommendation, including at least two letters from former professors familiar with the applicant's graduate work
- 6) Have completed a CEPH (Council on Education for Public Health) accredited Master's degree in public health. Students who have not completed a Master's degree in public health may be required to take additional courses as determined by the Ph.D. Review Committee upon review of current CEPH requirements. Such courses will be specified at the time of admission into the program (see below for Prerequisite Coursework).

Admission Assessment

For fullest consideration of admission and financial awards, applications need to be completed by January 10. This deadline is especially important for applicants who want to be considered for assistantships or for fellowship opportunities. Applications completed after January 10 but by March 15 will be reviewed, and decisions regarding admission made on a space-available basis.

Prerequisite Coursework

Students who graduated with an MPH or MSPH degree from a CEPH accredited program or school are assumed to have met the required prerequisite foundation courses. Students entering with a master's degree in a field other than public health must complete the Required Prerequisite Foundation courses in Public Health in the first year of starting the program in consultation with the Ph.D. Director and/or Advisor. These prerequisite foundation course credits do not count toward the 63 credit hours required for the Ph.D.

Required Prerequisite Foundation Courses in Public Health (9 credit hours)

HLTH 6200 Introduction to Public Health (3)
 HLTH 6202 Community Epidemiology (3)
 HLTH 6203 Public Health Data Analysis (3)

Degree Requirements**Total Hours Required**

The program requires 63 post-master's credit hours. All coursework must be taken at the 6000-level or above. The majority of the courses are at the 8000-level.

Course Requirements

The curriculum has 5 major components:

Core Methods Courses (15 credit hours)

HLTH 8201 Introduction to Quantitative Research Design (3)
 HLTH 8270 Applied Biostatistics: Regression (3)
 HLTH 8271 Applied Biostatistics: Multivariate Methods (3)
 HLTH 8281 Measurement and Scale Development (3)
 HLTH 8282 Health Survey Design and Research (3)

Professional Seminar Courses (9 credit hours)

HLTH 8601 Ethics in the Public Health Profession (3)
 HLTH 8602 Communicating and Disseminating Research (3)
 HLTH 8603 Teaching Portfolio (3)

Concentration in Behavioral Sciences Courses (12 credit hours)

HLTH 8220 Theories and Interventions in Behavioral Science (3)
 HLTH 8221 Qualitative Research I: Theory Generation in Behavioral Sciences (3)
 HLTH 8222 Qualitative Research II: Theory Generation and Analysis in Behavioral Sciences (3)
 HLTH 8223 Social Determinants of Health (3)

Specialty Content Courses (9 credit hours)

Specialty content areas are developed in consultation with the doctoral student's advisor and make use of expertise and course offerings on the UNC Charlotte campus. Specialty content areas can focus on a specific population (e.g., older adults/gerontology or maternal and child health (MCH)), a health issue (e.g., AIDS), or approach (e.g., psychology). A specialty content area should cover literature related to: health and social policy issues, epidemiology of a health condition/population, relevant theories or approaches related to the condition/population, and/or current topics in the area. Coursework must be at the 6000-8000 level.

Dissertation Courses (18 credit hours)

HLTH 8901 Dissertation Research (18)

Grade Requirements

Students must maintain a minimum cumulative 3.0 GPA (on a 4.0 scale) in all coursework taken in the program. An accumulation of 2 C grades will result in suspension of enrollment in the doctoral program.

A grade of U or N constitutes an automatic termination of enrollment. Students who do not pass the qualifying exam, the dissertation proposal defense, or the final dissertation defense are automatically terminated from the program.

Transfer Credit

The UNC Charlotte Graduate School stipulates that students may transfer up to 30 graduate level credit hours from a regionally accredited university toward a doctoral degree. This Ph.D. program limits master's level transfer credits to at most 6 credit hours. Master's level transfer credits will be considered only toward Specialty Content courses, the Ethics Seminar (HLTH 8601), and the Measurement course (HLTH 8281). The Ph.D. Program Director, in conjunction with Program Faculty, approves graduate level transfer credits. Students must apply for transfer of graduate levels courses within the first year of enrollment, or within one semester following completion of the course if taken during the Ph.D. program. Only courses in which the student earned a grade of B or above (or its equivalent) may be transferred.

Students transferring from another doctoral program can transfer up to 30 credit hours (with not more than 6 at the master's level) upon approval of the Ph.D. Program Director. Credit for dissertation research cannot be transferred.

Courses taken to fulfill the master's level prerequisite public health courses do not count toward the 63 credit hour total.

Assistantships

Exceptionally qualified full-time students may be offered graduate assistantships. Award of the assistantship follows the guidelines of the Graduate School and is dependent on availability of funds.

Comprehensive Exam and Advancing to Candidacy

The comprehensive exam includes a written and an oral component and serves as the qualifying exam. As detailed more fully in the *Public Health Sciences Ph.D. Student Handbook*, all Ph.D. students must pass a comprehensive exam after completing the core methods, concentration, and specialty content courses, and prior to the dissertation proposal defense, typically after year two of full-time coursework. Students must take the exam within 12 months of finishing all of the required coursework.

The exam consists of three sections: 1) Concentration; 2) Methods; and 3) Specialty Content area. The oral exam provides an opportunity for the student to further elaborate on written exam responses and demonstrate mastery of the core competencies. Students may not defend their dissertation proposal until they have successfully passed all components of the comprehensive exam.

The specific procedures for grading the exam are detailed in the *Student Handbook* for the year in which the exam is taken.

Dissertation

The dissertation is an original research project conceived, conducted, analyzed, and interpreted by the student to demonstrate expertise in her/his concentration and chosen specialty area as it relates to public health. The research must make a distinct, original contribution to the field of public health research. Students cannot register for dissertation credits until they have passed their comprehensive examination. Students must complete a minimum of 18 credit hours of dissertation research activity. Per University policy, students must be continuously enrolled in dissertation credit hours beginning with the semester after the dissertation topic proposal is approved, through and including the semester of graduation. Guidelines for selecting a Dissertation Chair and Committee Members are provided in detail in the *Public Health Sciences Ph.D. Student Handbook*. The dissertation consists of three phases: the proposal defense, research, and the final dissertation defense.

In conjunction with the Dissertation Committee, students agree on the dissertation topic and indicate their preferred dissertation format – either the “traditional” 5-chapter model or the 3-manuscript

model. The dissertation proposal consists of three chapters: 1) introduction to the problem including the importance of the problem, significance of the proposed research, the research question and hypotheses; 2) conceptual model and literature review; and 3) a detailed methods section including sampling, recruitment, measures, data analysis, and limitations. With the guidance of the Dissertation Chair, students work with each committee member individually to develop the scope and direction of the dissertation. Students provide the overall idea for the dissertation including major concepts to be investigated, measures to be used, and strategy for primary or secondary data analysis. The dissertation topic proposal must be defended at a meeting of the student’s advisory/dissertation committee.

The dissertation defense is scheduled when the Dissertation Chair and the student concur that the student has a final product that meets with initial committee member approval. The outcome of the exam is pass or fail. Details regarding development of the dissertation proposal, proposal defense, conducting the dissertation research, and dissertation defense are available in the *Public Health Sciences Ph.D. Student Handbook*.

Program Progress

Doctoral students and candidates are evaluated annually to ensure that they are making sufficient progress to complete the degree in a timely manner. This evaluation is especially important during the dissertation process when students have less programmatic interaction and structure as they work more independently conducting their dissertation research. Each year students complete a checklist of scholarly activities and submit their curriculum vitae. Please consult the *Public Health Sciences Ph.D. Student Handbook* for further details.

Time Limits for Completion

Students must pass all sections of the comprehensive exam within 1 year of finishing their required coursework. Students may not defend their dissertation proposal before passing all components of the comprehensive exam. Students must pass their dissertation proposal defense within 6 months of passing the comprehensive exam. Students must pass their dissertation defense within 5 years of the proposal defense, but not later than the end of their 8th year following matriculation as a doctoral student. Students must complete their degree, including the dissertation, within 8 years of first registering as a doctoral student.

Residency Requirement

Residency requirements for the program include completing 21 hours of continuous enrollment, either

as coursework or dissertation credits. Residence is considered to be continuous if the student is enrolled in one or more courses in successive semesters until 21 hours are earned.

MASTER OF PUBLIC HEALTH (MPH)

The Master of Public Health (MPH) program prepares graduate students to apply core principles of public health education within a variety of community settings and to advance the public health profession. The MPH program seeks to fulfil the Department of Public Health Science's vision "Healthy People. Healthy Places. Healthy Communities." The mission is to develop leaders in practice and research who advance the public's health. The program values collaboration, community engagement, diversity, innovation, professionalism, health equity, and social justice in its pursuit of attaining the highest possible standards of health and well-being.

Students develop specialized skills to assess health behavior and to design, deliver, and evaluate health promotion, risk prevention, and risk reduction services. The MPH program consists of core content courses as well as research and practical experiences through a capstone project and a required internship. The program prepares students to provide leadership in a variety of settings, including health-related agencies and organizations, hospitals, local and state public health departments, academic research centers and institutes, corporate disease management and wellness programs, non-profit agencies, and healthcare businesses and industries.

Program Goals

The MPH Program achieves its mission through a set of complementary and reinforcing instructional, research, service, and diversity goals that reflect the program's values and provide a framework for defining, assessing, and evaluating both students and the curriculum.

Goal 1 (instructional): Provide public health students with knowledge, skills, and abilities to become effective practitioners and researchers through educational activities, a course of study, and related internship experiences.

Goal 2 (research): Develop new knowledge and innovative re-conceptualizations of theories that improve the effectiveness and efficiency of public health services and contribute to the development, implementation, and evaluation of public health practice, with a primary focus on the Charlotte region.

Goal 3 (service): Promote collaborations with community partners and stakeholders through faculty

and students, helping to lead the development of the public health profession in the Charlotte region.

Goal 4 (service): Foster participation in local, regional, and national/international organizations that advance the public health profession.

Goal 5 (diversity): Address the health and public health workforce needs of a dynamic, emerging urban environment and its increasingly diverse population.

Additional Admission Requirements

- 1) Acceptable scores on both the verbal and quantitative portions of the Graduate Record Examination (GRE). Scores from the Medical College Admission Test (MCAT) may be substituted for the GRE. Contact the Graduate School to upload official MCAT reports.
- 2) Undergraduate major or coursework that prepares students for graduate work.
- 3) Submission of official scores on the Test of English as a Foreign Language (TOEFL), the Michigan English Language Assessment Battery (MELAB) or the International English Language Testing System (IELTS), if English is not the applicant's native language and he or she has not earned a post-secondary degree from a U.S. institution. Required is either a minimum score of 557 on the paper-based TOEFL, a minimum score of 220 on the computer based TOEFL, a minimum score of 83 on the Internet based TOEFL, a minimum score of 78 percent on the MELAB, or a minimum total score of 6.5 on the IELTS. Applicants from certain countries are exempt from the English language proficiency requirement.
- 4) Internationally trained physicians who have passed all steps of the US Medical Licensing Exam (USMLE) through Step 2 CS have the equivalent of a US Medical Degree (MD) and are exempt from the GRE and English language proficiency requirements. Please contact the Graduate School to upload official documentation of USMLE results into the application.

Early Entry Program

An Early Entry Program is available for well-qualified UNC Charlotte undergraduate students majoring or minoring in Public Health. The Early Entry Program allows eligible students enrolled in an undergraduate public health degree program to begin work toward the MPH graduate degree before completion of the baccalaureate degree. For details, see the *UNC Charlotte Undergraduate Catalog*.

Degree Requirements

The curriculum leading to the Master of Public Health degree requires a minimum of 45 credit hours of graduate credit including 21 credit hours of core courses, an internship experience (3 credit hours), a capstone thesis (6 credit hours) or project (3 credit hours), the completion of a specialty area (9 credit hours), and elective courses (6-9 credit hours). While the program can be completed within two academic years (4 semesters), 5 semesters is the expected time to completion for full-time students. Part-time students are expected to complete the program within 5 years (10 semesters).

Core Requirements (21 credit hours)

HLTH 6201 Social and Behavioral Foundations of Public Health (3)
 HLTH 6202 Community Epidemiology (3)
 HLTH 6203 Public Health Data Analysis (3)
 HLTH 6204 Public Health Research Methods (3)
 HLTH 6205 Environmental Health (3)
 HLTH 6206 Health Services Administration (3)
 HLTH 6207 Community Health Planning and Evaluation (3)

Additional Requirements (24 credit hours)

HLTH 6471 Public Health Internship (3)
 HLTH 6900 Research and Thesis in Public Health (6)
 OR HLTH 6901 Public Health Capstone Project (3)
 Specialty Area Courses (9)
 Elective Courses (6-9)

Specialty Area*

Community Health Practice (9 credit hours)

HLTH 6220 Health Behavior Change (3)
 HLTH 6221 Community Health (3)
 HLTH 6222 Methods in Community Health (3)

**Based on student interest, course availability, and program goals, the Program Director may approve (in advance) another set of related courses to fulfill the specialty area requirement provided core program competencies are still met.*

Assistantships

Positions as a graduate administrative assistant may be available. Research assistantships may be available as well, and are competitively awarded. Students seeking assistantships should contact the Program Director in the Department of Public Health Sciences for additional information.

Internships

The internship is an intensive, supervised experience and is required for all students. Students assume a professional role in a community health setting and demonstrate the ability to apply research and theory in a field-based setting, and to assume leadership

roles. Internship experiences are designed and approved in concert with the Program Director or other faculty advisor. Students register for HLTH 6471 (3 credit hours) during the internship period.

Note: A criminal background check and drug screen are among the internship requirements. Students who fail these screening measures and who are unable to be placed in an internship face dismissal from the program.

Capstone Experiences

Each student is required to complete either a capstone thesis or project. In all cases, the capstone experience must be of the student's own design, demonstrate independent learning, and originate under the supervision of a faculty advisor and at least two additional graduate faculty committee members.

Advising

Upon acceptance into the program an academic advisor is assigned to each student. Students are expected to meet with their advisors on a regular basis to plan their progression through their program of study. The Program Director must approve, in writing, all course substitutions. Each student also must assemble a graduate committee for development and evaluation of the capstone thesis or project. Members of the committee include the student's capstone Chair and at least two other graduate faculty members who represent major areas of concentration in the student's program.

Program Certifications/Accreditations

The MPH Program is fully accredited by the Council on Education for Public Health (CEPH). The Department of Public Health Services is a member of the Association of Accredited Public Health Programs (AAPHP) and the Association of Schools and Programs of Public Health (ASPPH). Students completing the MPH Program are eligible to sit for the Certified in Public Health (CPH) credentialing exam administered by the National Board of Public Health Examiners. Students completing the MPH community health practice specialty area are eligible to take the Certified Health Education Specialist (CHES) examination administered by the National Commission for Health Education Credentialing (NCHEC; students completing alternate specialty areas also might be eligible to sit for the CHES).

Research Opportunities/Experiences

A range of research opportunities exists in the Department of Public Health Sciences and in the College of Health and Human Services for students to conduct both independent and collaborative research projects.

Tuition Waivers

Tuition waivers are available to some students with assistantships.

Financial Aid/Financial Assistance

Financial aid and assistance is available to qualifying students, which may be accessed through the Office of Student Financial Aid. See the Financial Information section of this Catalog for more information on the opportunities that are available, and how to contact the Office of Student Financial Aid.

MPH/JD DUAL DEGREE

This dual degree program allows students to earn a Master of Public Health (MPH) degree from the College of Health and Human Services at UNC Charlotte and a Juris Doctor (JD) degree from the Charlotte School of Law (CSL).

This dual degree program is for students who wish to add specialization in law and its application to public health, to the extensive interdisciplinary curriculum gained in the MPH program. Full-time students typically spend their first two years of study at CSL. The entire third year is spent at UNC Charlotte. For the remainder of the program, students take classes at both UNC Charlotte and CSL. Each school grants up to twelve (12) units of credit for courses taken at the other school.

Visit publichealth.uncc.edu and charlottelaw.edu for additional information. Contact the MPH Program Director and the CSL Associate Dean for Academics before submitting applications.

MPH/M.S. IN HEALTH INFORMATICS DUAL DEGREE

The Master of Public Health (MPH) and Professional Science Master's in Health Informatics (HI PSM) dual degree program allows students to earn both an MPH and an M.S. in Health Informatics degree. The dual MPH and HI PSM program (outlined below) consists of 60 credit hours of coursework, as opposed to the 75 credit hours required if pursuing these degrees separately.

Admission Requirements

Interested students must submit a separate application to each program. Both programs' admissions committees will review applicants to the dual program. Applicants might be offered admission into only the individual MPH or HI PSM programs instead of the dual program. Similarly, students admitted into

the dual program may opt to matriculate into only the MPH or HI PSM program. Students having matriculated into either the MPH or HI PSM program desiring to add the dual degree must apply and gain admission to the dual degree no later than the end of their first semester of matriculation into either program.

Degree Requirements

HCIP 5375 Computer Vocabularies & Classification Systems (3)
 HCIP 6102 Healthcare Data Analysis (3)
 HCIP 6380 Introduction to Health Informatics (3)
 HCIP 6385 Healthcare Communication and Leadership (3)
 HCIP 6400 Health Internship Project (3)
 HLTH 6201 Social and Behavioral Foundations of Public Health (3)
 HLTH 6202 Community Epidemiology (3)
 HLTH 6203 Public Health Data Analysis (3)
 HLTH 6204 Public Health Research Methods (3)
 HLTH 6205 Environmental Health (3)
 HLTH 6207 Program Planning and Evaluation (3)
 HLTH 6220 Health Behavior Change (3)
 HLTH 6221 Community Health (3)
 HLTH 6222 Methods in Community Health (3)

One of the following three courses:

HCIP 5376 Introduction to Programming -Health Informatics (3)
 HCIP 6201 Computer Security, Privacy and Legal Issues (3)
 ITIS 6200 Principles of Information Security and Privacy (3)

And complete either the thesis or project option:

Thesis Option

HLTH 6900 Research and Thesis in Public Health (6)
 HCIP XXXX Restricted Elective - Data Science Concentration (3)
 HCIP XXXX Restricted Elective - Data Science Concentration (3)
 HCIP XXXX Restricted Elective - Data Science Concentration (3)

Project Option

HLTH 6901 Public Health Capstone Project (3)
 HLTH XXXX Elective (3)
 HCIP XXXX Restricted Elective - Data Science Concentration (3)
 HCIP XXXX Restricted Elective - Data Science Concentration (3)
 HCIP XXXX Restricted Elective - Data Science Concentration (3)

Note: Under the MPH and HI PSM dual degree option, students must take a minimum of 9 HCIP courses (27 credit hours) and 11 HLTH courses (33

credit hours). Additionally, the Graduate School considers any deviation from the approved plan of study as requiring a Special Request approval.

GRADUATE CERTIFICATE IN COMMUNITY HEALTH

The Graduate Certificate in Community Health contributes to 15 of the 25 credit hours in health education/health promotion needed for community and public health practitioners to take the Certified Health Education Specialist (CHES) examination (see NCHCEC at www.nchec.org for specific requirements). The certificate also is available to students who wish to complement an existing degree in a health profession (e.g., health psychology, nursing, or social work), or who wish to explore a career in public health. This certificate complements (i.e., is not redundant with, can be completed in addition to) the Graduate Certificate in Public Health Core Concepts.

Admission Requirements

Students are admitted to the Graduate School in a special category for certificate programs. See the "Degree Requirements and Academic Policies" section of this *Catalog* for details.

Certificate Requirements

The program leading to a Graduate Certificate in Community Health requires a minimum of 15 credit hours of graduate credit including 9 hours of core courses and two additional elective courses (6 credit hours).

Core Courses (9 credit hours)

HLTH 6207 Community Health Planning and Evaluation (3)
HLTH 6220 Health Behavior Change (3)
HLTH 6221 Community Health (3)

Elective Courses (6 credit hours)

The remaining 6 credit hours are chosen by students in consultation with their assigned academic advisor and/or Program Director from among available departmental offerings. Courses from outside the Department of Public Health Sciences may be substituted with the written permission of the Program Director.

Students not demonstrating prior undergraduate or graduate coursework comparable to HLTH 6200 (Introduction to Public Health) will be required to take this course as one of their electives.

Credits applied toward the Graduate Certificate in Public Health Core Concepts cannot also be applied to this certificate. Additionally, transfer credits are not

accepted in this certificate program. Completion of the certificate program does not ensure admission into the MPH degree program.

GRADUATE CERTIFICATE IN PUBLIC HEALTH CORE CONCEPTS

The Graduate Certificate in Public Health Core Concepts (PHCC) contributes to the preparation of community and public health practitioners entering the field from related disciplines and serves as a stepping-stone to further graduate training in public health. The certificate is also available to students who wish to complement an existing degree in a health profession (e.g., nursing or social work). This certificate complements (i.e., is not redundant with, can be completed in addition to) the Graduate Certificate in Community Health, which provides focused health education and promotion skills.

Admission Requirements

Students are admitted to the Graduate School in a special category for certificate programs. See the "Degree Requirements and Academic Policies" section of this *Catalog* for details.

Certificate Requirements

The program leading to a Graduate Certificate in Public Health Core Concepts requires a minimum of 15 credit hours of graduate credit including 12 credit hours of core courses and a restricted elective course (3 credit hours). Students should plan their program of study in consultation with their assigned academic advisor and/or Graduate Coordinator.

Core Courses (12 credit hours)

HLTH 6200 Introduction to Public Health (3)
HLTH 6201 Social and Behavioral Foundations of Public Health (3)
HLTH 6202 Community Epidemiology (3)*
HLTH 6205 Environmental Health (3)

Restricted Elective Course (3 credit hours)

Select one of the following:

HLTH 6203 Public Health Data Analysis (3)*
HLTH 6204 Public Health Research Methods (3)
HLTH 6206 Health Services Administration (3)*

**Students enrolled in the Master of Health Administration (MHA) program may substitute HADM 6104 for HLTH 6202, HADM 6108 for HLTH 6203, and/or HADM 6145 for HLTH 6206.*

Credits applied toward the Graduate Certificate in Community Health cannot also be applied to this certificate. Additionally, transfer credits are not accepted in this certificate program. Completion of

the certificate program does not ensure admission into the MPH degree program.

COURSES IN PUBLIC HEALTH (HLTH)

HLTH 5124. Safety Through the Life Span. (3)

Introduction to accident/injury prevention emphasizing personal responsibility for healthcare with a focus on psycho-social development and a wellness approach to safety management.

HLTH 5126. Adolescent Sexuality and Family Life Education. (3)

Designed for teachers, counselors, school nurses, administrators and others responsible for family life education programs in school, with focus on adolescent sexuality issues.

HLTH 5130. Applied Nutrition for Today's Consumer. (3)

Principles of nutrition, dietary guidelines, dietary relationships to diseases and health, special populations, computerized dietary analysis.

HLTH 5136. Health Product and Service Consumerism. (3)

Teaching methodology, knowledge and skills for affecting appropriate health behaviors through emphasis on the individual consumer at the health marketplace.

HLTH 6000. Special Topics in Public Health. (1-4)

Courses in selected topics and advanced studies in public health. *May be repeated for credit with change of topic.* Lecture hours will vary with the courses taught.

HLTH 6090. International Comparative Health Systems. (3)

Cross-listed as NURS 6090 and SOWK 7090. A study tour to explore the cultures, social, and healthcare systems outside the United States. Participants will visit a variety of healthcare sites and attend presentations by practitioners and educators. They will have opportunities to interact with people from the host countries and visit a variety of cultural and historic sites.

HLTH 6101. International Health. (3) Principles and methods of studying international health, including historical background, sources and problems associated with health data, the social context, the role of government and non-government agencies, health in relation to environment and development, international health projects, defining the international health sector, infectious disease problems, and the practice of international health.

HLTH 6153. Worksite Health Promotion. (3) An exploration of the practices of promoting health in various settings for a variety of consumers.

HLTH 6155. Health Risk Reduction and Disease Prevention. (3)

Personal/professional management of risk factors and lifestyle intervention processes for leading causes of mortality and morbidity.

HLTH 6200. Introduction to Public Health. (3)

An introduction and historical background to the diverse profession of public health. Emphasizes the development of a conceptual model of public health and exposure to the essential skills in critical thinking and group process skills needed in public health practice. Students complete an analysis of a current public health problem, including recommended courses of action to policy makers.

HLTH 6201. Social and Behavioral Foundations of Public Health. (3)

Prerequisite: MPH, COHP, or PHCC student, or permission of instructor. Introduction to concepts and theories from the social and behavioral sciences relevant to public health practice and research. Effects of selected social and psychological factors including demographic, socioeconomic and life style indicators on health.

HLTH 6202. Community Epidemiology. (3)

Cross-listed as NUDN 8202. Prerequisite: MPH, COHP, or PHCC student, or permission of instructor. Principles and methods of epidemiology including definitions and models of health, illness and disease; modes of transmission of clinically important infectious agents; risk factors and chronic diseases; and insights into existing studies and paradigms of health promotion and disease prevention.

HLTH 6203. Public Health Data Analysis. (3)

Prerequisite: MPH, COHP, or PHCC student, or permission of instructor. A foundations graduate course designed to develop understanding and skill in data analysis and interpretation in research related to public health. Students will have opportunities to develop basic skills in data analysis, computer use, data interpretation, and the presentation/communication of results.

HLTH 6204. Public Health Research Methods. (3)

Prerequisite: MPH, COHP, or PHCC student, or permission of instructor. An introductory graduate course designed to expose students to the processes and techniques necessary to conduct relevant social and behavioral science research in public health. The course explores the fundamental concepts of research design, sampling, data collection, and data analysis. Students will develop understanding and proficiency in commonly used public health measurement procedures and techniques, and how to estimate the

adequacy of those procedures for communities and populations.

HLTH 6205. Environmental Health. (3) Prerequisite: MPH, COHP, or PHCC student, or permission of instructor. Contemporary environmental factors including biological, physical, and chemical factors which affect the health of a community. Traditional elements of environmental health, including the control of infectious diseases, toxicology, and environmental health policy and practices at local, state, and federal levels.

HLTH 6206. Health Services Administration. (3) Cross-listed as HADM 6145. Prerequisite: MPH, COHP, or PHCC student, or permission of instructor. Introduction to organizational theory with applications to healthcare systems, including organizational design and inter-organizational networks and alliances. Examination of communication and leadership skills development, including conflict, labor and dispute management.

HLTH 6207. Community Health Planning and Evaluation. (3) Prerequisite: MPH or COHP student, or permission of instructor. The use of community and behavioral analysis as a basis for establishing program goals and objectives, for determining appropriate methods to study health-related interventions, for carrying out planned intervention programs, and for evaluating behavioral change outcomes.

HLTH 6220. Health Behavior Change. (3). Prerequisite: MPH or COHP student, or permission of instructor. Assessment of psychosocial, cultural and situational factors in the voluntary behavior change process; theories of health behavior.

HLTH 6221. Community Health. (3) Prerequisite: MPH or COHP student, or permission of instructor. The nature of communities as social systems. Principles and practices relevant to community health.

HLTH 6222. Methods in Community Health. (3) Prerequisites: MPH or COHP student; HLTH 6204 or permission of instructor. Methods based on the ecological model of health for planning community health interventions including strategies directed at policy, community, institutional, inter- and intra-personal levels.

HLTH 6260. Analytic Epidemiology. (3) Cross-listed as HCIP 6260, HLTH 8260, HSRD 8003, and PPOL 8665. Prerequisites: MPH or COHP student, and HLTH 6202 with a grade of B or above. Principles and methods of studying advanced epidemiology, with emphasis on the analytic approach, including

advanced techniques in the establishment of disease causation in groups and communities. Topics include: risk assessment, environmental exposures, stratification and adjustment, and multivariate analysis in epidemiology. Emphasis is also placed on quality assurance and control and communicating results of epidemiological studies in professional publications and settings.

HLTH 6262. Public Health Data Analysis II. (3) Prerequisites: MPH or COHP student; HLTH 6203. This course provides the foundation skills for advance statistical methods used in the analysis of epidemiological and public health data. The course emphasizes developing advanced data analysis skills using real life data. Topics covered include multiple linear regression, logistic regression, Poisson regression, survey data analysis, and survival data analysis.

HLTH 6281. Measurement and Scale Development. (3) Cross-listed as HLTH 8281. Prerequisites: MPH or COHP student; and HLTH 6204 or permission of instructor. The conceptual aspects of quantitative measurement in the public health sciences and the practical aspects of the scale development process as applied to individual and population health status and behavioral and social determinant assessment. Students progress from a conceptual model of the health phenomenon under consideration to item development, response scaling, item selection, and scale development through reliability and validity testing. Students develop a framework for judging the appropriateness of a measure for a given situation.

HLTH 6346. Evaluation of Community Health Programs. (3) Prerequisites: MPH or COHP student; HLTH 6207 or permission of the instructor. Teaches students methods for evaluating community health programs. Students learn and apply various evaluation techniques including formative, retrospective, and monitoring; survey and trend analysis; application of experimental and quasi-experimental design; triangulation of data; and evaluation report development.

HLTH 6361. Ethics in the Public Health Profession. (3) Prerequisite: MPH or COHP student. Examines the ethical issues facing public health professionals working in public health practice, research, teaching, and service. Topics include: ethical issues in public health program implementation, research with vulnerable populations, data falsification and fabrication, plagiarism among students, ethics of working with students, publishing ethics, human subjects research, and working with the community.

HLTH 6471. Public Health Internship. (3) Prerequisites: MPH student having completed 18 or

more graduate credit hours and permission of the Graduate Coordinator. Intensive, supervised experience in the practice of public health in community settings. *Graded on a Pass/Unsatisfactory or IP basis.*

HLTH 6600. Seminar in Public Health. (1-6)

Prerequisite: Permission of instructor. Seminar in selected current topics and advanced studies in public health. *May be repeated for credit with change of topic.*

HLTH 6800. Tutorial in Public Health. (1-3)

Prerequisite: Permission of instructor. Directed study in areas of specialization in public health and related fields. Maximum credit toward degree: three hours. *Graded on a Pass/Unsatisfactory or IP basis.*

HLTH 6900. Research and Thesis in Public Health.

(1-6) Prerequisites: MPH student having completed at least 18 credit hours of graduate program (including HLTH 6201, HLTH 6202, HLTH 6203, HLTH 6204, and HLTH 6205), and permission of Graduate Program Director. A capstone synthesis course in which the candidate demonstrates independent learning thorough application of public health research skills to solve a problem or hypothesis. The thesis is of the student's own design conducted under the supervision of an advisor and graduate committee. Maximum 6 credit hours applied toward MPH degree. *Graded on a Pass/Unsatisfactory or IP basis. May be repeated for credit.*

HLTH 6901. Public Health Capstone Project. (1-3)

Prerequisites: MPH student having completed at least 18 credit hours of graduate program (including HLTH 6201, HLTH 6202, HLTH 6203, HLTH 6204, and HLTH 6205), and permission of Graduate Program Director. A capstone synthesis course in which the candidate demonstrates independent learning thorough application of public health research skills to a problem or opportunity in a community health setting with a target population. The project is of the student's own design conducted under the supervision of an advisor and graduate committee. Maximum 3 credit hours applied toward MPH degree. *Graded on a Pass/Unsatisfactory or IP basis. May be repeated for credit.*

HLTH 8000. Special Topics in Public Health

Sciences. (1-4) Courses in selected topics and advanced studies in public health sciences. *May be repeated for credit with change of topic.*

HLTH 8201. Introduction to Quantitative Research

Design. (3) Cross-listed as HSRD 8101. An overview of quantitative methods as applied to design and analysis of public health and health services research problems. Topics include: categories and levels of

quantitative research, characteristics of a good research design, relationship between theory and research, selection process for measurement tools, power analysis, sampling techniques, design sensitivity, and human subjects protection. An overview of qualitative research methods and their relationship to quantitative methods also are provided.

HLTH 8220. Theories and Interventions in Behavioral Science. (3)

A broad overview of theories that influence health behavior and health outcomes using the social-ecological model as a guiding framework. Focus is less on learning specific theories, and more on how to apply theories in a health intervention. Students read a variety of articles related to intervention research and identify issues that could form potential avenues of theoretical and intervention inquiry. The major emphasis is on designing a health behavior intervention using theory and writing a complete grant proposal detailing the intervention.

HLTH 8221. Qualitative Research I: Theory Generation in Behavioral Sciences. (3)

Introduction to research designs and data generation techniques that lead to theory generation and identification of theoretical concepts. Students learn the philosophical basis of qualitative research, the basic qualitative research designs and their uses, gain an understanding of qualitative research elements that must be addressed in a research project, and the importance of research rigor. Students perform multiple field projects to gain practical experience with conducting qualitative research that leads to theory generation. Students work in small groups partnered with a community agency to generate qualitative data to answer a "real world" research question. This same data is then analyzed and presented back to the community agency during the follow on course, HLTH 8222.

HLTH 8222. Qualitative Research II: Theory Generation and Analysis in Behavioral Sciences. (3)

Pre- or corequisite: HLTH 8221. Using data collected in HLTH 8221, students work in teams to analyze data from various techniques and perspectives including grounded theory to develop robust and bounded concepts. The focus is on analyzing and writing qualitative research to contribute to theory development. Students learn how to write a qualitative article for publication. Additional assignments include: developing a code book, analyzing text data using grounded theory techniques of constant comparison, presenting findings back to your community partner agency, and writing a qualitative methods section of a research manuscript.

HLTH 8223. Social Determinants of Health. (3) The major social determinants of health using the social-

ecological model as a guiding framework. Focus is on how differences in levels of these determinants contribute to health inequalities and poor health. Students read across disciplines and international boundaries to gain a broad understanding of social determinants. Students write a literature review paper addressing a key social determinant and how it influences health behavior and a corresponding health outcome.

HLTH 8281. Measurement and Scale Development.

(3) Cross-listed as HLTH 6281. Pre- or corequisite: HLTH 8201. The conceptual aspects of quantitative measurement in the public health sciences and the practical aspects of the scale development process as applied to individual and population health status and behavioral and social determinant assessment. Students progress from a conceptual model of the health phenomenon under consideration to item development, response scaling, item selection, and scale development through reliability and validity testing. Students develop a framework for judging the appropriateness of a measure for a given situation.

HLTH 8282. Health Survey Design and Research. (3)

Pre- or corequisites: HLTH 8201; and HLTH 8281 or HLTH 6281. The practical aspects of designing (or selecting) quantitative survey instruments related to health status assessment in individuals and populations and their use in research. Building upon prior coursework and drawing upon case studies and practical exercises, students progress from appropriately formulating questions (items) for a variety of domains to the design and layout of survey instruments and the development of survey protocols through the data entry, data cleaning, and analysis/reporting phases.

HLTH 8270. Applied Biostatistics: Regression. (3)

Cross-listed as HSRD 8110 and STAT 8110. Pre or corequisites: Graduate level Introduction to Biostatistics or approved Statistics course; basic knowledge of statistical software; or permission of the instructor. To understand and apply concepts and principles of regression based statistical methods (regression, linear models, logistic regression, Poisson regression) to health related studies. Selection of appropriate methods for analysis, development of skills to conduct the analysis of the data and capability to write in scientific language the results of the study are studied.

HLTH 8271. Applied Biostatistics: Multivariate Methods. (3)

Cross-listed as HSRD 8111 and STAT 8111. Pre- or corequisite: HLTH 8270 or HSRD 8110, or permission of instructor. Includes study of the concepts, principles and statistical methods of analysis of discrete and continuous multivariate data. Students learn to use the most popular methods of

multivariate data reduction, classification and clustering such as principal components, factor analysis and canonical correlation analysis. Design issues, verification of the assumptions and interpretation of the results are discussed. Skills for concise presentation of the results of statistical analysis will be developed.

HLTH 8260. Analytic Epidemiology. (3) Cross-listed as HCIP 6260, HLTH 6260, HSRD 8003, and PPOL 8665. Pre- or corequisite: a graduate introductory course in epidemiology such as HLTH 6202 or HADM 6104. Principles and methods of studying advanced epidemiology, with emphasis on the analytic approach, including advanced techniques in the establishment of disease causation in groups and communities. Topics include: risk assessment, environmental exposures, stratification and adjustment, and multivariate analysis in epidemiology. Emphasis is also placed on quality assurance and control and communicating results of epidemiological studies in professional publications and settings.

HLTH 8272. Large Data Sets and Health Services Research. (3)

Cross-listed as HSRD 8103. Pre- or corequisites: HLTH 8271 or HSRD 8111; HSRD 8102; and enrollment in Ph.D. in Health Services Research or Ph.D. in Public Health Sciences program, or permission of the instructor. Health quality and outcomes issues addressed through secondary data analysis using large, public data sets are examined. Issues related to secondary analysis and drawing items from multiple data sets are discussed. Analytical techniques such as adjustments for missing data, transformations of data, and risk adjustment are applied using public data sets.

HLTH 8600. Seminar in Public Health Sciences. (1-6)

Pre- or corequisite: Permission of instructor. Seminar in selected current topics and advanced studies in public health. *May be repeated for credit with change of topic.*

HLTH 8601. Ethics and Integrity in Health Research and Practice. (3)

Examines the ethical and integrity issues health professionals may face in research, practice, teaching, and service. Topics include: responsible human and animal subjects research, including research with vulnerable populations and communities, data falsification, and fabrication; ethical issues in health program implementation; professional ethics; plagiarism; publishing ethics; and interactions with students. Fulfills the GRAD 8002 requirement.

HLTH 8602. Communicating and Disseminating Research. (3)

Research dissemination planning, writing for publication, grantsmanship, presenting at

professional conferences, presenting to the community, writing technical reports for funders, writing abstracts, working with the media, and an introduction to the field of health communication. Students work on a variety of assignments to gain skills relating to disseminating research in different venues.

HLTH 8603. Teaching Portfolio. (3) Teaching strategies that focus on the major aspects of university teaching. Topics include: preparing a syllabus, creating assignments, evaluating student performance, and enhancing student learning through the use of various discussion and lecture techniques. Students work with a faculty member to develop and deliver a lecture, and develop and grade an assignment to assess students' understanding based on the delivered lecture.

HLTH 8800. Independent Study in Public Health Sciences. (1-6) Pre- or corequisite: Full graduate standing in the PhD in Public Health Sciences program and permission of instructor. Guided individual study in topics or issues related to public health sciences arranged with a faculty advisor. *Graded on a Pass/Unsatisfactory or IP basis. May be repeated for credit.*

HLTH 8901. Dissertation Research. (1-9) Pre- or corequisite: Passing the Ph.D. in Public Health Sciences comprehensive exam and approval of the Dissertation Chair. Individual investigation that culminates in the preparation and presentation of a doctoral dissertation. *Graded on a Pass/Unsatisfactory basis. May be repeated for credit up to 18 hours for degree.*

Social Work

• Master of Social Work (MSW)

School of Social Work

socialwork.uncc.edu

Graduate Program Director

Dr. Robert Herman-Smith

Graduate Faculty

Dr. Suzanne Boyd, Associate Professor

Dr. Vanessa Drew-Branch, Lecturer

Hontah Epps, Lecturer and Field Education Director

Dr. Mark Ezell, Professor

Dr. Robert Herman-Smith, Associate Professor

Dr. Shanti Kulkarni, Associate Professor

Dr. Othelia Lee, Associate Professor

Dr. Susan McCarter, Associate Professor

Dr. Laneshia McCord, Assistant Professor

Dr. Annelise Mennicke, Assistant Professor

Dr. Julian Montoro-Rodriguez, Professor

Sonya Richardson, Lecturer

Dr. Diana Rowan, Associate Professor

Roger Suclupe, Lecturer

Dr. Lori Thomas, Associate Professor

MASTER OF SOCIAL WORK

The Master of Social Work (MSW) program offers an advanced generalist concentration that embraces the profession's commitment to social and economic justice, individual and community well-being, and scientific inquiry. As a reflection of UNC Charlotte's designation as North Carolina's urban research university, our curriculum is especially focused on the needs of vulnerable populations in the growing urban and suburban areas of the state. Graduates of the program will be able to synthesize and apply a broad range of knowledge and skills in order to refine and advance the quality of social work practice and the profession in a range of settings.

The MSW program prepares students to assess, plan, implement, and evaluate social prevention and intervention programs, particularly with vulnerable individuals and communities. The program takes a holistic approach to social work education - one that attempts to bridge divides between individually-focused and community-focused practice. This holistic approach is guided by seven specific themes listed below, each with a corresponding program goal.

- 1) Context - Recognizes the inseparability of individual struggles and social issues
- 2) Multi-Level Practice - Takes action on multiple levels of social work practice
- 3) Evidence-Based - Engages in research-informed practice and practice-informed research
- 4) Strengths - Understands and employs the strengths of vulnerable populations but also insures their capacity and power to engage societal opportunities
- 5) Cultural Sensitivity and Humility - Conducts social work practice with cultural sensitivity and humility
- 6) Local and Global - Practices social work in communities everywhere
- 7) Critically Reflective - Encourages the continuous development of critically reflective practitioners

Accreditation

The UNC Charlotte MSW degree is fully accredited by the Council on Social Work Education, the national accrediting organization for social work education programs.

Admission Requirements

- 1) Undergraduate Preparation including GPA
 - a. The Graduate School sets a 3.0 as the minimum GPA for admission to master's programs
 - b. The Graduate School requires students to provide copies of unofficial transcripts for all institutions the applicant has attended
 - c. The School of Social Work seeks applicants with a liberal arts background. Courses in biology and statistics are encouraged in order to prepare students for the program.
- 2) GRE Scores
 - a. Scores of 150 or higher in the verbal and quantitative sections and a 4 or higher in the writing section would be considered competitive
 - b. When an applicant's scores in either area are below 150, the Admissions Committee searches for other evidence of the potential to be successful in MSW coursework - Examples: High undergraduate grades in writing, statistics, and/or research courses
- 3) Recommendations
 - a. Three forms submitted by faculty members and supervisors from paid or volunteer experience with human service agencies
 - b. Recommenders have the option of uploading a letter of support with the form
- 4) Relevant Volunteer and/or Paid Experience described in the applicant's resume
- 5) Personal Statement
 - a. Applicant's upload a narrative addressing the following items in no more than 4-5 pages:

- b. Please discuss why you are interested in becoming a master-level social worker
- c. Please discuss your reasons for seeking admission to the MSW Program specifically. How are your career plans and interests congruent with the MSW curriculum?
- d. The Social Work Program values diversity in its student population. Diversity may be defined in terms of race, age, ethnicity, gender, sexual orientation, religion, socioeconomic status, unique skills, or life experiences. What personal characteristics, unique skills, or life experiences will you bring to the program?
- e. Social workers practice with individuals from historically oppressed and diverse groups. What groups may challenge you, either because of your personal values and/or attitudes and how will you handle this?
- f. Describe a time when you were given critical feedback. What was your reaction to that experience? What did you learn about yourself?
- g. As a prospective graduate student, what strengths and skills do you bring to the program? What do you identify as your areas of growth?
- h. Applicants are often interested in choosing social work because it is a helping profession. Discuss the differences between helping in personal and professional relationships. In addition, discuss a time you helped someone (not a family member) and your reaction to the helping experience.

Additional Admission Information

International applicants may be required by The Graduate School to submit additional materials.

Upon acceptance to the program, students are asked to complete an Intent to Enroll Form and a Field Application Form. Because some field placement agencies serving vulnerable populations exclude personnel with criminal convictions, students entering the program may be subject to a criminal history inquiry. Many agencies require drug testing as well.

Financial Assistance

Paid internships and assistantships are limited. Visit socialwork.uncc.edu for more information.

Degree Requirements

The MSW curriculum promotes its mission and goals through the Foundation curriculum and the Advanced curriculum. The Foundation curriculum prepares students to apply generalist social work knowledge, skills, and values. The Advanced curriculum prepares students for more specialized application of the

profession's knowledge, skills, and values, with special attention to the needs of vulnerable populations. All students must successfully complete SOWK 7651, which serves as the capstone course for the MSW.

The MSW may be pursued through the Full-Time (two years), Part-Time (three years), or Advanced Standing (one year) plans of study.

Full-Time Plan of Study (Two Years) (62 credit hours)

The Full Time MSW plan of study is designed for students to complete the MSW through two years of intensive study. The Foundation curriculum is completed during the first year of study and the Advanced curriculum is completed during the second year. Classes meet at the main university campus. Students complete a total of 62 graduate credits hours, which includes 48 credit hours in the classroom and 14 credit hours in an approved field placement.

Year One – Foundation Curriculum

Fall (15 credit hours)

- SOWK 6121 Social Work Practice: Theories and Skills (3)
- SOWK 6131 Social Work Research (3)
- SOWK 6141 Foundations of Social Work (3)
- SOWK 6151 Social Work, Social Justice, and Diversity (3)
- SOWK 6441 Foundation Social Work Practicum I (3)

Spring (15 credit hours)

- SOWK 6232 Practice and Program Evaluation (3)
- SOWK 6242 Advocacy and Policy Change (3)
- SOWK 6252 Mental Health Assessment (3)
- SOWK 6442 Foundation Social Work Practicum II (3)
- Elective Course (3)*

Year Two – Advanced Curriculum

Fall (16 credit hours)

- SOWK 7122 Advanced Social Work Practice with Individuals (3)
- SOWK 7126 Advanced Social Work Practice with Groups (3)
- SOWK 7222 Advanced Social Work Practice with Communities and Organizations I (3)
- SOWK 7443 Advanced Social Work Practicum I (4)
- Elective Course (3)*

Spring (16 credit hours)

- SOWK 7127 Advanced Social Work Practice with Families (3)
- SOWK 7223 Advanced Social Work Practice with Communities and Organizations II (3)
- SOWK 7444 Advanced Social Work Practicum II (4)
- SOWK 7651 Reflection and Synthesis (3)
- Elective Course (3)*

** Full-Time MSW students work with their advisors to choose three elective courses that reflect their individual professional interests and goals. Elective courses may be from any academic discipline but must relate to the School of Social Work's mission to work with vulnerable populations.*

Part-Time Plan of Study (Three Years) (62 credit hours)

The Part-Time MSW plan of study is designed for students who wish to complete an MSW but cannot attend graduate school full-time. The Part-Time MSW can be completed in three years. Students take the same courses as students in the Full-Time plan of study. They complete 62 graduate credits hours, which includes 48 credit hours in the classroom and 14 credit hours in an approved field placement.

The Part-Time plan of study is offered as a hybrid model. Classes alternate between meetings on Saturday at the UNC Charlotte Center City Building and online classes. Online classes are offered asynchronously, meaning students do not have to log in at the same time. They can complete assignments when it is convenient for them as long as they are completed by their due date.

The Foundation curriculum is completed during the first year. During the Fall and Spring semesters, students continue to take courses through hybrid (Saturday and online) classes. They complete the Foundation field placement during other days of the week. During the next Extended Summer Session, students take one course to complete the Foundation curriculum.

The Advanced curriculum is completed over two years, which includes two Fall semesters, two Spring semesters, and one Extended Summer Session. During the Advanced curriculum, students continue to take courses through hybrid (Saturday and online) classes. They complete an Advanced field placement during other days of the week. In the final Extended Summer Session, students take an elective course that reflects their professional interests. In the final Fall and Spring, students complete their required Advanced curriculum courses.

Year One – Foundation Curriculum

Summer (6 credit hours)

- SOWK 6121 Social Work Practice: Theories and Skills (3)
- SOWK 6141 Foundations of Social Work (3)

Fall (9 credit hours)

- SOWK 6131 Social Work Research (3)

SOWK 6151 Social Work, Social Justice, and Diversity (3)
 SOWK 6441 Foundation Social Work Practicum I (3)

Spring (9 credit hours)

SOWK 6232 Practice and Program Evaluation (3)
 SOWK 6242 Advocacy and Policy Change (3)
 SOWK 6442 Foundation Social Work Practicum II (3)

Summer (3 credit hours)

SOWK 6252 Mental Health Assessment (3)

Year Two – Advanced Curriculum

Fall (10 credit hours)

SOWK 7122 Advanced Social Work Practice with Individuals (3)
 SOWK 7222 Advanced Social Work Practice with Communities and Organizations I (3)
 SOWK 7443 Advanced Social Work Practicum I (4)

Spring (9 credit hours)

SOWK 7127 Advanced Social Work Practice with Families (3)
 SOWK 7223 Advanced Social Work Practice with Communities and Organizations II (3)
 SOWK 7444 Advanced Social Work Practicum II (4)

Summer (3 credit hours)

Elective Course (3)*

Year Three – Advanced Curriculum (cont.)

Fall (6 credit hours)

SOWK 7126 Advanced Social Work Practice with Groups (3)
 Elective Course (3)*

Spring (6 credit hours)

SOWK 7651 Reflection and Synthesis (3)
 Elective Course (3)*

** Part-Time MSW students work with their advisors to choose three elective courses that reflect their individual professional interests and goals. Elective courses may be from any academic discipline but must relate to the School of Social Work's mission to work with vulnerable populations.*

**Advanced Standing Plan of Study (One Year)
 (41 credit hours)**

The Advanced Standing plan of study is designed for students who have earned a BSW from an accredited social work program within the past seven years and wish to pursue the MSW. Advanced Standing students are not required to complete the Foundation curriculum for the MSW. Under the Advanced Standing plan of study, the MSW can be completed in one calendar year. Students complete 41 graduate credits hours, which includes 30 credit hours in the

classroom and 11 credit hours in an approved field placement.

Classes begin during Extended Summer Session, which meets on the main University campus for 10 weeks in the summer months. Advanced Standing students complete 9 credit hours of graduate level coursework designed to bridge the gap between their BSW curriculum and the Advanced MSW curriculum. In the Fall and Spring semesters, students complete the Advanced curriculum along with students completing the Full-Time plan of study.

Summer (9 credit hours)

SOWK 6232 Practice and Program Evaluation (3)
 SOWK 6242 Advocacy and Policy Change (3)
 SOWK 6252 Mental Health Assessment (3)

Fall (16 credit hours)

SOWK 7122 Advanced Social Work Practice with Individuals (3)
 SOWK 7126 Advanced Social Work Practice with Groups (3)
 SOWK 7222 Advanced Social Work Practice with Communities and Organizations I (3)
 SOWK 7443 Advanced Social Work Practicum I (4)
 Elective Course (3)*

Spring (16 credit hours)

SOWK 7127 Advanced Social Work Practice with Families (3)
 SOWK 7223 Advanced Social Work Practice with Communities and Organizations II (3)
 SOWK 7444 Advanced Social Work Practicum II (4)
 SOWK 7651 Reflection and Synthesis (3)
 Elective Course (3)*

** Advanced Standing MSW students work with their advisors to choose two elective courses that reflect their individual professional interests and goals. Elective courses may be from any academic discipline but must relate to the School of Social Work's mission to work with vulnerable populations.*

Field Placement

Field placements are assigned from a variety of agencies and practice settings approved by the UNC Charlotte Social Work Field Office. Field Instructors, approved by the School of Social Work, guide the student through learning experiences, coordinating field experiences with the concurrent classroom coursework. The Foundation field placement prepares students to apply generalist social work knowledge, skills, and values. The Advanced field placement prepares students for more specialized application, with special attention to the needs of vulnerable populations.

State Certification

Graduates of the MSW Program may pursue state licensure or certification at the graduate level. Application for licensure or certification should be made with the state board in the state where the applicant intends to practice social work. In North Carolina, the Certification and Licensure Board for Social Work may be accessed on the web at ncswboard.org or by phone at 336-625-1679. MSW levels of licensure/certification in North Carolina include the following: Licensed Clinical Social Worker (LCSW), Licensed Clinical Social Worker Associate (LCSWA), Certified Master Social Worker (CMSW), and Certified Social Work Manager (CSWM).

Special Programs

North Carolina Child Welfare Education Collaborative

UNC Charlotte participates in the North Carolina Child Welfare Education Collaborative, which is a joint effort of the NC Division of Social Services, the NC Association of County Directors of Social Services (DSS), and the National Association of Social Workers NC Chapter, to improve the quality of public child welfare services in North Carolina. The program is administered by the Jordan Institute for Families at UNC Chapel Hill. At UNC Charlotte, Child Welfare Education Collaborative MSW students complete the course SOWK 7015 Child Welfare as one of their electives. They also complete their graduate field placements in a child welfare agency. Students who complete all requirements for the Collaborative program receive a certificate indicating they have successfully met North Carolina Child Welfare Pre-service Training competencies. Graduates may then be hired at a NC County DSS with credit for six (6) months of experience.

For additional information about the North Carolina Child Welfare Education Collaborative at UNC Charlotte, please contact the UNC Charlotte Child Welfare Collaborative Liaison, Dr. Robert Herman-Smith, Associate Professor, at bherman@uncc.edu or 704-687-7180.

School Social Work

Graduates of the program may also qualify for licensure as a school social worker in the state of North Carolina.

The School Social Work license is awarded by the North Carolina Department of Public Instruction. To be eligible for school social work licensure, MSW students must complete a two-semester field placement in a school setting, take SOWK 7010 School Social Work, and take another course from a list of approved electives. Students interested in school

social work licensure should begin planning with their advisors and the MSW Field Education Director as early in the program as possible.

The School of Social Work's Field Education Director, Hontah Epps, has additional information about school social work licensure requirements. She can be reached at htepps@uncc.edu or 704-687-7932. Information is also available online at ncsswa.org.

Gerontology

UNC Charlotte's M.A. in Gerontology and Graduate Certificate in Gerontology are administered jointly by the College of Health and Human Services and the College of Liberal Arts & Sciences. The M.A. program is housed within the School of Social Work. MSW students are given special consideration for graduate courses in Gerontology.

COURSES IN SOCIAL WORK (SOWK)

SOWK 6121. Social Work Practice: Theories and Skills. (3) Introduces the theories of human behavior and models of social work intervention necessary to engage all levels of client systems. Also introduces the skills necessary to identify, analyze, and implement evidence-based interventions to achieve client goals.

SOWK 6131. Social Work Research. (3) Introduction of social science research methods and their relevance to social work. Other content relates to the application of critical thinking and how to engage in research-informed practice and practice-informed research.

SOWK 6141. Foundations of Social Work. (3) Introduction to the profession of social work, with attention to social work history, social welfare history, and current social policies and programs that influence the contexts of social work practice. Professional values, identity, and critical thinking are discussed in relationship to current and historical understandings of social problems and policy responses.

SOWK 6151. Social Work, Social Justice, and Diversity. (3) Examines individual, systemic, and ideological factors related to diversity and social justice. Theories and perspectives that contribute to understanding oppression and privilege are emphasized. Implications for social work practice, research, and policy are examined. Strategies to counter discrimination and oppression are identified. Requires considerable critical analysis and self-reflection on the part of participants.

SOWK 6171. Early Childhood Mental Health. (3)

Highlights the relevance of early relationships between children and their parents, families, and other care providers to later health, mental health, and social adjustment. Emphasis on how the social environment and neuroanatomy during the earliest years of life interact to shape later functioning. Covers basic evidence-based prevention and interventions for young children and their caregivers. Students should have some familiarity with child developmental theory.

SOWK 6232. Practice and Program Evaluation. (3)

Prerequisite: SOWK 6131 (Advanced Standing students are exempt from this prerequisite). Demonstrates how to engage in research-informed practice and practice-informed research. Managing client data and critically analyzing, monitoring, and evaluating interventions are covered in-depth.

SOWK 6242. Advocacy and Policy Change. (3) The role of advocacy in the social work profession, tools for bringing about policy change, and use of advocacy to promote social justice, especially for vulnerable populations.

SOWK 6252. Mental Health Assessment. (3)

Prerequisite: SOWK 6121 (Advanced Standing students are exempt from this prerequisite). An overview of social work theories related to mental/behavioral health assessment with special emphasis on and critique of the APA *Diagnostic and Statistical Manual of Mental Disorders* (DSM).

SOWK 6441. Foundation Social Work Practicum I. (3)

The Foundation field practicum prepares students to apply generalist social work knowledge, skills, values, and ethical principles gained in the classroom to social work practice. Students work in an approved field site under the supervision of a social work field instructor and attend a monthly seminar.

SOWK 6442. Foundation Social Work Practicum II. (3)

Prerequisite: SOWK 6441. The Foundation field practicum that prepares students to apply generalist social work knowledge, skills, values, and ethical principles gained in the classroom to social work practice. Students work in an approved field site under the supervision of a social work field instructor and attend a monthly seminar.

SOWK 6635. The Social Context of Mental Health. (3)

Cross-listed as SOCY 6635, PSYC 8636, and PPOL 8636. Prerequisite: Admission to graduate program or permission of instructor. Draws upon contributions from the field of psychiatry, psychology, social work, and anthropology. The focus is on mental health and illness in its social context, with an

emphasis on the relationship between social structure and mental health/disorder. Social factors are examined which shape psychiatric diagnosis, the effects of socio-demographic variables on mental health, and the role of social support and stress for different groups. Also examines the organization, delivery, and evaluation of mental health services, and mental healthcare policy.

SOWK 7090. Special Topics in Social Work. (3) A topics course that is only available for graduate credit. *May be repeated for credit with change of topic.*

SOWK 7010. School Social Work. (3) Exploration of school social work practices from a theoretical as well as practical point of view. Also focuses on the roles of school social workers and the type of issues they confront.

SOWK 7015. Child Welfare. (3) Prerequisite: Permission of MSW Program Director or instructor. Examination of the history, purpose, and goals of child welfare services in North Carolina and in the United States. Course information is provided from the context of the child- and family-centered model that guides child welfare services.

SOWK 7020. Social Welfare and Philanthropy. (3) Introduction to philanthropy which allows students, through a community-based project, to experience two predominant aspects of philanthropy – grant making and fundraising – with an emphasis on supporting the well-being of vulnerable populations.

SOWK 7025. Social Development in Malawi. (3) Students actively participate in several pre-departure class lectures and work sessions. They travel to Malawi for 11 days and engage in service-learning activities aligned with social development in rural Malawi. Experiential projects are designed and implemented by students using funds they raise. Sustainability and anti-oppressive approaches to social development are highlighted.

SOWK 7030. Trauma and Recovery: Theory and Intervention. (3) The history and evolution of trauma theory and social movements, and exploration of the impact of trauma and healing upon survivors. Students master the foundational principles and basic skills of trauma intervention. Students also participate in a community project that involves learning about services available for trauma survivors locally.

SOWK 7035. Social Work with HIV and AIDS. (3) The impact of HIV on social work client populations and emphasis on the need for social work practitioners and other helping professionals to be knowledgeable about the disease, prevention strategies, and related epidemiologic disparities.

Addresses skills necessary to assist with needs of people living with HIV/AIDS, their significant others, families, and communities.

SOWK 7122. Advanced Social Work Practice with Individuals. (3) Prerequisite: SOWK 6121 (Advanced Standing students are exempt from this prerequisite). Expands social work students' knowledge, values, and skills with regard to advanced micro practice with individuals, especially members of vulnerable groups.

SOWK 7126. Advanced Social Work Practice with Groups. (3) Prerequisite: SOWK 6121 (Advanced Standing students are exempt from this prerequisite). Theory and practice related to social work with small groups. Various approaches to group development and facilitation, including social change, therapeutic change, goal setting, and assessment in groups, with an emphasis on work with vulnerable populations.

SOWK 7127. Advanced Social Work Practice with Families. (3) Prerequisite: SOWK 6121 (Advanced Standing students are exempt from this prerequisite). Expands social work students' knowledge, values, and skills with regard to advanced micro practice with families, especially members of vulnerable populations.

SOWK 7222. Advanced Social Work Practice with Organizations and Communities I. (3) Builds on the foundational theories and skills introduced in Social Work Practice with specific attention to communities and organizations as primary client systems. Introduces theories that inform and guide practice in communities and organizations. Builds advanced skills in engaging and assessing communities and organizations.

SOWK 7223. Advanced Social Work Practice with Organizations and Communities II. (3) Prerequisite: SOWK 7222. Builds advanced practice skills in the design, development, implementation, and evaluation of interventions at the community and organizational levels. Also builds skills in leadership and ethical decision-making. Emphasizes the use of critical thinking and self-awareness concerning leadership and ethical challenges in community and organizational contexts.

SOWK 7443. Advanced Social Work Practicum I. (4) Prerequisite: SOWK 6442 (Advanced Standing students are exempt from this prerequisite). The Advanced field practicum prepares students for more specialized application of social work knowledge, values, and skills, with special attention to the needs of vulnerable populations. Students work in an approved field site under the supervision of a social work field instructor and attend a monthly seminar.

SOWK 7444. Advanced Social Work Practicum II. (4) Prerequisite: SOWK 7443. The Advanced field practicum prepares students for more specialized application of social work knowledge, values, and skills, with special attention to the needs of vulnerable populations. Students work in an approved field site under the supervision of a social work field instructor and attend a monthly seminar.

SOWK 7651. Reflection and Synthesis. (3) Prerequisites: SOWK 7222 and SOWK 7443. Provides MSW students with an opportunity to practice personal reflection, synthesize their learning from the MSW program, and demonstrate competency.

SOWK 7627. Seminar in Advanced Practice: Supervision and Staff Training. (3) Prerequisites: SOWK 6121, SOWK 6131, SOWK 6141, SOWK 6151, or admission to Advanced Standing program. Students may choose to satisfy their social work elective requirement with this course. This seminar is for students who anticipate working in traditional social welfare organizations in the public or private sectors. The focus is on knowledge and skills that a social worker needs to succeed in practice in large organizations. Included is content on supervision, staff training and development, and the role of the professional in large organizations.



College of Liberal Arts & Sciences

clas.uncc.edu

Dean: Dr. Nancy Gutierrez

Senior Associate Dean: Dr. Bill Hill

Associate Dean for Academic and Student Success: Dr. Banita Brown

Associate Dean for Academic Affairs and Diversity: Dr. Shawn Long

Associate Dean for Research and Graduate Education: Dr. Richard Tankersley

The College of Liberal Arts & Sciences is the largest of the seven discipline-based colleges at the University of North Carolina at Charlotte, housing 18 academic departments and numerous interdisciplinary programs. The College serves the Charlotte region and the state of North Carolina and is engaged in the discovery, dissemination, synthesis and application of knowledge. It provides for the educational, economic, social, and cultural advancement of the people of North Carolina through on-and off-campus programs, continuing personal and professional education opportunities, research and collaborative relationships with the private, public, and nonprofit institutional resources of the greater Charlotte metropolitan region. The College offers a wide array of graduate programming including graduate certificate, Master of Arts, Master of Science, and Ph.D. programs.

Graduate Degree Programs

- Master of Arts in Anthropology
- Master of Arts in Biology
- Master of Arts in Communication Studies
- Master of Arts in English
- Master of Arts in Ethics and Applied Philosophy
- Master of Arts in Geography
- Master of Arts in Gerontology
- Master of Arts in History
- Master of Arts in Latin American Studies
- Master of Arts in Latin American Studies/MBA Dual Degree (see *Belk College of Business section*)
- Master of Arts in Liberal Studies
- Master of Arts in Psychology

- Master of Arts in Industrial / Organizational Psychology
- Master of Arts in Religious Studies
- Master of Arts in Sociology
- Master of Arts in Spanish
- Master of Public Administration: Nonprofit Management / Arts Administration / Emergency Management
- Master of Science in Applied Physics
- Master of Science in Biology
- Master of Science in Chemistry
- Master of Science in Criminal Justice
- Master of Science in Earth Sciences
- Master of Science in Mathematics: Applied Mathematics / General Mathematics / Applied Statistics
- Master of Science in Mathematical Finance (see *the Belk College of Business section*)
- Master of Science in Optical Science and Engineering (with *The William States Lee College of Engineering*)
- Ph.D. in Applied Mathematics
- Ph.D. in Biology
- Ph.D. in Geography and Urban Analysis
- Ph.D. in Health Psychology (with *Colleges of Education and Health & Human Services*)
- Ph.D. in Infrastructure and Environmental Systems (see *The William States Lee College of Engineering section*)
- Ph.D. in Nanoscale Science
- Ph.D. in Optical Science and Engineering (with *The William States Lee College of Engineering*)
- Ph.D. in Organizational Science
- Ph.D. in Public Policy

Graduate Non-Degree Programs

- Certificate in Africana Studies
- Certificate in Applied Ethics
- Certificate in Applied Linguistics
- Certificate in Arts Administration
- Certificate in Cognitive Science
- Certificate in Emergency Management
- Certificate in Gender, Sexuality, and Women's Studies
- Certificate in Gerontology
- Certificate in Languages and Culture Studies: Translating
- Certificate in Nonprofit Management
- Certificate in Public Budgeting and Finance
- Certificate in Technical/Professional Writing
- Certificate in Urban Management and Policy

Africana Studies

• Graduate Certificate in Africana Studies

Department of Africana Studies

africana.uncc.edu

Graduate Program Director

Dr. Akin Ogundiran

GRADUATE CERTIFICATE IN AFRICANA STUDIES

The Graduate Certificate in Africana Studies is designed for students interested in the global African and African Diaspora experience, with emphasis on history, culture, and social policy. The program provides advanced credential of analytical knowledge and skills in any area of Africana Studies. The certificate can be earned either as a freestanding course of study or in conjunction with master's or doctoral work in a wide variety of subjects, especially in the Humanities, Social Sciences, Arts and Architecture, Education, and Health Sciences. The graduate certificate curriculum is interdisciplinary and courses offered will provide students with advanced knowledge of the intersecting issues of race, identity, culture and aesthetics, history, globalization, development, and social policy.

Admission Requirements

Applications for admission to the Graduate Certificate in Africana Studies will be considered as they are received, and admissions will be ongoing. To be considered for admission, an applicant must (1) hold a bachelor's degree from an accredited university, and with a minimum cumulative grade point average of 3.0 (based on a 4.0 scale); or (2) be enrolled and in good standing in a graduate degree program at UNC Charlotte. If the applicant has earned or attempted a post-baccalaureate degree (i.e., master's, doctoral, or other), grades in that program will also be taken into consideration.

In addition to the general requirements for graduate certificate programs as explained at the beginning of this *Catalog*, an applicant must provide official transcripts, three letters of recommendation from persons familiar with the applicant's personal and professional qualifications, and a two-page statement of purpose explaining his/her educational and work background, interests, and plans, with an emphasis on how this certificate will enhance, complement, or

advance the applicant's professional goals and/or personal education.

Certificate Requirements

To obtain a Graduate Certificate in Africana Studies, admitted students will complete 15 credit hours.

Required Courses (6 credit hours)

AFRS 6610 Diaspora and Transnational Theories (3)

Plus one of the following:

AFRS 6620 Advanced Readings in African Modernities (3)

AFRS 6630 Graduate Colloquium (3)

AFRS 6901 Directed Readings/Research (3)

Elective Courses (9 credit hours)*

AFRS 5000 Special Topics in Africana Studies (3)

AFRS 6620 Advanced Readings in African Modernities (3)

AFRS 6630 Graduate Colloquium (3)

AFRS 6901 Directed Readings/Research (3)

ANTH 5090 Topics in Anthropology (3)**

CSLG 6145 Multicultural Counseling (3)

ENGL 5155 Pan-African Literature (3)

ENGL 5156 Gender and African American Life (3)

ENGL 5157 African American Poetry (3)

ENGL 5158 African American Literary Theory and Criticism (3)

ENGL 6070 Topics in English (3)**

ENGL 6147 Perspectives in African American Literature (3)

HIST 5000 Problems in American History (when topic is related to Africana Studies) (3)

HIST 5002 Problems in Non-Western History (3)**

HIST 6000 Topics in History (3)**

LTAM 5600 Seminar in Latin American Studies (when topic is related to Africana Studies) (3)

LTAM 6251 Colloquium on Colonial Latin American History (3)**

LTAM 6252 Colloquium on Modern Latin American History (3)**

PHIL 6050 Race and Philosophy (3)

TESL 6204 Multicultural Education (3)

**Other elective courses may be selected, with the approval of the Graduate Program Director, from any UNC Charlotte graduate courses relevant to Africana Studies.*

***When topic is related to Africana Studies.*

All or part of the 15-hour credit courses may count towards a M.A. or Ph.D. program in which the student is enrolled, provided that the courses are approved for that purpose by the advisors of that program. Students must have a minimum grade point of 3.0 in each course that counts towards the certificate. The award of the graduate certificate is carried on the student's

official transcript upon completion of the program. Students in another degree programs must enroll concomitantly in the certificate program. The certificate will not be awarded retroactively.

COURSES IN AFRICANA STUDIES (AFRS)

AFRS 5000. Special Topics in Africana Studies. (3)

Intensive survey of a topic in African, African American, or the broad African Diaspora studies, depending on the needs of student and staff resources. *May be repeated for credit with change of topic.*

AFRS 6610. Diaspora and Transnational Theories. (3)

Focuses on the dialectical relationships between the social theories of nation, state, ethnicity, identity, race, and culture on one hand and the emerging theorizing of the diaspora and transnational networks on the other. The historical contexts that have shaped the African Diaspora and the more recent global transnational networks will be emphasized throughout the course.

AFRS 6620. Advanced Readings in African Modernities. (3)

Prerequisite: 3 credit hours of Africana Studies course(s) at the graduate-level or approval of the Graduate Program Director. The advanced seminar explores the meanings, character, complexity, and consequences of modernity in Africa. The interdisciplinary readings and the analyses that derive from a wide range of disciplines – philosophy, history, anthropology, politics, literature, and the arts – will be deployed to understand the African realities of modernity as a product of 500 years of history from the Atlantic Slavery through colonialism, to the present.

AFRS 6630. Graduate Colloquium. (3)

Prerequisite: prior written permission of instructor and Graduate Program Director. Focuses on an interdisciplinary theme that combines two or more of the following: literature, language, politics, health issues, social policy, education, popular culture, history, performance theory, pedagogy, etc. Students write short papers and reports directed toward developing breadth in the theoretical and empirical understanding of a topic in Africana Studies using interdisciplinary approaches. *May be repeated for credit with change of topic.*

AFRS 6901. Directed Readings/Research. (3)

Prerequisite: prior written permission of instructor and Graduate Program Director. A directed research on a specific theme in Africana Studies. Students will produce a publishable essay at the end of the semester based on original research. The goal is for students to develop research, theoretical and

analytical depth in an area of study in Africana Studies. *May be repeated for credit with change of topic.*

Anthropology

- **M.A. in Anthropology**

Department of Anthropology

anthropology.uncc.edu

Graduate Program Director

Dr. Nicole Peterson

Graduate Faculty

Dr. Elise Berman, Assistant Professor

Dr. Steven Falconer, Professor

Dr. Andrea Freidus, Assistant Professor

Dr. Catherine Fuentes, Teaching Professor

Dr. Janet Levy, Professor

Dr. Jonathan Marks, Professor

Dr. Dennis Ogburn, Associate Professor

Dr. Peta Katz, Lecturer

Dr. Nicole Peterson, Associate Professor

Dr. Gregory Starrett, Professor

Dr. Coral Wayland, Associate Professor

MASTER OF ARTS (M.A.) IN ANTHROPOLOGY

Anthropology is an integrative and comparative field of scholarship devoted to discovering and analyzing the range of human biological and cultural variation, as well as to understanding the historical, ecological, and sociopolitical contexts in which human diversities and commonalities develop. The field encompasses and integrates cultural anthropology (the study of living communities), linguistic anthropology (the study of the human use of language), biological anthropology (the study of humans' primate relatives, human evolution, and modern biological variation), and archaeology (the study of the culture of past communities). The Master of Arts in Anthropology degree program will provide students with the theoretical and methodological skills to gather, record, analyze, and communicate about human activity patterns in the past and present, and at local and global levels.

The M.A. in Anthropology is designed to meet the needs of two kinds of students: those seeking to prepare for doctoral education in anthropology or other fields and those seeking post-baccalaureate skills for employment in a wide range of occupations in our increasingly intercultural and international world: education, government, program planning and evaluation, healthcare, media, the nonprofit sector, and business. Coursework in the program will build skills in data collection, analysis, and interpretation,

and the application of anthropological perspectives to both theoretical and applied problems.

The M.A. in Anthropology has the following educational objectives:

- to provide opportunities for post-baccalaureate study about the human species from evolutionary and cross-cultural perspectives;
- to provide training for the application of anthropological techniques and perspectives to contemporary social problems;
- to expand cross-cultural understanding within regional and national communities and institutions;
- to expand understanding of the complex interconnections between local communities and global environments, both natural and social;
- to emphasize the importance of cross-disciplinary, biocultural approaches to research on the human species.

Additional Admission Requirements

In addition to meeting the University's graduate admission requirements, all prospective students must submit at least three letters of reference of which at least two are from academic sources; a B.A. in Anthropology or a related field, such as Area Studies, History, Biology, Sociology, etc.; a GPA of at least 3.0 in the student's undergraduate degree; and GRE scores.

Degree Requirements

The M.A. in Anthropology requires the completion of a minimum of 33 credit hours of approved graduate work with a GPA of 3.0 or above. The successful completion of a Thesis or an Internship with a research report is also required.

Required Core Courses

ANTH 6601 History of Anthropology (3)
ANTH 6602 Interdisciplinary Study in Anthropology (3)

Select two of the following:

ANTH 6603 Theory in Cultural Anthropology (3)
ANTH 6604 Archaeological Theory and Practice (3)
ANTH 6605 Evolutionary and Biological Anthropology (3)
ANTH 6606 Foundational Issues in Linguistic Anthropology (3)

Select one of the following:

ANTH 5122 Ethnographic Methods (3)
ANTH 5140 Field Biology of the Primates
ANTH 5453 Field Project in Archaeology (1-4)

Thesis Track Additional Requirements

ANTH 6910 Thesis Tutorial (3)

ANTH 6920 Master's Thesis (3)

Four elective courses

Practicum Track Additional Requirements

ANTH 6400 Anthropology Practicum (3)

ANTH 6611 Seminar in Applied Anthropology (3)

Four elective courses

Students in both tracks may earn up to six credit hours in programs outside of the Department of Anthropology, with approval of the Director of Graduate Studies.

Advising

The Director of Graduate Studies will appoint an advisor for each graduate student from among the Anthropology Graduate Faculty.

Committees

Each student will form a committee of three faculty with the advice of the Director of Graduate Studies. One of these committee members may come from another department.

Language Requirement

There is no specific language requirement, but students in the thesis track are encouraged to pursue appropriate language study.

Thesis/Practicum Research

Students in the Thesis Track will complete a research-based thesis while taking ANTH 6910 and ANTH 6920. Students in the Practicum Track will complete a research-based report as part of an internship (ANTH 6400) with an organization, institution, or agency.

Application to Graduation

Students must complete an Application for Graduation by the deadline date specified in the official University academic calendar in the semester in which they plan to graduate. Details are available on the Graduate School website at graduateschool.uncc.edu/current-students/graduation.

Assistantships

The Department offers a limited number of graduate assistantships. Awards are made on a competitive basis after acceptance to the program. Interested students should complete the Graduate Assistantship Application online at graduateschool.uncc.edu.

COURSES IN ANTHROPOLOGY (ANTH)

ANTH 5090. Topics in Anthropology. (3)

Prerequisite: Permission of instructor. Intensive treatment of a topic in anthropology or survey of related topics. Examples: Religion, Art, and Archaeology; Islam and Globalism. *May be repeated for credit with change of topic.*

ANTH 5120. Intercultural Communications. (3)

Prerequisite: ANTH 1101 or permission of instructor. Learning to cope with cultural differences; contrasting value systems; cross-cultural communication styles; nonverbal communication; cultural relativity; culture and business; ethnocentrism; cultural shock.

ANTH 5122. Ethnographic Methods. (3) Designed to introduce students to the methodological approaches used in ethnography and to provide a basic mastery of several key methods used in ethnographic research. Includes a discussion of the nature of inquiry in the social sciences; the development and implementation of different kinds of research designs to investigate a range of questions; issues of sampling and informant selection; research ethics; participant observation, interviewing techniques; data management and analysis.

ANTH 5131. Culture, Pregnancy, and Birth. (3)

Cross-listed as WGST 5131. Explores how culture shapes the experience and practice of pregnancy and birth. Some of the topics explored include the birthing experience, midwifery, infertility, new reproductive technologies, and surrogate motherhood.

ANTH 5140. Field Biology of the Primates. (3) The theory and methods utilized in the study of nonhuman primate behavior. This applied behavioral primatology course entails original research projects done at an appropriate zoological venue in North and South Carolina.

ANTH 5453. Field Project in Archaeology. (1-4)

Prerequisite: Permission of instructor. Practical experience in archaeological techniques. Students participate in field research on an historic or prehistoric archaeological site. Research may include field reconnaissance, excavation, mapping, systematic description and analysis of cultural material, and/or other techniques appropriate to the site and research problem. Students supervise undergraduates under the guidance of the instructor. *May be repeated for credit with up to 6 credits applied to the M.A. degree.*

ANTH 5615. Seminar in Middle East Ethnography. (3)

Seminar exploring both historically significant and recent ethnographies on selected topics. Examples

include Israel/Palestine, Women in the Middle East, and Tribe, State, and Nation in the Middle East. *May be repeated for credit with change of topic.*

ANTH 5622. Seminar in the Ethnography of Religion. (3)

Seminar exploring both historically significant and recent ethnographies on the anthropology of religion.

ANTH 6010. Advanced Topics in Cultural Anthropology/Linguistics. (3)

Prerequisite: Permission of the department. Intensive treatment of a topic in cultural anthropology or linguistic anthropology, depending on student needs and faculty resources. *May be repeated for credit.*

ANTH 6040. Advanced Topics in Biological Anthropology. (3)

Prerequisite: Permission of the department. Intensive treatment of a topic in biological anthropology, depending on student needs and faculty resources. *May be repeated for credit.*

ANTH 6050. Advanced Topics in Archaeology. (3)

Prerequisite: Permission of the department. Intensive treatment of a topic in archaeology, depending on student needs and faculty resources. *May be repeated for credit.*

ANTH 6132. Culture, Health, and Aging. (3)

Exploration of the interaction between culture and the aging experience, with a particular emphasis on issues of health and the healthcare system.

ANTH 6400. Anthropology Practicum. (3)

Prerequisite: Permission of the department. Pre- or corequisite: ANTH 6611. Supervised practical experience in the application of anthropological principles in an agency, organization, or facility not part of the department. Following the needs of the agency, students will conduct applied research and write a report as part of this practicum. *May be repeated for credit; 6 credits may be applied to the M.A. degree program.*

ANTH 6401. Teaching Anthropology. (1)

Methods and skills for teaching undergraduate students. Students examine and practice teaching skills and classroom procedures. Includes preparation of model teaching materials, such as syllabi, and practice teaching.

ANTH 6601. History of Anthropology. (3)

Development of the field of anthropology; key concepts, focusing on concepts of "race" and "culture;" debates in anthropological method and theory; implications for ethical practice in contemporary anthropology.

ANTH 6602. Seminar in Interdisciplinary Anthropology. (3)

Analysis of a key issue or debate

through the lens of two or more anthropological specialties. Emphasizes the holistic, interdisciplinary nature of anthropology. *May be repeated for credit with change of topic.* Up to 6 hours may be applied to the degree.

ANTH 6603. Theory in Social and Cultural Anthropology. (3) Discussion of major works that form the theoretical foundation of contemporary social and cultural anthropology.

ANTH 6604. Issues in Archaeological Practice. (3) Exploration of current theory and practice in anthropological archaeology. Topics include: major theoretical perspectives; the relationship of theoretical choices with the formation of research problems and choice of research methods; discussion of the legal and ethical framework of contemporary archaeology; examination of the influence of multiple stakeholders on the practice of archaeology.

ANTH 6605. Evolutionary and Biological Anthropology. (3) Discussion of theories, concepts, and controversies informing biological anthropology, including evolutionary theory as applied to primate and human evolution, behavioral ecology, genetics, and modern human variation.

ANTH 6606. Language and Culture: Foundational Issues in Linguistic Anthropology. (3) Discussion of the theories, concepts, controversies, and major findings of linguistic anthropology. Includes an analysis of the difference between human and non-human communication, semiotics, language and thought, the nature of meaning, language socialization, language variation, language and power, and multilingualism, as well as linguistic change. No prior training in linguistics is assumed, presupposed, or required.

ANTH 6611. Seminar in Applied Anthropology. (3) Theories, methods, and ethics of applied anthropology in medical, educational, business, and development fields. Cultural perspective on the program evaluation in community settings; culturally competent evaluations using ethnographic methods; role of anthropology in program development and evaluation at the regional, national, and international levels.

ANTH 6612. Theoretical Approaches to Gender. (3) Cross-listed as WGST 6602. An interdisciplinary examination of the core theories about the role of gender in identity formation and social organization. Topics covered include the feminist critique of biological essentialism; gender as a continuum; the social construction of gender; gender performativity; historical changes in gender; masculinity studies; the

intersection of race, class and gender; and the economics of gender.

ANTH 6642. Selection in Relation to Sex in Primates. (3) Explores the current state of theory and empirical research on sexual selection; discussion will focus on critically evaluating the evidence that sexual selection plays an important role in the evolution and maintenance of particular aspects of morphology, behavior and social organization in nonhuman primates and humans.

ANTH 6800. Directed Readings/Research. (1-3) Prerequisite: Permission of the department. Study of specialized topic through individually designed reading program and scheduled conferences with a faculty member. *May be repeated for credit.*

ANTH 6910. Thesis Tutorial. (3) Prerequisite: Permission of the Graduate Program Director. Independent study with a faculty advisor, to conduct research for the M.A. thesis.

ANTH 6920. Master's Thesis. (3) Prerequisites: Admission to candidacy and permission of the Graduate Program Director. Preparation of master's thesis under the supervision of the thesis committee. *May be repeated for credit up to 6 credits.*

Biology

- **Ph.D. in Biology**
- **M.S. in Biology**

Department of Biological Sciences

biologicalsciences.uncc.edu

Graduate Program Director

Dr. Christine Richardson

Graduate Faculty

Dr. Kenneth Bost, Professor
 Dr. Richard Chi, Assistant Professor
 Dr. Mark Clemens, Professor
 Dr. Didier Dréau, Associate Professor
 Dr. Valery Grdzlishvili, Associate Professor
 Dr. Lawrence Leamy, Professor
 Dr. Ian Marriott, Professor
 Dr. Pinku Mukherjee, Professor
 Dr. James Oliver, Professor
 Dr. Matthew Parrow, Associate Professor
 Dr. Molly Redmond, Assistant Professor
 Dr. Adam Reitzel, Assistant Professor
 Dr. Thomas Reynolds, Professor
 Dr. Christine Richardson, Associate Professor
 Dr. Amy Ringwood, Associate Professor
 Dr. Stanley Schneider, Professor
 Dr. Bao-Hua Song, Assistant Professor
 Dr. Todd Steck, Associate Professor
 Dr. Andrew Truman, Assistant Professor
 Dr. Shan Yan, Associate Professor
 Dr. Jian Zhang, Associate Professor

Associate Graduate Faculty

Dr. Daniel Nelson, Research Associate Professor
 Dr. Ken Piller, Adjunct Associate Professor
 Dr. Jennifer Warner, Senior Lecturer

PH.D. IN BIOLOGY

The Ph.D. in Biology Program has as its intellectual focus an interdisciplinary synthesis of the biological sciences and related biotechnology. In addition to a vigorous research concentration, the program emphasizes the importance of relevant coursework. All students are required to complete a series of core courses related to the interdisciplinary nature of the program. Students must choose the Molecular, Cellular, and Developmental Biology (MCD) concentration or the Ecology, Evolution, and Environmental Biology (E3B) concentration before selecting elective courses. The cornerstone of the program is the student's research dissertation. Each dissertation is expected to be a significant scientific

contribution based on independent and original research, leading to publications in national/international peer-reviewed journals.

For further information, please see the department website at biologicalsciences.uncc.edu.

Admission Requirements

Applicants will be evaluated in a holistic manner to identify those who have the greatest potential for success. In addition to the general requirements for admission to the Graduate School, to begin study toward the Interdisciplinary Ph.D. in Biology, students admitted to the program should have:

- 1) A B.S. or B.A. degree from an accredited university.
- 2) An overall grade point average of at least 3.0 out of 4.0. Additionally, applicants must have a grade point average of at least 3.5 in biology, 3.0 in chemistry, and 3.0 in mathematics.
- 3) A score on the Graduate Record Examination General Test in at least the 65th percentile (average for the verbal, quantitative, and analytical sections).
- 4) A minimum of 24 hours in biology, including at least one course in genetics, physiology, and cell/molecular biology. Additionally, applicants should have one year each of general chemistry, organic chemistry, physics, and mathematics. Applicants with academic deficiencies may be admitted on the condition that any deficiencies are corrected during the first year of graduate study. The Graduate Ph.D. Committee will determine the remediation necessary for identified deficiencies.
- 5) A score of at least 100 on the Internet-based, 220 on the computer-based, or 557 on the paper-based Test of English as a Foreign Language (TOEFL), or a minimum overall band score of 6.5 on the IELTS, for applicants whose native language is not English. Students who do not pass this examination must pass ENGL 1100 (English as a Foreign Language) with a grade of C or above. In addition, these students who will be involved in any instructional activity (e.g., teaching assistants) will be required to be evaluated by the English Language Training Institute at UNC Charlotte prior to the beginning of the first semester of study.
- 6) Three letters of reference, at least two of which must be from faculty members.

Degree Requirements

The Ph.D. acknowledges the value of coursework as background and preparation for research, but the primary emphasis of the program is on the development of research skills and the completion of

a research project on a significant problem in the biological sciences or related biotechnology.

The program requires 72 post-baccalaureate credit hours. All students are required to take a general curriculum that includes a sequence of courses as shown below.

Required Courses

BIOL 8101 Hypothesis Testing (3)
 BIOL 8102 Cellular and Molecular Biology (3)
 BIOL 8140 Evolutionary Biology (3)
 BIOL 8201 Seminar (2) (*1 hour per year*)

Concentration Course

Select one of the following, based on concentration:

BIOL 8241 Environmental Biology (3) (*for students pursuing the Ecology, Evolution and Environmental Biology (E3B) concentration*)
 BIOL 8270 Biological Pathways and Metabolism (3) (*for students pursuing the Molecular, Cellular and Developmental Biology (MCD) concentration*)

Research and Ethics Course

Select one of the following:

BIOL 8260 Careers in Bioscience: Professional Development and Responsible Conduct (2)
 GRAD 8002 Responsible Conduct of Research (2)
 PHIL 8240 Research Ethics in the Biological and Behavioral Sciences (3)

Concentration Elective Courses

Students should select a minimum of 9 credit hours of elective courses; to be determined in consultation with the student's Dissertation Committee, but typically will consist of at least three 3 credit hour courses from either the MCD or E3B concentration. At least half the total elective hours, including the concentration requirement must be at the 8000-level. Elective courses outside the concentration may be substituted upon approval from the Supervisory Committee and Graduate Program Director.

Ecology, Evolution, and Environmental Biology Concentration Elective Courses

Select from the following:

BIOL 5000 Advanced Topics in Biology (1-4)
 BIOL 5111 Evolution (3)
 BIOL 5121 Advanced Biometry (4)
 BIOL 5144 Advanced Ecology (4)
 BIOL 5162 Advanced Biotechnology I (3)
 BIOL 5163 Advanced Biotechnology II (3)
 BIOL 5168 Recombinant DNA Techniques (4)
 BIOL 5184 Plant Biotechnology (3)
 BIOL 5189 Mechanisms in Development (3)
 BIOL 5199 Molecular Biology (3)
 BIOL 5205 Advanced Horticulture (3)
 BIOL 5221 Plant Systematics (4)
 BIOL 5229 Dendrology (4)

BIOL 5234 Wildlife Biology (3)
 BIOL 5235 Mammalogy (4)
 BIOL 5242 The Biology of Birds (3)
 BIOL 5242L The Biology of Birds Lab (1)
 BIOL 5243 Animal Behavior (3)
 BIOL 5244 Conservation Biology (3)
 BIOL 5250 Microbiology (3)
 BIOL 5250L Microbiology Laboratory (1)
 BIOL 5253 Marine Microbiology (4)
 BIOL 5257 Microbial Physiology and Metabolism (3)
 BIOL 5260 Population Genetics (3)
 BIOL 5277 Endocrinology (3)
 BIOL 5282 Developmental Plant Anatomy (3)
 BIOL 5282L Developmental Plant Anatomy Laboratory (1)
 BIOL 5283 Animal Development (3)
 BIOL 5283L Animal Development Laboratory (1)
 BIOL 5293 Comparative Vertebrate Anatomy (4)
 BIOL 6000 Special Topics in Biology (1-4)
 BIOL 6800 Tutorial (1-4)
 BIOL 8000 Special Topics in Biology (1-4)
 BIOL 8200 Interdisciplinary Colloquium (1)
 BIOL 8800 Laboratory Rotations (2)

Molecular, Cellular, and Developmental Biology Concentration Elective Courses

Select from the following:

BIOL 5000 Advanced Topics in Biology (1-4)
 BIOL 5121 Advanced Biometry (4)
 BIOL 5162 Advanced Biotechnology I (3)
 BIOL 5163 Advanced Biotechnology II (3)
 BIOL 5167 Medical Genetics (3)
 BIOL 5168 Recombinant DNA Techniques (4)
 BIOL 5171 Cell Physiology (3)
 BIOL 5189 Mechanisms in Development (3)
 BIOL 5199 Molecular Biology (3)
 BIOL 5233 Parasitology (3)
 BIOL 5250 Microbiology (3)
 BIOL 5250L Microbiology Laboratory (1)
 BIOL 5251 Immunology (3)
 BIOL 5251L Immunology Laboratory (1)
 BIOL 5254 Epidemiology (3)
 BIOL 5255 Bacterial Genetics (3)
 BIOL 5256 Pathogenic Bacteriology (3)
 BIOL 5256L Pathogenic Bacteriology Laboratory (1)
 BIOL 5257 Microbial Physiology and Metabolism (3)
 BIOL 5258 Epidemics and Plagues (3)
 BIOL 5259 Advanced Virology (3)
 BIOL 5259L Advanced Virology Laboratory (1)
 BIOL 5265 Drugs: Molecular and Cellular Mechanisms (3)
 BIOL 5277 Endocrinology (3)
 BIOL 5279 Neurobiology (3)
 BIOL 5282 Developmental Plant Anatomy (3)
 BIOL 5282L Developmental Plant Anatomy Laboratory (1)
 BIOL 5283 Animal Development (3)
 BIOL 5283L Animal Development Laboratory (1)
 BIOL 5292 Advances in Immunology (3)

BIOL 6000 Special Topics in Biology (1-4)
 BIOL 6010 Special Topics in Microbiology (1-4)
 BIOL 6103 Immunology of Infection (4)
 BIOL 6104 Integrative Systems Physiology (4)
 BIOL 6273 Advanced Human Physiology (3)
 BIOL 6274 Advanced Human Pathophysiology (3)
 BIOL 6800 Tutorial (1-4)
 BIOL 8000 Special Topics in Biology (1-4)
 BIOL 8010 Special Topics in Microbiology (1-4)
 BIOL 8103 Immunology of Infection (4)
 BIOL 8104 Integrative Systems Physiology (4)
 BIOL 8200 Interdisciplinary Colloquium (1)
 BIOL 8201 Seminar (1)
 BIOL 8800 Laboratory Rotations (2)

Dissertation

BIOL 8999 Dissertation Research (*minimum of 18 credit hours*)

Grade Requirements

Students must maintain a cumulative average of 3.0 in all coursework taken for graduate credit. Lab rotations and the dissertation research are graded on a Pass/Unsatisfactory basis and therefore are not included in the cumulative average. An accumulation of one C grade results in suspension from the program; two C grades results in termination of enrollment in the graduate program. If students make a grade of U in any course, enrollment in the program is terminated.

Transfer Credit

Only courses with grades of A or B may be accepted for transfer credit; courses graded IP/P typically cannot be transferred among graduate programs. Although the maximum amount of credit past the baccalaureate degree that a Ph.D. student may count towards the doctorate is 30 credit hours, only courses appropriate for the program and curriculum in which the student is enrolled may be transferred. This should be determined by the student's Dissertation Committee and approved by the Graduate Program Director, before the request is submitted to the Graduate School. This rule applies whether the courses were taken at UNC Charlotte or elsewhere, and whether a Master's degree was earned or not. However, no more than six hours taken when the student was in post-baccalaureate (non-degree seeking) status may be applied toward the doctoral degree.

Departmental Seminars

Graduate students are expected to attend all seminars sponsored by the Department of Biological Sciences. In addition, each student is required to make a 20 minute presentation on his/her research at the departmental seminar after entering his/her 2nd year in the program. The Graduate Program Director will

work out the logistics with the department seminar coordinator concerning the arrangement of students' presentations.

Advancement to Candidacy

For Advancement to Candidacy, students must pass the Qualifying Examination by the end of the 5th semester of study. The Qualifying Examination can be taken only after all coursework for the degree has been completed, with the exception of the Doctoral Dissertation Research. Following successful completion of the Qualifying Examination, a dissertation topic is proposed to the student's Dissertation Committee by the end of the 6th semester of study. Students advance to candidacy following approval of the proposed dissertation topic by their Dissertation Committee and the Dean of the Graduate School.

Obtaining the Non-Thesis M.S. While Completing the Ph.D. Degree

Ph.D. students may choose to receive the non-thesis M.S. degree while continuing to work toward the doctoral degree provided they have successfully completed the Qualifying Examination and completed at least 30 credit hours of coursework, and two credit hours of BIOL 6800 (Tutorial) culminating in a written assignment developed in consultation with the student's major advisor. Obtaining the non-thesis M.S. requires dual enrollment in the Ph.D. and M.S. programs. Doctoral students can apply for enrollment in the M.S. program after entering the Ph.D. program.

Dissertation

The doctoral program of study must include a minimum of 18 hours of dissertation credit. Students must complete and defend a dissertation based on a research program approved by their dissertation committee, which results in a high quality, original and substantial piece of research. Students must orally present and successfully defend the dissertation to their dissertation committee in a defense that is open to the public. A copy of the dissertation must be made available for review by the program doctoral faculty at least two weeks prior to the public defense.

UNC Charlotte Residency Requirement

Students must satisfy the UNC Charlotte residency requirement for the program by completing 20 credit hours, either as coursework or research credits. Residence is considered to be continuous if students are enrolled in one or more courses in successive semesters until 20 credit hours are earned.

Laboratory Research Rotations

Optional laboratory research rotations allow the student to sample areas of research and become familiar with program faculty. Students may engage

in a maximum of 3 rotations. Each rotation consists of a minimum of 4 weeks and there is no expectation that the work done during the rotation results in a publication. By the end of their second semester, students must have determined their major advisor. A rotation must have been completed in the advisor's laboratory.

The purpose of a laboratory rotation is to learn and perform techniques associated with the lab, and to potentially identify a Dissertation Advisor. A typical rotation involves 5-10 hours per week in the laboratory for 4-10 weeks. Students are encouraged to identify a sponsoring faculty member well in advance of the scheduled rotation. Students must meet with the sponsoring faculty member to determine what will be done during the rotation (i.e., techniques to be learned and identification of the project to be completed). At the end of the rotation, students must write a one- to two-page synopsis of the rotation to be signed by the sponsoring faculty member and turned in to the Graduate Program Director.

Student Teaching

Every student must teach at least once. This requirement is satisfied by being a Graduate Teaching Assistant for one course for one semester.

Deadlines/Progression Requirements

- A student must have an advisor by no later than the end of the 2nd Semester.
- A student must establish their Dissertation Committee by the end of the 3rd Semester.
- A student must have a Program of Study/Curriculum Contract approved by the Dissertation Committee by the end of the 3rd Semester.
- The student and Dissertation Committee must meet by the end of the 4th Semester to set a timeline for the candidacy exam.
- The student is required to meet with their Dissertation Committee at least once a year.
- The deadline for completing the candidacy exam is the end of the student's 5th Semester.
- A student must have a Dissertation Proposal approved by their Dissertation Committee by the end of the 6th Semester.

Time Limits for Completion

All requirements for the degree must be completed within eight years after first registration as a doctoral student. Students must achieve admission to candidacy within six years after admission to the program and complete all requirements within six years after admission to candidacy for the Ph.D. degree. These time limits are maxima; students are

typically expected to complete the degree requirements within five years.

MASTER OF SCIENCE IN BIOLOGY

The M.S. in Biology degree program is designed for students who desire to pursue advanced studies in professional and graduate schools or various vocational opportunities in biology and related areas (see biologicalsciences.uncc.edu). The program provides the opportunity for broad training in a variety of biological areas as well as specialization in areas of particular interest through the Molecular, Cellular, and Developmental Biology (MCB) concentration and the Ecology, Evolution, and Environmental Biology (E3B) concentration. Selection of either concentration is optional.

The Department of Biological Sciences offers the thesis and non-thesis track within the M.S. degree. The thesis track is designed for students whose career goals include formal research training. The non-thesis track is designed for students whose career goals include graduate education, but not formal research experience. Students may switch between the thesis and non-thesis tracks with written approval from their major advisor and the Graduate Program Director.

Additional Admission Requirements

In addition to the general requirements for admission to the Graduate School, the following requirements are specific to the Department of Biological Sciences:

- A B.S. or B.A. degree from an accredited university.
- Evidence of undergraduate preparation in biology with a minimum 24 credit hours in biology and 24 credit hours of cognate study.
- An overall grade point average of at least 3.0 out of 4.0. Additionally, applicants must have a grade point average of at least 3.0 in biology.
- A score on the Graduate Record Examination General Test in at least the 50th percentile (average for the verbal, quantitative, and analytical writing sections).
- A score of at least 100 on the Internet-based, 220 on the computer-based, or 557 on the paper based Test of English as a Foreign Language (TOEFL), or a minimum overall band score of 6.5 on the IELTS, for applicants whose native language is not English. Students who do not pass this examination must pass ENGL 1100 (English as a Foreign Language) with a grade of C or above. In addition, these students who will be involved in any instructional activity (e.g., teaching assistants) will be required to be evaluated by the English Language Training

Institute at UNC Charlotte prior to the beginning of the first semester of study.

- 6) Three letters of reference, at least two of which must be from faculty members.

Degree Requirements

All M.S. students must complete 30 credit hours of coursework approved by a Supervisory Committee, including the following courses:

Required Courses

- BIOL 6101 Hypothesis Testing (3)
- BIOL 6102 Cellular and Molecular Biology (3)
- BIOL 6140 Evolutionary Biology (3)

Research and Ethics Course

Select one of the following:

- BIOL 6260 Careers in Bioscience: Professional Development and Responsible Conduct (2)
- GRAD 6002 Responsible Conduct of Research (2)
- PHIL 6240 Research Ethics in the Biological and Behavioral Sciences (3)

Concentration Elective Courses

Students may choose the Molecular, Cellular, and Developmental Biology (MCD) concentration or the Ecology, Evolution, and Environmental Biology (E3B) concentration when selecting elective courses, although selection of a concentration is not required. Elective courses outside the concentration may be substituted upon approval from the Supervisory Committee and Graduate Program Director. In addition to coursework, each degree candidate must pass an oral candidacy examination administered by the Supervisory Committee.

Molecular, Cellular, and Developmental Biology (MCD) Concentration Elective Courses

Select from the following:

- BIOL 5000 Advanced Topics in Biology (1-4)
- BIOL 5111 Evolution (3)
- BIOL 5121 Advanced Biometry (4)
- BIOL 5144 Advanced Ecology (4)
- BIOL 5162 Advanced Biotechnology I (3)
- BIOL 5163 Advanced Biotechnology II (3)
- BIOL 5168 Recombinant DNA Techniques (4)
- BIOL 5184 Plant Biotechnology (3)
- BIOL 5189 Mechanisms in Development (3)
- BIOL 5199 Molecular Biology (3)
- BIOL 5205 Advanced Horticulture (3)
- BIOL 5221 Plant Systematics (4)
- BIOL 5229 Dendrology (4)
- BIOL 5234 Wildlife Biology (3)
- BIOL 5235 Mammalogy (4)
- BIOL 5242 The Biology of Birds (3)
- BIOL 5242L The Biology of Birds Lab (1)
- BIOL 5243 Animal Behavior (3)
- BIOL 5244 Conservation Biology (3)
- BIOL 5250 Microbiology (3)

- BIOL 5250L Microbiology Laboratory (1)
- BIOL 5253 Marine Microbiology (4)
- BIOL 5257 Microbial Physiology and Metabolism (3)
- BIOL 5260 Population Genetics (3)
- BIOL 5277 Endocrinology (3)
- BIOL 5282 Developmental Plant Anatomy (3)
- BIOL 5282L Developmental Plant Anatomy Laboratory (1)
- BIOL 5283 Animal Development (3)
- BIOL 5283L Animal Development Laboratory (1)
- BIOL 5293 Comparative Vertebrate Anatomy (4)
- BIOL 6000 Special Topics in Biology (1-4)
- BIOL 6800 Tutorial (1-4)

Ecology, Evolution, and Environmental Biology (E3B) Concentration Elective Courses

Select from the following:

- BIOL 5000 Advanced Topics in Biology (1-4)
- BIOL 5121 Advanced Biometry (4)
- BIOL 5162 Advanced Biotechnology I (3)
- BIOL 5163 Advanced Biotechnology II (3)
- BIOL 5167 Medical Genetics (3)
- BIOL 5168 Recombinant DNA Techniques (4)
- BIOL 5171 Cell Physiology (3)
- BIOL 5189 Mechanisms in Development (3)
- BIOL 5199 Molecular Biology (3)
- BIOL 5233 Parasitology (3)
- BIOL 5250 Microbiology (3)
- BIOL 5250L Microbiology Laboratory (1)
- BIOL 5251 Immunology (3)
- BIOL 5251L Immunology Laboratory (1)
- BIOL 5254 Epidemiology (3)
- BIOL 5255 Bacterial Genetics (3)
- BIOL 5256 Pathogenic Bacteriology (3)
- BIOL 5256L Pathogenic Bacteriology Laboratory (1)
- BIOL 5257 Microbial Physiology and Metabolism (3)
- BIOL 5258 Epidemics and Plagues (3)
- BIOL 5259 Advanced Virology (3)
- BIOL 5259L Advanced Virology Laboratory (1)
- BIOL 5265 Drugs: Molecular and Cellular Mechanisms (3)
- BIOL 5277 Endocrinology (3)
- BIOL 5279 Neurobiology (3)
- BIOL 5282 Developmental Plant Anatomy (3)
- BIOL 5282L Developmental Plant Anatomy Laboratory (1)
- BIOL 5283 Animal Development (3)
- BIOL 5283L Animal Development Laboratory (1)
- BIOL 5292 Advances in Immunology (3)
- BIOL 6000 Special Topics in Biology (1-4)
- BIOL 6010 Special Topics in Microbiology (1-4)
- BIOL 6103 Immunology of Infection (4)
- BIOL 6104 Integrative Systems Physiology (4)
- BIOL 6273 Advanced Human Physiology (3)
- BIOL 6274 Advanced Human Pathophysiology (3)
- BIOL 6800 Tutorial (1-4)

M.S. Degree: Thesis Track

At least 16 of the 30 credit hours required for the degree, including no more than eight hours of thesis research, must be in courses at the 6000-level. The candidate must prepare a written thesis based upon original research acceptable to the Supervisory Committee and the Dean of the Graduate School. Students have the opportunity to conduct their thesis research under the co-direction of a Biology faculty member and select faculty at the Carolinas Medical Center in Charlotte. The student must orally present and successfully defend the thesis to the student's Supervisory Committee in a defense open to the public.

M.S. Degree: Non-Thesis Track

At least 12 of the 30 credit hours required for the degree must be in courses at the 6000-level, including two credit hours of BIOL 6800 (Tutorial) culminating in a written assignment developed in consultation with the major advisor. A maximum of two credit hours of non-thesis research (BIOL 6901) may be taken as an elective, and students are encouraged to gain research experience. No written thesis or oral thesis defense is required for the non-thesis track.

Proportion of Courses Open Only to Graduate Students

At least 16 of the 30 required hours, including no more than eight hours of thesis research, must be in courses open to graduate students only.

Grade Requirement

Students must maintain a cumulative average of 3.0 in all coursework taken for graduate credit. An accumulation of two C grades results in suspension from the Master's program. An accumulation of more than two C grades results in termination of enrollment in the Master's program. If students make a grade of U in any course, enrollment in the program is terminated.

Transfer Credit

Up to 6 hours of transfer credit may be applied to the Master's degree. Only courses with grades of A or B may be accepted for transfer credit. Courses taken to satisfy the requirements of a previously completed degree cannot be counted toward the Master's degree. All transfer credit must be approved by the student's Thesis Committee and the Graduate Program Director.

Departmental Seminars

Graduate students are expected to attend all seminars sponsored by the Department of Biological Sciences.

Student Teaching

Every student must teach at least once. This requirement is satisfied by being a Graduate Teaching Assistant for one course for one semester.

Deadlines/Progression Requirements

- 1) All M.S. students must establish their Supervisory Committee by the end of the 2nd semester. The Committee must be established before approving the Curriculum Contract and taking the Oral Candidacy exam. For thesis-track students, the Supervisory Committee must also be established before approving the Thesis Proposal.
- 2) The Curriculum Contract must be approved no later than the end of the 2nd semester and preferably by the end of the 1st semester.
- 3) The Oral Candidacy exam must be approved before the beginning of the 3rd semester. All required coursework for the degree, with the exception of the Tutorial requirement for non-thesis track students and Research and Thesis for thesis-track students, must be completed before taking the Candidacy Examination. For thesis-track students, completion of the Candidacy exam must precede approval of the Thesis Proposal.
- 4) For thesis-track students, the Thesis Proposal must be approved before the beginning of the 3rd semester.
- 5) The student is required to meet with their Supervisory Committee at least once a year.

Admission to Candidacy

General academic regulations will apply to admission to candidacy. In addition to these the applicant should have:

- 1) Removed any identified entrance deficiencies by the time of application.
- 2) Successfully completed the Qualifying Examination, which can be taken only after the completion of all required coursework for the degree, with the exception of the Tutorial requirement for the non-thesis track, and Research and Thesis for the thesis-track.
- 3) Taken at least 15 credit hours of graduate work with a GPA of 3.0 or above.
- 4) Satisfied the Supervisory Committee that he/she is qualified to become a candidate, i.e., can fulfill the requirements successfully.

Assistantships

Teaching and research assistantships are available on a competitive basis for qualified students. A limited number of tuition grants are also competitively awarded. Typically, thesis-track M.S. students are prioritized above non-thesis track students for funding awards.

COURSES IN BIOLOGY (BIOL)

BIOL 5000. Advanced Topics in Biology. (1-4)

Courses in selected topics and advanced studies in biology. Lecture and laboratory hours will vary with the topics taught. *May be repeated for credit with change of topic.*

BIOL 5111. Evolution. (3) Prerequisite: BIOL 3166. Theories of evolution and forces, which affect gene frequencies.

BIOL 5121. Advanced Biometry. (4) Prerequisites: BIOL 2140 or equivalent, BIOL 3166 or equivalent, and one STAT course. Advanced biostatistics design and analysis of experiments. Three lecture hours and one laboratory period of three hours a week.

BIOL 5144. Advanced Ecology. (4) Energy flow, nutrient cycles, community structure, population growth and regulation. Three lecture hours and one laboratory period of three hours a week.

BIOL 5162. Advanced Biotechnology I. (3)

Prerequisite: BIOL 3161 or BIOL 3166 with grade of C or above. Problem-based learning approach where students work in teams to develop solution strategies that use biotechnology to solve real-world problems. Three lecture hours per week.

BIOL 5163. Advanced Biotechnology II. (3)

Prerequisites: BIOL 3161 or BIOL 3166 with grade of C or above and permission of instructor. Students work in teams to implement solution strategies developed in BIOL 5162 that use biotechnology to solve real-world problems. One laboratory period and two lecture hours per week.

BIOL 5167. Medical Genetics. (3) Prerequisite: Admission to Graduate School in Biology or permission of instructor. Various applications of genetics to human health, including studies of the inheritance of diseases in families, mapping of disease genes to specific locations on chromosomes, analyses of the molecular mechanisms through which genes cause disease, diagnosis and treatment of genetic disease, and genetic counseling.

BIOL 5168. Recombinant DNA Techniques. (4)

Modern molecular biological methods (such as DNA cloning, gel electrophoresis, nucleic acid hybridization, PCR, and DNA sequencing) data analysis and interpretation. One lecture hour and two laboratory periods of three hours a week.

BIOL 5171. Cell Physiology. (3) The fundamental physicochemical properties of cells.

BIOL 5184. Plant Biotechnology. (3) A laboratory-oriented course designed to integrate plant molecular biology, recombinant DNA technology, and plant cell and tissue culture. One lecture hour and two laboratory periods of three hours a week.

BIOL 5189. Mechanisms in Development. (3)

Cellular and molecular bases of differentiation; an exploration of the experimental analysis of causal and controlling factors in development.

BIOL 5199. Molecular Biology. (3) Structural and functional interaction of nucleic acids and proteins in the replication, transcription and translation of genetic material.

BIOL 5205. Advanced Horticulture. (3) Topics in ornamental horticulture and landscaping, including greenhouse projects and field trips. Two lecture hours and three hours of lab a week.

BIOL 5221. Plant Systematics. (4) Identification and classification of vascular plants, including experimental concepts of speciation. Three lecture hours and one laboratory period of three hours a week.

BIOL 5229. Dendrology. (4) The identification, structure, function, ecology, reproduction, and evolutionary relationships of woody plants. Three lecture hours and one three-hour lab a week.

BIOL 5233. Parasitology. (3) Prerequisites: BIOL 2130. Morphology, life cycles, ecology, taxonomy, and medical and economic importance of parasites. Three lecture hours a week.

BIOL 5234. Wildlife Biology. (3) Concepts, principles and techniques of wildlife biology. Identification and life histories with emphasis on the value, study attraction, management, conservation and control of wildlife species.

BIOL 5235. Mammalogy. (4) Prerequisite: BIOL 3111. Taxonomy, anatomy, physiology and life histories of the mammals. Three lecture hours and one laboratory period of three hours a week.

BIOL 5242. The Biology of Birds. (3) Prerequisite: BIOL 3144 or permission of department. Overview of general avian biology, including taxonomy and anatomy, but concentrating on behavior, ecology and conservation of birds. Focus is on birds of the southeastern U.S.

BIOL 5242L. The Biology of Birds Lab. (1) Meets for one three-hour period per week. The laboratory and field portion of the Biology of Birds focus on field identification and inventory techniques, with an

introduction to anatomy. Students will need binoculars.

BIOL 5243. Animal Behavior. (3) An ethological approach to how animals respond to their environment. Causation, development and adaptive significance of behavior in social systems.

BIOL 5244. Conservation Biology. (3) Conservation values, extinction rates, genetic diversity, demography, habitat fragmentation, reserve management, ecological restoration.

BIOL 5250. Microbiology. (3) Morphology, physiology, pathogenicity, metabolism and ecology of micro-organisms.

BIOL 5250L. Microbiology Laboratory. (1) Pre- or corequisite: BIOL 5250. One laboratory period of three hours a week.

BIOL 5251. Immunology. (3) Cellular, molecular, and genetic basis for immunity; physical chemistry of antigens and antibodies and their interactions; defense mechanisms.

BIOL 5251L. Immunology Laboratory. (1) Pre- or corequisite: BIOL 5251. One laboratory period of three hours a week.

BIOL 5253. Marine Microbiology. (4) Bacteria, fungi and viruses of marine origin, and their response to the salt, temperature, pressure and nutrient environment of the ocean. Roles of marine microorganisms in public health, pollution and fouling. Three lecture hours and one laboratory period of three hours a week.

BIOL 5254. Epidemiology. (3) History and practices of epidemiology with emphasis on modes of transmission of clinically important infectious agents and the analysis of epidemiological data. Three lecture hours a week.

BIOL 5255. Bacterial Genetics. (3) Regulation of gene expression in bacterial systems. Bacteriophage genetics. DNA transfer in bacteria.

BIOL 5256. Pathogenic Bacteriology. (3) Cellular and molecular interactions of mammalian hosts with procaryotic parasites.

BIOL 5256L. Pathogenic Bacteriology Laboratory. (1) One laboratory period of three hours a week.

BIOL 5257. Microbial Physiology and Metabolism. (3) Bacterial cell growth and division, transport mechanisms, catabolism and energy production, biosynthesis of cellular components, global regulation

of gene expression in response to the environment, and cell-cell communication between bacteria.

BIOL 5258. Epidemics and Plagues. (3) Prerequisite: Admission to the Ph.D. or Master's in Biology program or permission of instructor. A study of the history, modeling, epidemiology, environmental, and behavioral changes that contributed to the development of selected epidemics and plagues which have dramatically affected plants, agricultural animals, and humans.

BIOL 5259. Advanced Virology. (3) Prerequisites: BIOL 3166, BIOL 4199, or BIOL 4250 with a grade of C or above. Focus on molecular biology, evolution, and pathogenesis of clinically relevant human and animal viruses. Additional topics include: advances in virus-based gene therapy, vaccines and anticancer agents; viruses as potential bioterrorism threats; bacteriophages and plant viruses; unusual virus-like agents.

BIOL 5259L. Advanced Virology Laboratory. (1) Pre- or corequisite: BIOL 5259. One laboratory period of three hours per week.

BIOL 5260. Population Genetics (3) The genetics of qualitative and quantitative traits in populations, including an assessment of the factors affecting the extent and pattern of the genetic variation in these traits.

BIOL 5265. Drugs: Molecular and Cellular Mechanisms. (3) Prerequisite: Admission to the Ph.D. or Master's in Biology program or permission of instructor. A detailed focus on representative drugs and their target cells and organs to understand mechanisms of action at a molecular and cellular level. Drug discovery, approval, and economics are also discussed.

BIOL 5277. Endocrinology. (3) Endocrine glands and their physiological roles in metabolism, growth and reproduction.

BIOL 5279. Neurobiology. (3) Prerequisite: Biology graduate student or permission from instructor. The molecular and cellular processes of neuronal function in the human central and peripheral nervous systems.

BIOL 5282. Developmental Plant Anatomy. (3) Study of plant cells, tissues, organs and patterns of growth and differentiation.

BIOL 5282L. Developmental Plant Anatomy Laboratory. (1) Pre- or corequisite: BIOL 5282. One laboratory period of three hours a week.

BIOL 5283. Animal Development. (3)

Developmental processes occurring chiefly during gametogenesis, fertilization, early embryogenesis and organogenesis.

BIOL 5283L. Animal Development Laboratory. (1)

Pre- or corequisite: BIOL 5283. One laboratory period of three hours a week.

BIOL 5292. Advances in Immunology. (3) Current topics in immunology with particular emphasis upon the genetic systems and molecular mechanisms underlying immune reactions.

BIOL 5293. Comparative Vertebrate Anatomy. (4)

Prerequisite: BIOL 2111. Comparative studies of the anatomy, physiology and functional adaptations of selected vertebrates with emphasis on evolutionary developments, especially in mammals. Three lecture hours and one laboratory period of three hours a week.

BIOL 6000. Special Topics in Biology. (1-4)

Prerequisite: Permission of department. Courses in selected topics and advanced studies in biology. Lecture and laboratory hours will vary with the courses taught. *May be repeated for credit.*

BIOL 6010. Special Topics in Microbiology. (1-4)

Prerequisite: Permission of department. Advanced courses in microbiology. *May be repeated for credit with change of topic.* Lecture and laboratory hours will vary with the courses taught. *May be repeated for credit.*

BIOL 6101. Hypothesis Testing. (3) Prerequisite:

Admission to the M.S. in Biology program or permission of department. Design and analysis of biological experiments and critical analysis of experimental design in pertinent biological literature.

BIOL 6102. Cell and Molecular Biology. (3) Structure

of cellular components; the cell cycle; regulation of transcription, translation, and protein trafficking; cell membranes and transport; cell-cell communication, including signal transduction; extracellular matrix.

BIOL 6103. Immunology of Infection. (4)

Prerequisites: BIOL 6102 and CHEM 6101, or permission of instructor. The interaction between the host immune system and microorganisms or viruses explored at the genetic and physiological levels with emphases on the process of infection; intracellular invasion and survival/replication; its modulation by resident microbiota and the host's innate and adaptive immune responses; the utility of pathogenic agents for the exploration of host resistance and immunity. Thirty two-hour lectures.

BIOL 6104. Integrative Systems Physiology. (4)

Prerequisites: CHEM 6101, BIOL 6102, BIOL 6103, or permission of instructor. The functioning of an intact mammalian organism with an emphasis on human physiology. Traditional survey of organ systems' functions, and problems of the response of cells within tissues to stress and their impact on organismal response. Thirty two-hour lectures.

BIOL 6140. Evolutionary Biology. (3) Prerequisite:

Admission to the M.S. in Biology program or permission of department. Fundamental evolutionary forces of mutation, genetic drift, natural selection, and gene flow; mechanisms generating biological diversity in molecules, genomes, and populations; relationship of micro-evolutionary change and macro-evolutionary patterns.

BIOL 6241. Environmental Biology. (3) Prerequisite:

Admission to the M.S. in Biology program or permission of department. An overview of ecological principles as they apply to relationships and interactions between organisms and their environment, with investigation of current research topics and issues related to impacts of human activities on environmental processes.

BIOL 6260. Careers in Bioscience: Professional Development and Responsible Conduct. (2)

Prerequisite: Admission to M.S. in Biology program or permission of department. Professional development for Master's students. The focus is on teaching toward the Broadening Experiences in Scientific Training (BEST) initiative and the Responsible Conduct of Research (RCR) directive. Hybrid course composed of class meetings and MOODLE tasks.

BIOL 6270. Biological Pathways and Metabolism. (3)

Prerequisite: Admission to the M.S. in Biology program or permission of department. An overview of biological pathways and metabolism principles as they apply to cell biology, relationships and interactions between cell and/or organisms and their environment, with investigation of current research topics.

BIOL 6273. Advanced Human Physiology. (3)

Prerequisite: Admission to MSN program. Advanced course in human physiology stressing the interaction between physiological systems.

BIOL 6274. Advanced Human Pathophysiology. (3)

Prerequisite: Admission to MSN program. Advanced course in human pathophysiology stressing the loss of normal function interaction in physiological systems.

BIOL 6600. Seminar. (1-2) Topics of current emphasis in biology. *May be repeated for credit.*

BIOL 6800. Tutorial. (1-4) Directed study in areas of specialization in biology and related fields. Maximum credit toward degree: four hours. *Graded on a Pass/Unsatisfactory or IP basis.*

BIOL 6900. Research and Thesis. (1-8) Laboratory research for the thesis. *IP grade until the student's last semester and then changed to Graded on a Pass/Unsatisfactory basis.*

BIOL 6901. Laboratory Research. (1-2) Directed laboratory research in areas of specialization in biology and related fields. Maximum credit toward non-thesis Master's degree = two hours. *Graded on a Pass/Unsatisfactory basis.*

BIOL 8000. Special Topics in Biology. (1-4)
Prerequisite: Permission of department. Courses in selected topics and advanced studies in biology. Lecture and laboratory hours vary with the courses taught. *May be repeated for credit.*

BIOL 8010. Special Topics in Microbiology. (1-4)
Prerequisite: Permission of department. Advanced courses in microbiology. *May be repeated for credit with change of topic.* Lecture and laboratory hours vary with the courses taught. *May be repeated for credit.*

BIOL 8101. Hypothesis Testing. (3) Prerequisite: Admission to the Ph.D. in Biology program or permission of department. Design and analysis of biological experiments and critical analysis of experimental design in pertinent biological literature.

BIOL 8102. Cell and Molecular Biology. (3)
Prerequisite: Admission to Ph.D. in Biology program or permission of department. Structure of cellular components; the cell cycle; regulation of transcription, translation, and protein trafficking; cell membranes and transport; cell-cell communication, including signal transduction; extracellular matrix.

BIOL 8103. Immunology of Infection. (4)
Prerequisites: BIOL 8101 and CHEM 8101, or permission of instructor. The interaction between the host immune system and microorganisms or viruses explored at the genetic and physiological levels with emphases on the process of infection; intracellular invasion and survival/replication; its modulation by resident microbiota and the host's innate and adaptive immune responses; the utility of pathogenic agents for the exploration of host resistance and immunity. Thirty two-hour lectures.

BIOL 8104. Integrative Systems Physiology. (4)
Prerequisites: BIOL 8102, BIOL 8103, CHEM 8101, or permission of instructor. The functioning of an intact mammalian organism with an emphasis on human

physiology. Traditional survey of organ systems' functions, and problems of the response of cells within tissues to stress and their impact on organismal response.

BIOL 8140. Evolutionary Biology. (3) Prerequisite: Admission to the Ph.D. in Biology program or permission of department. Fundamental evolutionary forces of mutation, genetic drift, natural selection, and gene flow; mechanisms generating biological diversity in molecules, genomes, and populations; relationship of micro-evolutionary change and macro-evolutionary patterns.

BIOL 8200. Interdisciplinary Colloquium. (1)
Prerequisite: Admission to the Ph.D. in Biology program. Discussion and analysis of topics of current emphasis in biomedicine and biotechnology. *May be repeated for credit.*

BIOL 8201. Seminar. (1) Prerequisite: Admission to the Interdisciplinary Ph.D. in Biology program. Formal student presentations of current literature topics. *May be repeated for credit.*

BIOL 8241. Environmental Biology. (3) Prerequisite: Admission to the Ph.D. in Biology program or permission of department. An overview of ecological principles as they apply to relationships and interactions between organisms and their environment, with investigation of current research topics and issues related to impacts of human activities on environmental processes.

BIOL 8260. Careers in Bioscience: Professional Development and Responsible Conduct. (2)
Prerequisites: Admission to the Ph.D. in Biology program or permission of department. Professional development for Ph.D. students and post-doctoral fellows. The focus is on teaching toward the Broadening Experiences in Scientific Training (BEST) initiative and the Responsible Conduct of Research (RCR) directive. Hybrid course composed of class meetings and MOODLE tasks.

BIOL 8270. Biological Pathways and Metabolism. (3)
Prerequisite: Admission to Ph.D. in Biology program or permission of department. An overview of biological pathways and metabolism principles as they apply to cell biology, relationships and interactions between cell and/or organisms and their environment, with investigation of current research topics.

BIOL 8800. Laboratory Rotations. (2) Prerequisite: Admission to the Ph.D. in Biology program. Directed study in an area of specialization. *May be repeated for credit. Graded on a Pass/Unsatisfactory basis.*

BIOL 8999. Doctoral Dissertation Research. (0-9)

Prerequisites: Admission to the Ph.D. in Biology program. Individual investigation that culminates in the preparation and presentation of a doctoral dissertation. *May be repeated for credit. Graded on a Pass/Unsatisfactory or IP basis.*

Chemistry

- **M.S. in Chemistry**
- **Ph.D. in Nanoscale Science** (*see individual Nanoscale Science section*)

Department of Chemistry

chemistry.uncc.edu

Graduate Program Director

Dr. Markus Etzkorn

Graduate Faculty

Dr. Brian T. Cooper, Associate Professor
 Dr. Bernadette T. Donovan-Merkert, Professor,
 Department Chair
 Dr. Markus Etzkorn, Associate Professor
 Dr. Kenneth E. Gonsalves, Celanese Acetate
 Distinguished Professor of Polymer Chemistry
 Dr. Daniel S. Jones, Associate Professor
 Dr. Marcus Jones, Associate Professor
 Dr. Joanna K. Krueger, Associate Professor
 Dr. Craig A. Ogle, Professor
 Dr. Jordan C. Poler, Associate Professor
 Dr. Daniel Rabinovich, Professor
 Dr. John M. Risley, Professor
 Dr. Thomas A. Schmedake, Associate Professor
 Dr. Jerry (Jay) M. Troutman, Associate Professor
 Dr. Juan Vivero-Escoto, Assistant Professor
 Dr. Michael G. Walter, Assistant Professor

MASTER OF SCIENCE IN CHEMISTRY

The Department of Chemistry offers a research-based Master of Science (M.S.) degree, which provides the background necessary for further graduate or professional studies in the physical, life or medical sciences or a career in chemistry. The M.S. degree requires a minimum of 30 credit hours and a thesis based on original research carried out under the direction of a member of the graduate faculty. Student participation in research activities is through selection of a faculty advisor and enrollment in the special research courses offered. Major emphasis is placed upon the research project and required thesis. UNC Charlotte B.S. degree chemistry majors may elect to participate in the five-year Accelerated Early Entry M.S. program (described in the *UNC Charlotte Undergraduate Catalog*).

Additional Admission Requirements

In addition to the general requirements for admission to the Graduate School, the following are required for graduate study in Chemistry:

- 1) A satisfactory score on the Graduate Record Examination.
- 2) Administration of placement examinations by the department each semester just prior to registration as an aid in identifying academic deficiencies.
- 3) Removal of any deficiencies within one year.
- 4) International students must meet published University standards on English proficiency.

Degree Requirements

Students in this program must complete a minimum of 30 credit hours, including at least 15 credit hours in 6000-level courses open to graduate students only.

Students in the M.S. in Chemistry program are required to be non-deficient in four out of five sub-disciplines of chemistry (inorganic chemistry, organic chemistry, physical chemistry, biochemistry, instrumental/analytical chemistry) as determined by five placement exams prior to the beginning of classes during the first enrolled semester. Students must not be deficient in organic chemistry, physical chemistry, and two other sub-disciplines of their choice. Deficiencies may be removed by passing the placement exam at the beginning of the subsequent semester or by passing a graduate level course with a grade B or above.

To obtain the required 30 credit hours for graduation, students may choose additional credit hours in Research and Thesis or Elective Courses.

Required Courses

CHEM 6681 Research Seminar (1)
CHEM 6682 Research Seminar (1)
CHEM 6900 Research and Thesis (1 to 16)

Elective Courses

Select 6 credit hours from the following:

CHEM 6060 Special Topics and Investigations (1 to 3)*
CHEM 6069 Topics in Biochemistry (3)
CHEM 6082 Surfaces and Interfaces of Materials Chemistry (3)
CHEM 6101 Biochemical Principles (4)
CHEM 6115 Advanced Analytical Chemistry (3)
CHEM 6125 Theoretical Inorganic Chemistry (3)
CHEM 6126 Organometallic Chemistry (3)
CHEM 6135 Advanced Organic Chemistry (3)
CHEM 6138 Stereochemistry (3)
CHEM 6145 Chemical Thermodynamics (3)
CHEM 6146 Rates and Mechanisms (3)
CHEM 6147 Molecular Photochemistry and Photophysics (3)
CHEM 6150 Seminar-Internship (1 to 3)
CHEM 6155 Polymer Synthesis (3)
CHEM 6165 Advanced Biochemistry (3)
CHEM 6900 Research and Thesis (1 to 16)
MEGR 6109 Biotechnology and Bioengineering (3)

Another course that has been approved by the Department of Chemistry faculty**

**Departmental approval is necessary before CHEM 6060 credit can be used to satisfy this requirement.*

***Any 5000 level or higher Biology, Engineering, Mathematics or Physics course, except those designed for a professional education sequence, may be taken for graduate credit upon departmental approval.*

Grade Requirements

Students in the M.S. in Chemistry program are required to maintain satisfactory progress toward the degree. Continued enrollment is at all times subject to review on the basis of academic record. This review is performed by the departmental Graduate Committee.

A GPA of 3.0 is required for the degree. An accumulation of two marginal (C) grades or one unsatisfactory (U) grade on the graduate transcript results in termination of the student's enrollment in the M.S. in Chemistry program and a termination of any assistantships and fellowships they were receiving.

Advising

Approval of the program of each student and monitoring his/her progress toward the degree is the responsibility of the student's research advisor. Prior to the selection of a research advisor, graduate student progress is monitored by the departmental Graduate Committee.

Thesis

A thesis must be written and defended within six calendar years after admission into the M.S. program as a degree student.

Thesis Committee

The written thesis is defended before the department and a special thesis committee of no fewer than four persons, with at least one member from outside of the Department of Chemistry.

Application for Degree

Each student should make application for his/her degree by completing the online Application for Degree through Banner Self Service no later than the filing date specified in the University Academic Calendar.

Research Experiences

Chemistry faculty offer research opportunities in all areas of molecular and nanoscale sciences, and many participate in formal or informal interdisciplinary research programs. Faculty research interests include

computational chemistry, organic synthesis, polymer chemistry, organometallic chemistry, structural and mechanistic organic chemistry, electrochemistry, materials and interfacial chemistry, catalysis, biochemistry, biophysical chemistry, analytical separations, bioanalytical chemistry, mass spectrometry, and chemical education. Many chemistry faculty are active participants in interdisciplinary research projects in biotechnology and biomedicine, optical science, materials science, or electrical engineering. Students receive academic credit for their research and benefit from a low student-to-faculty ratio. Graduate students are assigned individual projects and work closely with faculty members to build their own, original contribution to the scientific literature. Students have full access to and receive excellent training in the use of any departmental instrumentation needed to carry out their research. Results are presented at informal seminars, scientific conferences, and in articles published in high-quality, refereed journals. Research in the Department is funded in part from competitive grants obtained from agencies such as the American Chemical Society, National Science Foundation, National Institutes of Health, DoD, DoE, Research Corporation, Dreyfus Foundation, North Carolina Biotechnology Center, UNC Charlotte Foundation, and private industry.

Assistantships

Graduate students generally support their education through teaching or research assistantships available through the Department of Chemistry. The department also sponsors the Gary Howard Research Fellowship competition, which provides significantly greater support to one highly qualified applicant. Tuition waivers covering state tuition are also available to external applicants through the Thomas Walsh Tuition Fellowships. Many faculty may offer research assistantships to qualified students. Further information is available in the department. Support in the summer months may also be available.

Tuition Waivers

Fellowships are available for students enrolled in the M.S. in Chemistry program and for students seeking an interdisciplinary doctoral degree through the Department of Chemistry. Further information is available in the department.

COURSES IN CHEMISTRY (CHEM)

CHEM 5090. Special Topics in Chemistry. (1-4)

Prerequisite: Permission of instructor. Selected topics in chemistry. Lecture and/or laboratory hours will vary with the nature of the course taught. *May be repeated for credit.*

CHEM 5095. Topics for Teachers. (1-4) Prerequisite: Permission of instructor. Selected topics in chemical education. Lecture and/or laboratory hours will vary with the nature of the course taught. *May be repeated for credit.*

CHEM 5111. Instrumental Analysis. (3-4)

Prerequisite: Permission of instructor. Selected modern instrumental methods of analysis, including theory and practice, with considerable attention given to the instrument and elementary electronics involved in the techniques. Two lecture hours and six hours of lab per week.

CHEM 5121. Advanced Inorganic Chemistry. (3-4)

Prerequisite: Permission of instructor. A review of atomic structure and bonding, a survey of the synthesis, structure, and reactivity of the elements and their most important compounds, a discussion of key industrial processes dealing with the preparation of inorganic compounds, and an overview of coordination and organometallic chemistry. Laboratory work involves inorganic preparations and characterization techniques. Three lecture hours and one laboratory period of three hours a week.

CHEM 5133. Methods of Organic Structure Determination. (2)

Prerequisite: Permission of instructor. Study and application of modern techniques, primarily spectroscopy, to determine the structure of organic molecules. One hour of lecture and one laboratory period of three hours each week.

CHEM 5134. Organic Reaction Mechanisms. (2)

Prerequisite: Permission of instructor. Mechanistic and theoretical topics which are beyond the scope of CHEM 2131 and CHEM 2132, including orbital symmetry control of organic reactions, the Hammett equation and other linear free energy relationships, heterocyclic compounds, polycyclic aromatic compounds, organic photochemistry, carbenes, nitrenes, arynes and other short lived, reactive intermediates.

CHEM 5135. Concepts and Techniques in Organic Synthesis. (2)

Pre- or corequisite: CHEM 5133 or permission of instructor. Modern techniques of organic synthesis. Laboratory includes one or more multi-step syntheses of complex molecules. One hour of lecture and one laboratory period of three hours each week.

CHEM 5165. Principles of Biochemistry I. (3)

Prerequisite: satisfactory score on an organic chemistry proficiency exam, or permission of instructor. A study of the structures, properties, and functions of biological molecules, bioenergetics of biological reactions, and enzyme catalysis, with

particular emphasis on the underlying chemical principles, including thermodynamics and kinetics.

CHEM 5165L. Principles of Biochemistry I

Laboratory. (1) Pre- or corequisite: CHEM 5165. Physical properties of biological molecules and an introduction to experimental techniques in biochemical research. Eleven four-hour lab periods.

CHEM 5166. Principles of Biochemistry II. (3)

Prerequisite: CHEM 5165 with a grade of B or above. A study of various metabolic pathways and information transfer including molecular aspects of cell biology and genetics, with particular emphasis on the underlying chemical reactions, including thermodynamics and kinetics.

CHEM 5167. Structure and Mechanism in Protein

Chemistry. (3) Prerequisites: CHEM 5165, and either CHEM 5166 or BIOL 5171, or permission of instructor. Examination of structures, properties, and functions of proteins, enzyme catalysis, and bioenergetics, emphasizing underlying mechanistic chemical and biochemical principles.

CHEM 5171. Biochemical Instrumentation. (4)

Prerequisites: CHEM 5165 and CHEM 5165L with grades of B or above or permission of department. Modern instrumental methods used in biorelated areas such as biochemistry, biotechnology and medical technology. Theory and practice. Potentiometry, spectrophotometry, chromatography, sedimentation, and electrophoresis. Two lecture hours and two three-hour laboratory periods per week.

CHEM 5175. Physical Biochemistry. (3)

Prerequisites: CHEM 5165, CHEM 5165L, and CHEM 5166 with grades of B or above, or permission of instructor. Colloid systems, equilibria in biological fluids, mass and energy transport in fluids and in association with membranes, energy storage and dissipation with relation to specific chemical bonding, enzyme kinetics.

CHEM 5185. Chemical Fate of Pollutants. (3)

Prerequisites: Satisfactory score on a chemistry proficiency exam, or permission of instructor. Chemical reactivity and fate of pollutants (in air, water, soil) in terms of their chemical structure and energetics, mechanisms, structure/energy relationships and their interaction with reactive environmental species including light.

CHEM 5200. Computational Chemistry. (4) Pre- or corequisite: Permission of instructor. Electronic and molecular mechanics-based computational methods, including properties, optimized equilibrium and transition state structures and potential energy

surfaces of reactions. Three lecture hours and three hours of laboratory each week. Additional projects required of graduate students.

CHEM 6060. Special Topics and Investigations. (1-3)

Prerequisite: Permission of instructor. Directed study of topics of current chemical interest. *May be repeated for credit.*

CHEM 6069. Topics in Biochemistry. (3)

Prerequisite: CHEM 6165 or permission of instructor. Discussion of current topics in biochemistry emphasizing their biomedical/biotechnological aspects from a bioinorganic chemistry perspective, bioorganic chemistry, bioanalytical chemistry, biophysical chemistry, biocomputational chemistry, biomaterials. *May be repeated for credit.* Three lecture hours per week.

CHEM 6082. Surfaces and Interfaces of Materials

Chemistry. (3) Prerequisites: Any three semesters of undergraduate calculus based mathematics (i.e., MATH 1241, MATH 1242, and MATH 2241) and an upper level undergraduate course in thermodynamics (i.e., CHEM 3142, PHYS 3151, or MEGR 3112) or permission of instructor. Theoretical basis, conceptual understanding and experimental investigations of the properties of surfaces and interfaces of various classes of materials will be presented. The content of this course will build from a rigorous derivation of the physical chemistry of surfaces and interfaces to a discussion of topical materials classes and specific materials properties. Three lecture hours each week.

CHEM 6101. Biochemical Principles. (4)

Prerequisite: Admission to the graduate program or permission of instructor. Molecular biophysics of biological molecules. Bioenergetics of biological reactions and enzyme structure, mechanisms, and regulation. Metabolic pathways and the role of cellular organelles. Biochemical analysis methodology. Thirty-one two-hour lectures.

CHEM 6102. Nanoscale Phenomena. (3)

Cross-listed as NANO 8102, OPTI 6302, and OPTI 8302. Topics include: scaling phenomena; nano-optics (near-field optics, limits of lithography masks, nano-dots and nanoscale optical interactions); nanoscale mechanics; nanotribology; biological and biologically-inspired machines.

CHEM 6103. Synthesis and Characterization of Nanomaterials. (3)

Cross-listed as NANO 8103. Prerequisite: CHEM 6102 or permission of instructor. Topics include: quantum dots, metallic nanoparticles, carbon nanostructured materials and nanotubes, zeolites, organic-inorganic polymers, composite

materials, solution-phase colloids, sol-gel process, silica spheres porous silicon, photonic crystals.

CHEM 6115. Advanced Analytical Chemistry. (3)

Prerequisite: CHEM 5111 with a grade of B or above, or permission of instructor. The application of modern analytical methods to chemical problems. Emphasis is upon chemical information, particularly structural, obtainable from these techniques. *May be repeated for credit.*

CHEM 6125. Theoretical Inorganic Chemistry. (3)

Prerequisite: CHEM 5121 with a grade of B or above, or permission of instructor. Group theoretical treatment of current theories of inorganic chemistry. Topics include: Ligand field theory, molecular orbital theory for complex ions, electronic spectra of complex ions and the magnetic properties of complex ions.

CHEM 6126. Organometallic Chemistry. (3)

Prerequisites: Permission of instructor. Recommended pre- or corequisite: CHEM 5133. Synthesis, structure, characterization, and reactivity of organometallic compounds; introduction to catalysis and bioorganometallic chemistry. Three lecture hours each week.

CHEM 6135. Advanced Organic Chemistry. (3)

Prerequisites: CHEM 5133 and either CHEM 5134 or CHEM 5135 with grade of B or above, or permission of instructor. A qualitative discussion of modern mechanistic interpretation of the relations between structure and reactivity. Special emphasis is placed on the role of reactive intermediates such as carbocations, carbanions, carbenes, and radicals.

CHEM 6138. Stereochemistry. (3) Prerequisite: Advanced course in Biochemistry or Organic Chemistry. Three-dimensional chemistry and its chemical, physical and biochemical consequences, emphasizing classification of isomers and stereoisomers and the consequences of molecular shape on chemical and biological properties.

CHEM 6145. Chemical Thermodynamics. (3)

Prerequisite: Permission of instructor. The postulatory basis of classical thermodynamics. Problems in chemical thermodynamics. The use of statistical mechanics for calculating thermodynamic functions.

CHEM 6146. Rates and Mechanisms. (3)

Prerequisite: Permission of instructor. Consideration of chemical kinetics and mechanism schemes, particularly those of current interest.

CHEM 6147. Molecular Photochemistry and Photophysics. (3) Prerequisite: Admission to graduate

program or permission of instructor. An investigation of the excited states of organic molecules and the photophysics governing radiative and nonradiative transitions. Topics include: electronic orbitals, absorption, emission, potential energy surfaces, energy transfer, photophysical radiationless transitions, singlet oxygen and chemiluminescent organic reactions. Three lecture hours per week.

CHEM 6150. Seminar-Internship. (1-3) Prerequisite: Permission of instructor. Required for all teaching assistants. Supervised experience in the teaching of college chemistry. *May be repeated for credit.*

CHEM 6155. Polymer Synthesis. (3) Prerequisite: Permission of instructor. Polymer structure, classification of polymerization reactions, theory and practice of step growth polymerization, radical, ionic and ring opening polymerizations, polymerization by transition metal catalysts. Recent advances in polymer synthesis. Three lecture hours per week.

CHEM 6165. Advanced Biochemistry. (3)

Prerequisite: CHEM 6101, BIOL 6102, BIOL 6103, BIOL 6104, or permission of instructor. Advanced course on protein structure, enzyme and mechanistic biochemistry, metabolic biochemistry, biophysical chemistry. Three lecture hours per week.

CHEM 6681. Research Seminar. (1) Prerequisite: Permission of instructor. Individual investigation and exposition of the results.

CHEM 6682. Research Seminar. (1) Prerequisite: Permission of instructor. Individual investigation and exposition of the results. *May be repeated for credit.*

CHEM 6900. Research and Thesis. (1-16)

Prerequisite: Permission of instructor overseeing thesis research. Laboratory research for the thesis.

CHEM 8069. Topics in Biochemistry. (3)

Prerequisite: CHEM 6165 or permission of instructor. Discussion of current topics in biochemistry emphasizing their biomedical/biotechnological aspects from a bioinorganic chemistry perspective, bioorganic chemistry, bioanalytical chemistry, biophysical chemistry, biocomputational chemistry, biomaterials. *May be repeated for credit.* Three lecture hours per week.

CHEM 8101. Biochemical Principles. (4)

Prerequisite: Admission to Ph.D. program. Molecular biophysics of biological molecules. Bioenergetics of biological reactions and enzyme structure, mechanisms, and regulation. Metabolic pathways and the role of cellular organelles. Biochemical analysis methodology. Thirty-one two-hour lectures.

CHEM 8147. Molecular Photochemistry and Photophysics. (3) Prerequisite: Admission to graduate program or permission of instructor. An investigation of the excited states of organic molecules and the photophysics governing the transitions between these states both radiative and nonradiative. Topics include: electronic orbitals, absorption, emission, potential energy surfaces, energy transfer, photophysical radiationless transitions, singlet oxygen and chemiluminescent organic reactions. In this course each student will develop and demonstrate a photochemistry laboratory experiment that illustrates a principle or problem, or new direction of photochemistry. Three lecture hours per week.

CHEM 8155. Polymer Synthesis. (3) Prerequisite: Admission to Ph.D. program or permission of instructor. Polymer structure, classification of polymerization reactions, theory and practice of step growth polymerization, radical, ionic and ring opening polymerizations, polymerization by transition metal catalysts. Recent advances in polymer synthesis. Requires a "Research Proposal" which includes a presentation in class as well as a ten page prospectus style manuscript. Three lecture hours per week.

CHEM 8165. Advanced Biochemistry. (3) Prerequisites: CHEM 8101, BIOL 8102, BIOL 8103, and BIOL 8104. Advanced course on protein structure, enzyme and mechanistic biochemistry, metabolic biochemistry, biophysical chemistry. Three lecture hours per week.

Cognitive Science

• Graduate Certificate in Cognitive Science

Department of Psychology
cognisci.uncc.edu

Graduate Program Director
Dr. Mark Faust

Graduate Faculty

Computer Science

Dr. John Gero, Professor
Dr. Zbigniew Ras, Professor
Dr. William Ribarsky, Professor
Dr. Jing Xiao, Professor
Dr. Wlodek Zadrozny, Associate Professor

Educational Leadership

Dr. Rebecca Shore, Assistant Professor

Electrical and Computer Engineering

Dr. Yogendra Kakad, Professor

English

Dr. Boyd Davis, Professor
Dr. Pilar G. Blitvich, Professor
Dr. Tony Jackson, Professor
Dr. Alan Rauch, Professor
Dr. Ralf Thiede, Associate Professor

Languages and Culture Studies

Dr. Concepción deGodev, Associate Professor

Psychology

Dr. Anita Blanchard, Associate Professor
Dr. Mark Faust, Associate Professor
Dr. Jane Gaultney, Professor
Dr. Susan Johnson, Professor
Dr. Sara Levens, Assistant Professor
Dr. Charlie Reeve, Professor
Dr. Lori Van Wallendaal, Associate Professor

Software and Information Systems

Dr. Bei-Tseng (Bill) Chu, Professor
Dr. Mirsad Hadzikadic, Professor
Dr. Heather Lipford, Associate Professor
Dr. David Wilson, Professor

GRADUATE CERTIFICATE IN COGNITIVE SCIENCE

The Graduate Certificate in Cognitive Science offers graduate students an opportunity for an interdisciplinary program of study. Training focuses on an understanding of human cognitive processes and the means by which complex mental processes can be modeled or simulated by artificial systems. Cognitive science is a dynamic and rapidly evolving field that studies intelligent systems by synthesizing the knowledge and methodology from the fields of cognitive psychology, artificial intelligence, linguistics, philosophy of mind and cognitive neuroscience. Students are provided with the conceptual framework and the technical skills necessary to enhance careers in research, teaching, business or government. Students completing the program add an interdisciplinary perspective to the training received in their major, better preparing them for employment or further study in a variety of sciences and social sciences. The certificate may be pursued as a stand-alone program or concurrently with another graduate degree program at UNC Charlotte.

Additional Admission Requirements

The certificate program is open to all students who hold a bachelor's degree from an accredited university and either:

- are enrolled and in good standing in a graduate degree program at UNC Charlotte, or
- have a minimum GPA of 3.0 for their undergraduate courses.

Application for the Cognitive Science Certificate Program is made through the Office of Graduate Admissions.

Certificate Requirements

The Graduate Certificate in Cognitive Science Program involves 15 credit hours of coursework. Students must take the required introductory course and at least two of the disciplinary courses. The remaining hours may come from any of the other topics courses listed.

Required Course

Select one of the following:

- PSYC 6216 Introduction to Cognitive Science (3)
ITCS 6216 Introduction to Cognitive Science (3)
ITIS 6216 Introduction to Cognitive Science (3)

Disciplinary Courses

Select at least two of the following:

- PSYC 6116 Cognition
ENGL 6163 Language Acquisition

- ITCS 6150 Intelligent Systems
PHIL 6340 Philosophy of Mind

Elective Courses

- PSYC 5316 Cognitive Neuroscience
PSYC 6015 Topics in Perception and Physiological Psychology
PSYC 6102 Organizational Research Methods
PSYC 6115 Sensation and Perception
ITCS 5152 Computer Vision
ITCS 6151 Intelligent Robotics
ITCS 6153 Neural Networks
ITCS 6156 Machine Learning
ITCS 6158 Natural Language Processing
ITCS 6159/8159 Intelligent Tutoring
ITCS 6170 Logic for AI
ITIS 6400/8400 Principles of Human Computer Interaction
ITIS 6510/8510 Software Agent Systems
ITCS/ITIS 6500/8500 Complex Adaptive Systems
ECGR 5196 Introduction to Robotics
ECGR 6102 Optimization of Engineering Designs
ECGR 6266/8266 Neural Networks Theory and Design
CEGR 5181 Human Factors in Traffic Engineering
Topics, seminars, or other courses in the cognitive sciences approved by the Graduate Program Director.

Grade Requirements

A cumulative GPA of 3.0 is required and at most one course with a grade of C may be allowed toward the certificate.

COURSES IN COGNITIVE SCIENCE

The course descriptions for the courses listed above are available under the related individual headings within the Colleges of Computing and Informatics, Engineering, and Liberal Arts & Sciences sections of the *Graduate Catalog*.

Communication Studies

• M.A. in Communication Studies

Department of Communication Studies

gradcomm.uncc.edu

Graduate Program Director

Dr. Christine S. Davis

Graduate Faculty

Dr. Jaime Bochantin, Assistant Professor
 Dr. Jonathan Crane, Associate Professor
 Dr. Christine S. Davis, Professor
 Dr. Alan Freitag, Professor, APR, Fellow PRSA
 Dr. Loril Gossett, Associate Professor
 Dr. Dan Grano, Associate Professor
 Dr. Bill Hill, Professor
 Dr. Min Jiang, Associate Professor
 Dr. Dean Kruckeberg, Professor
 Dr. Richard Leeman, Professor
 Dr. Shawn D. Long, Professor
 Dr. Rachel A. Plotnick, Assistant Professor
 Dr. Margaret Quinlan, Associate Professor
 Dr. Clifton Scott, Associate Professor
 Dr. Ashli Q. Stokes, Associate Professor
 Dr. Jillian Tullis, Assistant Professor

MASTER OF ARTS IN COMMUNICATION STUDIES

The Master of Arts in Communication Studies is designed to provide advanced study in the communication discipline, particularly in the areas of organizational communication, critical media and rhetorical studies, health communication, and public relations. All studies emphasize the ability to understand and analyze communication practices in different environments in the 21st Century. The curriculum is broad-based and is a balance of theory and application to practice.

Additional Admission Requirements

At minimum, students must meet all of the Graduate School requirements, including earning an acceptable score on the Graduate Record Examination, and submit three letters of recommendation and a strong personal essay outlining their reasons for pursuing a master's degree. Students must also submit an academic writing sample.

Degree Requirements

The Master of Arts degree program requires the completion of thirty (30) credit hours of graduate work. All students, regardless of orientation and area of study, must complete four (4) core courses. All students writing a thesis or a directed project earn their final six (6) credit hours with research-based activities.

Note: No more than six (6) credit hours may be taken at 5000 level. Successful completion of the degree requires a minimum GPA of 3.0.

Core Courses

COMM 6011 Topics in Communication Research Methods (3)
 COMM 6100 Communication Research Methods (3)
 COMM 6101 Contemporary Viewpoints in Communication Theory (3)
 COMM 6102 Professional Seminar in Communication Studies (3)

Interest Areas

The graduate program is a generalist program, in that students don't specialize in any one area but instead take courses through many of the interest areas. Faculty teach and conduct research across the following interest areas:

Organizational Communication

Organizational communication focuses on the various ways individuals influence and are influenced by organizations and their members. Work in organizational communication is concerned with organizational culture and symbolism, interpersonal and group communication, change communication, globalization, mediated communication, leader communication, structural concerns of organizational communication, and critical analysis of organizational communication.

Rhetoric/Media Studies/Popular Culture

Graduate study of the mass media at UNC Charlotte concentrates on applied and critical research on the organization and effects of media industries and new media technologies. Areas of study include persuasion and popular culture, computer-mediated persuasion, computer-mediated communication, and the rhetoric of spectator sport.

Health Communication

Health communication is a field of study offering students a better understanding of the communication within a health context. This includes, but is not limited to, provider-patient interaction; the creation, promotion, and influence of health information; social and community health issues; healthcare organizations; media messages about health; and interpersonal health communication.

Public Relations/International Public Relations

The focus of public relations is on building and maintaining internal and external relationships with entities essential to an organization's success, including entities such as media, activist groups, community groups, and regulators. The focus of UNC Charlotte's program is on public relations management, especially in the areas of issues tracking, corporate communication, crisis communication, not-for-profit communication, and international public relations efforts.

Post-Baccalaureate Study

The department does allow students to take up to six (6) credit hours as a post-baccalaureate student; students must follow the Graduate School guidelines for application for this status. Students are encouraged to meet with the Graduate Program Director as soon as possible after registering as a post-baccalaureate student to discuss application procedures and program options.

Assistantships

The Department has regular research/teaching assistantships available on a competitive basis to qualified students. Students will automatically be considered for an assistantship as part of the regular application process.

Advising

Upon formal acceptance, all graduate students must meet with the Graduate Program Director to file a proposed plan of study in the department and become familiar with the department's expectations. As students progress through their program of study, the Graduate Program Director will assist them in selecting a suitable advisor and committee members for the thesis, directed project, or comprehensive examination options.

Capstone Experiences

Students choose among three (3) options for their capstone experience: writing a thesis (6 credit hours); designing and conducting a directed project (6 credit hours); or taking the comprehensive examination (0 credit hours).

Thesis

A thesis is a written research document incorporating original research in a student's area of interest. Students select a thesis committee chair and two committee members and submit a proposal to them. The written thesis is defended before the thesis chair and committee members in the semester the student graduates. A thesis must be written and defended within six (6) calendar years after admission into the Communication Studies master's program.

Directed Project

A directed project is an applied research document involving research and application to a real world problem or opportunity. Students select a directed project chair and two committee members and submit a project to them. The completed project is presented to the directed project chair and committee members in the semester the student graduates. A directed project must be successfully completed and presented within six (6) calendar years after admission into the Communication Studies master's program.

Comprehensive Examination

The comprehensive examination is a nine-hour, written examination and oral defense covering communication theory, communication research methods, and a third comprehensive area each student designates as his/her specialty area of study in communication. Students opting to take the comprehensive examination should indicate their intention to the Graduate Program Director in the semester previous to the one in which they plan to sit for the examination. The examination itself carries no credit hours; students selecting this option must take six (6) additional credit hours to reach the thirty (30) hour credit requirement. The comprehensive examination must be successfully completed within the six (6) year master's time limit for degree completion.

Application for Degree

Each student should make application for his/her degree by completing the online Application for Degree through Banner Self Service no later than the filing date specified in the University Academic Calendar.

COURSES IN COMMUNICATION STUDIES (COMM)

COMM 5000. Topics in Communication Studies. (3)

Timely and important areas relevant to communication studies. *May be repeated for credit with permission of graduate advisor.*

COMM 5101. Media and the Law. (3) Survey of legal rights, restrictions, and ethical considerations in field of communication including the First Amendment, libel, invasion of privacy, obscenity law, regulation of electronic media, relationships between media and judiciary.

COMM 5102. Federal Interpretation of the First Amendment. (3) In-depth case analysis of tests determining Constitutional boundaries of expression including clear and present danger, prior restraints,

fighting words/symbolic speech, strict scrutiny, obscenity, indecency.

COMM 5115. Seminar in Health Communication. (3) Course provides in-depth examination of a major area of health communication utilizing extensive readings, discussion and written work.

COMM 5141. Advanced Organizational Communication. (3) Critical examination of the communication practices of organizations which accomplish such tasks as establishing organizational identification, influencing organizational members, and making decisions. Includes application of research methods to assess and analyze an organization's communication practices.

COMM 5147. International Public Relations. (3) Examines the complexities of public relations practice in an international setting. Includes overview of the factors that complicate communication across cultures and borders and an examination of the effect those factors have on public relations practice in specific global regions.

COMM 6000. Topics in Communication Studies. (3) Intensive investigation of a timely and important topic in communication studies. The topic of investigation may vary from semester to semester. *May be repeated for credit with permission of graduate advisor.* Topics courses include: Public Relations Issues Management, Public Relations Theory, Facilitating Corporate Social Responsibility, Integrated Communication, Sports & Rhetoric, and Fundraising.

COMM 6011. Topics in Communication Research Methods. (3) Prerequisite: COMM 6100 or permission of instructor. Focused and advanced instruction on a specific data analytic methodology relevant to communication studies. Sample foci may include—but are not limited to—focus groups, textual analysis, regression, interviewing, structural equation modeling, ethnographic analysis, hierarchical linear modeling. *May be repeated for credit with permission of graduate advisor.*

COMM 6100. Communication Research Methods. (3) Methods for systematic investigation of communication behavior. Theoretical and practical applications of both qualitative and quantitative research methodologies are utilized for completion of original projects.

COMM 6101. Contemporary Viewpoints in Communication Theory. (3) A survey of the leading theoretical traditions in communication studies. Covers both qualitative and quantitative approaches to conceptualizing communication practices.

COMM 6102. Professional Seminar in Communication. (3) Examination of the academic study of communication. Investigates the role of paradigms and use of the scholarly method. Students develop a scholarly project through a seminar approach.

COMM 6103. Communication Ethics. (3) Discussion and analysis of inherently ethical elements of communication praxis in public, community, institutional and organizational domains. Exploration of practical, philosophical and theoretical concerns that affect everyday matters of moral choice and judgment.

COMM 6110. Advanced Persuasion. (3) Analysis of theories of persuasion as a mode of social influence. Focus on the understanding and analysis of how persuasion works in various communicative contexts including mass-mediated, public relations, organizations and public advocacy.

COMM 6120. Communication and Network Society. (3) Examines the social dynamics arising from the global embrace of revolutionary communication technologies. Topics include: the forces that shape new information flows and the effects emergent technologies exert across nations, local communities and individuals.

COMM 6121. Communication and the Internet. (3) Considers the Internet as a social, cultural and political phenomenon. Studies and debates the competing visions of how the Internet does, can and should play a role in reshaping society. Explores how the computer and network technologies shape communities as well as individual identities. Addresses questions of law and public policy connected to issues of access, intellectual property and censorship.

COMM 6130. Textual Analysis. (3) The application of qualitative methods of language and rhetorical analysis to communication artifacts. A seminar approach to learn close textual analysis. Methodologies include dramatism, situational analysis, genre, metaphor, perspectival and postmodern paradigms.

COMM 6141. Organizational Communication Case Studies. (3) Communication theories are applied to real and fictional organizational cases. Topics such as culture, diversity, change, networks, and diffusion of innovations are examined from a communication perspective.

COMM 6142. Seminar in Organizational Communication. (3) Using a seminar approach, this course surveys the theoretical approaches to the study

of organizational behavior from a communication perspective. Focuses on issues of communication, roles and leadership.

COMM 6143. Organizations and Communication Technology. (3) The theories and concepts of how communication and technologies interact to shape organizational structures and communication processes.

COMM 6145. Communication Campaign Management. (3) A blending of theory and application to public relations/communication campaigns. The application dimension stresses mastery of the technical aspects of the campaign: research, problem-solving, planning, evaluation, and teamwork. The theoretical dimension stresses the study of actual campaigns and formulating generalizations regarding their successes or shortcomings. Class members serve on account teams with the instructor as manager. Account teams represent real-world clients and prepare a campaign book for the client's later implementation.

COMM 6146. Media Relations. (3) Draws on academic and professional research to study the communication strategies and tactics associated with establishing and maintaining effective relations between public relations practitioners and the media.

COMM 6170. Communication Law and Policy. (3) Survey of legal rights, legal restrictions, and policy developments governing public communication in the United States.

COMM 6410. Professional Communication Studies Internship. (3, 6) Prerequisites: Enrollment in M.A. or Graduate Certificate in Communication Studies program. Students work 10 hours per week for 3 credit hours, or 20 hours per week for 6 credit hours in an approved placement. *May be repeated for credit in the same or a different internship placement with permission of Graduate Program Director. Graded on a Pass/Unsatisfactory basis. Does not count toward the required 30 credit hours of graduate work for the M.A. degree or graduate certificate.*

COMM 6880. Independent Study. (3) Prerequisites: Permission of instructor and Graduate Program Director. Area of study beyond the scope of current offerings to be devised by student and faculty member. *May be repeated for credit.*

COMM 6995. Directed Project in Communication. (3 or 6) Design, implementation, presentation and evaluation of an approved applied research project in student's specialty area. The Directed Project is of the student's own design under the supervision of a research advisory committee. *May be repeated with*

permission of Graduate Program Director, if taken for three hours credit. Six hours of Directed Project may be taken during a single semester.

COMM 6999. M.A. Thesis. (3 or 6) Appropriate research and written exposition of that research is required. The Thesis is proposed and defended under the supervision of a research advisory committee. *May be repeated by permission of Graduate Program Director, if taken for three hours credit. Six hours of Thesis may be taken during a single semester.*

Criminal Justice

• M.S. in Criminal Justice

Department of Criminal Justice and Criminology

criminaljustice.uncc.edu

Graduate Program Director

Dr. Shelley Listwan

Graduate Faculty

Dr. Bruce Arrigo, Professor

Dr. Beth Bjerregaard, Professor

Dr. Anita Blowers, Associate Professor

Dr. Charisse Coston, Associate Professor

Dr. M. Lyn Exum, Associate Professor and Associate Chair

Dr. Jennifer L. Hartman, Associate Professor

Dr. Joseph B. Kuhns III, Professor

Dr. Shelley Listwan, Associate Professor

Dr. Kathleen Nicolaides, Senior Lecturer

Dr. Matthew D. Phillips, Assistant Professor

Dr. Shannon E. Reid, Assistant Professor

Dr. John M. Stogner, Associate Professor

Dr. Michael G. Turner, Professor and Chair

MASTER OF SCIENCE IN CRIMINAL JUSTICE

The Master of Science (M.S.) in Criminal Justice degree program is designed to promote broad based study of the phenomenon of crime and to enhance career opportunities in the field of criminal justice. The program utilizes the social and behavioral sciences in an interdisciplinary approach to study law, crime, and social deviance, and to examine critically the systems created in response to deviance and crime. The objectives of the program are to: (1) provide present and future criminal justice personnel with the educational background necessary to function effectively in the dynamic field of criminal justice; (2) familiarize students with the nature, methods, and functions of research, and with the existing body of knowledge on criminal justice; (3) provide the criminal justice system with qualified candidates for careers in the field; and (4) prepare students for entrance into doctoral programs. Career opportunities available in the criminal justice system include law enforcement, corrections, administration, planning and analysis, juvenile justice, and college instruction. There are also private sector careers available, including private security and loss prevention. Students may enroll in the program on either a full-time or part-time basis. Many classes are

scheduled in the evening to accommodate the part-time student. Full-time students can complete the program over a 12-month period.

Additional Admission Requirements

Admission to the Criminal Justice graduate program is open to students with bachelor's degrees in any discipline who meet the general requirements for admission to the Graduate School. Preference is given to applicants who have a grade point average of at least 3.0, a satisfactory score on the Graduate Record Examination (GRE) (above 300 on the combined verbal and quantitative sections), a personal statement describing their interest in attaining the degree, and three strong recommendation letters from those who are able to attest to your academic ability.

Degree Requirements

A minimum of 31 credit hours is required.

Core Courses

Students must complete each of the following six core courses with a grade of B or above:

- CJUS 6100 Criminal Justice Policy (3)
- CJUS 6101 The Nature and Theory of Crime (3)
- CJUS 6102 Research in Criminal Justice I (3)
- CJUS 6103 Research in Criminal Justice II (3)
- CJUS 6104 Criminal Justice and Social Control (3)
- CJUS 6105 Criminal Justice Seminar (1)

Elective Courses

Students must complete 15 elective credit hours. These elective credit hours may come from any 5000- or 6000-level course offered within the Department of Criminal Justice and Criminology. A maximum of 9 elective credit hours may be taken outside the Department of Criminal Justice and Criminology (with approval of the Graduate Program Director).

Transfer Courses

A maximum of six elective credit hours with grades of B or above may be transferred from another institution. Transfer courses must be consistent with the program and will be accepted at the discretion of the department. At least 25 credit hours must be taken in residence. To complete the program, students have the option of taking a comprehensive examination or writing a thesis.

Assistantships

The Department of Criminal Justice and Criminology offers graduate assistantships which are awarded primarily on the basis of academic merit.

Financial Aid

In addition to the graduate assistantships, the department offers, as available, research assistantships and grant-funded opportunities for students. In addition, a few scholarships are available each year.

Thesis

Students who choose to write a thesis are required to complete 3 credit hours each of the following courses. These credit hours become part of the 15 elective credit hours students must complete.

CJUS 6901 Thesis I
CJUS 6902 Thesis II

Comprehensive Examination

The comprehensive examination is offered each Fall and Spring semester, as well as in the Summer. The comprehensive examination may be taken no more than two times. Students who fail to pass the comprehensive examination on their second attempt will be terminated from the program.

COURSES IN CRIMINAL JUSTICE AND CRIMINOLOGY (CJUS)

CJUS 5000. Topics in Criminal Justice and Criminology. (3) Specialized topics in criminal justice and criminology. *May be repeated for credit.*

CJUS 5101. Drugs, Crime and the Criminal Justice System. (3) Provides an overview of the current state of drug use in this country and throughout the world and examines the nature and extent of drug use, the history of drug use/ abuse, contemporary drug use patterns, licit and illicit drug dealing and trafficking, crime and violence associated with drug use and drug markets, drug control strategies at the local, state, national and international level, treatment level, treatment options and alternatives, drug policy issues, legalization debates, and prevention strategies.

CJUS 5103. International Criminal Justice. (3) Examination of the patterns and trends in international crime such as terrorism, transnational organized crime, and trafficking in people and a review of how the legal traditions of common law, civil law, Islamic law and socialist legal systems are structured and function criminal justice systems of the United States and other nations.

CJUS 5160. Victims and the Criminal Justice System. (3) Relationship between victims of crime and the criminal justice system. Specific topics include an analysis of the characteristics of crime victims, victim reporting patterns, treatment of victims by the various segments of the criminal justice system, victim

assistance programs, and the issue of compensation and/or restitution for victims of crime.

CJUS 5161. Violence and the Violent Offender. (3) Issues surrounding violence in today's society and their impact on offenders involved in homicide, child and domestic abuse, and other forms of violence. Examination of myths about violence, victim-offender characteristics and relationships, and theories of violence.

CJUS 5162. Sexual Assault. (3) Comprehensive and critical examination of sexual exploitation in the United States.

CJUS 6000. Topics in Criminal Justice. (3-6) Specialized criminal justice topics. *May be repeated for credit.*

CJUS 6100. Criminal Justice Policy. (3) Examination of the criminal justice subsystems (law enforcement, courts, corrections) with particular focus on the development of policy and the effectiveness of current policies aimed at reducing crime.

CJUS 6101. The Nature and Theory of Crime. (3) Definitions and patterns of criminal behavior. Major theoretical perspectives on crime, including historical, philosophical, individual, community-oriented and societal approaches.

CJUS 6102. Research in Criminal Justice I. (3) Introduction to research methodology and statistics with emphasis on applications to criminal justice settings. Topics to be covered include problem selection, theory, hypothesis formulation, research design, sampling, measurement, and proposal writing.

CJUS 6103. Research in Criminal Justice II. (3) Prerequisite: CJUS 6102. Advanced research methodology with emphasis on conducting, presenting and evaluating research in criminal justice settings. Topics to be covered include data collection, data input, data analysis, and interpretation.

CJUS 6104. Criminal Justice and Social Control. (3) Examines how the law functions as a powerful tool of social control in our society. Particular emphasis is given to understanding the constitutional limitations placed on the construction of law, the elements of criminal offenses, and criminal defenses.

CJUS 6105. Criminal Justice Seminar. (1) An introduction to the criminal justice faculty, their research areas of expertise, and the type of projects with which they are currently involved.

CJUS 6120. Criminal Justice Management and Decision-Making. (3) Application of generic

principles of management and supervision to operational problems confronted by criminal justice agencies with particular attention to decision-making and discretion in criminal justice settings.

CJUS 6130. Law Enforcement Systems. (3)

Consideration of the elements of law enforcement agencies as subsystems of the total criminal justice system. Comparisons of law enforcement systems in other countries is also considered.

CJUS 6131. Police Problems and Practices. (3)

Research on current issues in law enforcement with emphasis on the legal, social, and institutional contexts in which they occur.

CJUS 6132. Legal Issues in Law Enforcement. (3)

Law applicable to the functions of police administrators and line police officers including constitutional, statutory, judicial, and administrative law governing search and seizure, arrest, interrogation, use of force, jurisdiction, civil and criminal liability of administrators and officers, and the rights of officers and suspects.

CJUS 6140. Prosecution and Adjudication Processes. (3)

Functions and powers of prosecutors, defense attorneys, judges and juries including plea bargaining and court procedure.

CJUS 6150. Corrections. (3) Functions of correctional agencies, principles of punishment and a historical analysis of correctional institutions and programs including prisons, jails, probation and parole systems.

CJUS 6151. Correctional Strategies: Rehabilitation and Reintegration. (3)

Efforts to change offender behavior and to facilitate the development of offender-community linkages. Institutional classification and treatment strategies, pre-release and temporary release programs, innovative uses of probation and parole systems, community residential programs and new dispositional models; e.g., sentencing to community service and restitution.

CJUS 6152. Legal Issues in Corrections. (3)

Major legal issues pertaining to corrections, including sentencing, probation, restitution, prisons, parole, pardon and restoration of rights with emphasis on legal issues often confronted by correctional administrators and probation and parole personnel.

CJUS 6160. Juvenile Justice Systems. (3)

The process by which specific behaviors are identified as delinquent and the responses of the juvenile justice system to such behaviors. Laws dealing with the juvenile justice system, the historical development of the system, and the effectiveness of innovative responses to delinquency.

CJUS 6170. Program Planning and Evaluation in Criminal Justice. (3)

Applied research as a foundation for criminal justice planning and evaluation. Emphasis on the interrelationship of planning and evaluation within program management.

CJUS 6800. Directed Individual Study in Criminal Justice. (1-6)

Supervised investigation of a criminal justice problem of special interest to the student. *May be repeated for credit one time with permission of student's major professor or academic committee.*

CJUS 6901. Thesis I. (3)

Students work on developing a research proposal of a significant criminal justice topic approved by the student's thesis committee. The final proposal includes an extensive literature review and a detailed discussion of the research plan. *Graded on a Pass/Unsatisfactory basis.* Students do not receive a passing grade for the course until they have successfully defended their thesis proposal.

CJUS 6902. Thesis II. (1-3)

Prerequisite: CJUS 6901. Students conduct independent research developed in CJUS 6901, successfully defend the research in an oral defense meeting, and have the final written thesis approved by the graduate school. *Graded on a Pass/Unsatisfactory basis for a total of 3 credit hours to be taken in one or more than one semester.* Students do not receive a passing grade for the course until they have successfully defended their final thesis product.

CJUS 6903. The Applied Research Project. (3)

Prerequisite: must pass the qualifying examination, have a research project and human subjects approval, where necessary. Students develop a major paper on a topic of criminal justice importance. It is designed to be completed within one semester. This project is typically designed for research in agencies within the community and must be successfully defended in an oral defense meeting. It is geared towards the terminal Master's student and not appropriate for those seeking the doctorate. *Graded on a Pass/Unsatisfactory basis.*

Earth Sciences

• M.S. in Earth Sciences

Department of Geography and Earth Sciences

geoearth.uncc.edu

Graduate Program Director

Dr. Scott Hippensteel

Graduate Faculty

Dr. Craig Allan, Professor
 Dr. Andy Bobyarchick, Associate Professor
 Dr. Robert Boyer, Assistant Professor
 Dr. Harrison Campbell, Associate Professor
 Dr. Gang Chen, Assistant Professor
 Dr. Sandra Clinton, Research Assistant Professor
 Dr. Casey Davenport, Assistant Professor
 Dr. Elizabeth Delmelle, Assistant Professor
 Dr. Eric Delmelle, Associate Professor
 Dr. John Diemer, Professor
 Dr. Matthew Eastin, Associate Professor
 Dr. Martha Cary Eppes, Associate Professor
 Dr. Patricia Fall, Professor
 Dr. Sara Gagné, Assistant Professor
 Dr. William Graves, Associate Professor
 Dr. Scott Hippensteel, Associate Professor
 Dr. Brian Magi, Assistant Professor
 Dr. Tyrel Moore, Professor
 Dr. Heather Smith, Professor
 Dr. Janni Sorensen, Associate Professor
 Dr. Wenwu Tang, Assistant Professor
 Dr. Jean-Claude Thill, Professor
 Dr. David Vinson, Assistant Professor
 Dr. Qingfang Wang, Associate Professor
 Dr. Wei-Ning Xiang, Professor

MASTER OF SCIENCE IN EARTH SCIENCES

The Department of Geography and Earth Sciences offers a Master of Science in Earth Sciences degree with opportunities for study and research in the areas of geology, hydrology, atmospheric science, environmental science, remote sensing, and geospatial analysis. We also offer, in conjunction with the College of Engineering, a Ph.D. in Infrastructure and Environmental Systems (INES). See the Infrastructure and Environmental Systems heading under the "College of Engineering" section of this *Catalog* for a complete description of the requirements for the INES Ph.D.

The Department of Geography and Earth Sciences offers Earth Sciences graduate students the

opportunity to pursue both applied and academic research through access to extensive field, laboratory, and computing facilities.

The Earth Sciences faculty offer courses and are active in research areas that include surface and groundwater hydrology, vadose zone processes, geochemistry, marine geology and volcanology, biogeochemistry, mineralogy, structural geology, applied geophysics, remote sensing, soil science, Quaternary geology, surficial processes, fluvial processes, depositional environments, biodiversity, landscape ecology, urban ecology, sustainability, forestry, clastic and carbonate sedimentology, basin analysis, stratigraphy, coastal geology, paleoecology, macro- and micropaleontology, environmental geology, applied climatology, global fire modeling, biogeophysical modeling, climate model evaluation, terrestrial carbon cycle, aerosol physics and chemistry, air quality, renewable energies, numerical weather prediction, severe weather, tropical meteorology, and environmental epidemiology.

The program is designed to address a range of student needs and to be completed in two years of full-time study. Graduates of the program will employ their expertise in a wide variety of activities and will be prepared for careers such as environmental consultants, geologists in the energy and mining industries, regulators and applied practitioners in governmental agencies, and earth science teachers in secondary schools. The M.S. in Earth Sciences also prepares students for admission to traditional Geology, Atmospheric, Earth, and Environmental Sciences Ph.D. programs, as well as interdisciplinary Ph.D. programs such as Infrastructure and Environmental Systems.

Additional Admission Requirements

(Requirements in addition to Graduate School admission requirements)

It is the policy of the Department to provide equal opportunities to all students regardless of race, creed, color, sex, or national origin. The Department requires applicants to demonstrate evidence of suitability for the program.

All applications for admission are reviewed by the Earth Sciences Graduate Committee. The Department admits applicants on a competitive basis as space in the program allows.

- **Grade Point Average (GPA):** The Department expects an overall GPA of at least 3.0. However, exceptions may be made if the other elements of the application are strong.

- *Letters of Recommendation:* Three letters of reference are required. Letters from college or university teachers who have worked with and/or taught applicants are preferred. These letters are evaluated on the basis of how well the applicant is suited in terms of intellect, preparation, maturity, and motivation to perform graduate work.
- *Personal Essays:* Applicants must write a personal essay which directly addresses reasons for the desire to conduct graduate work in Earth Sciences as well as the desire to participate in the M.S. program at UNC Charlotte. Applicants should comment on their expectations regarding the benefits of an M.S. in Earth Sciences and how the program at UNC Charlotte fits their career and/or professional goals and how they would benefit from and contribute to the M.S. in Earth Sciences at UNC Charlotte. Lastly, applicants should identify at least three (3) potential advisors with whom they would like to work, and why those advisors would be ideal. Applicants are encouraged to contact potential advisors prior to submitting their application. The essay is very important in determining the applicant's commitment to graduate education and to a professional career in earth sciences or a related field. Careful preparation of the essay is time well spent.
- *Scores on the Graduate Record Exam (GRE):* In general the Department expects applicants to score above the 50th percentile on each exam section with minimum scores of 300 on the combined verbal and quantitative portions (equivalent to a minimum combined score of 1000 if taken before 2011). Lower scores will not automatically exclude applicants if the remainder of the applicant's file is strong.
- *Transcripts of College Coursework:* The transcripts are evaluated on the basis of performance across a range of earth and environmental sciences, physical sciences, and mathematics courses in order to determine the applicant's preparation for graduate level coursework.
- *Additional Requirements for International Applicants:* Scores on the Test of English as a Foreign Language (TOEFL) Exam: International applicants whose native language is not English must earn a total score of at least 83 (Internet-based) or 557 (paper-based) on the Test of English as a Foreign Language Exam. This requirement does not apply to U.S. citizens or native English speakers.

Additional Prerequisite Requirements

(Minimum requirements in addition to those enforced by the Graduate School)

All prospective graduate students must demonstrate competence in undergraduate subject matter in their area of study. While the department does not require that applicants have a degree in Earth Sciences, prospective graduate students should provide evidence that they are prepared to immediately take full advantage of graduate level coursework in geology, hydrology, atmospheric science, environmental science, remote sensing, or geospatial analysis.

Students applying to the program should, at a minimum, be familiar with the concepts and materials offered in courses such as: Introductory Physical Geography or Physical Geology, Introductory Chemistry, Introductory Physics, and calculus-based Mathematics. These courses or their equivalents are required for admission to the UNC Charlotte M.S. in Earth Sciences program.

All decisions concerning the equivalency of courses in an applicant's transcript to those listed as minimum requirements for entry in the M.S. in Earth Sciences are the responsibility of the Graduate Committee and the Department Chair.

Assistantships

Assistantships are much like a part-time job for the student. As we try to find work settings that fit the student's academic interest, these assistantships can also offer valuable training opportunities and work experience. The nature of a research assistantship depends entirely on the needs of the department or supervising faculty member. Teaching assistantships are assigned on the basis of the student's academic background.

Graduate assistantships are arranged for either one entire semester or for an entire academic year (2 semesters or 9 months). They are normally scheduled for 16 weeks per semester and the student is expected to work 20 hours per week. The department makes every effort to provide funding to every full-time student in the program.

Degree Requirements

The program requires a minimum of 36 hours of graduate credit. Students must complete at least 18 of the 36 credit hours in courses at the 6000-level or above. Of these, at least two credit hours will consist of ESCI 6600 (Earth Sciences Graduate Seminar) and at least 9 credit hours will consist of ESCI 6900 (Earth Sciences Research).

Up to 6 graduate credit hours may be accepted as transfer credit. Only courses with grades of A or B earned at an accredited university are eligible. Transfer credits are not automatic and require the approval of the Graduate Program Director and the Graduate School. The amount of transfer credit may not exceed the limit set by the Graduate School (6 credit hours).

It is anticipated that students primarily select courses from the Department of Geography and Earth Sciences but may also choose coursework from biology, chemistry, computer science, engineering, mathematics, and physics in support of particular emphases within the program. For example, certain geo-technology or environmental engineering courses in Civil and Environmental Engineering may be appropriate for the student pursuing problems in environmental earth sciences. Students examining the interaction of geology and the biosphere may include ecology or botany courses in the Department of Biological Sciences or organic chemistry courses in the Department of Chemistry in their program of study. Students must meet other departments' course prerequisite requirements or receive permission from the instructor before registering for out-of-department coursework.

Students are expected to achieve grades of A or B in all coursework taken for graduate credit and must have at least an average of B (3.0) in order to graduate. An accumulation of more than two grades of C results in suspension of the student's enrollment in the graduate program. A grade of U results in the immediate suspension of the student's enrollment in the graduate program. Readmission to the program requires approval of the Graduate Program Director, Department Chair, and Dean of the Graduate School.

Advising

A student's advisor guides the student through the design and implementation of a program of study and research tailored to the student's specific needs and career goals. The advisor generally is available to the student for advice on academic and other problems. An advisor is assigned by the Graduate Program Director to each student at the time of their admission into the program. Every effort is made to match students with advisors who have similar research interests. Students may change advisors by obtaining advanced permission from the faculty member (i.e., the new advisor) with whom they wish to work. No student will be allowed to register for courses without permission of his/her advisor.

Plan of Study

All students are required to formulate a complete plan for their M.S. before completion of the 2nd semester for full-time students, or before the completion of 18 credit hours for part-time students. This plan includes at a minimum the names of the student's research committee members (see below), a plan of study for all coursework that will be completed during the degree, and at least one proposal presentation for ESCI 6900 (see below). The plan of study must be approved by all committee members as well as the Earth Sciences Graduate Program Director, and serves as a guide to coursework and research while at UNC Charlotte.

Committees

All final research projects are evaluated by a faculty committee known as the research committee. Research committees must have a minimum of three members composed of the graduate faculty of the department or associated departments. Additional members are acceptable and in many cases outside members, other departments, or internship coordinators from off-campus agencies are advisable.

Earth Sciences Research

All M.S. in Earth Sciences students must complete 9 credit hours of ESCI 6900 (Earth Sciences Research). Students can pursue research experiences that are appropriate to individual student's interests and experience, departmental faculty resources and the availability of opportunities that exist to work with allied agencies or clients on or off campus. While it is possible to carry out more than one project to satisfy the 9 credit requirement, one of the research projects must constitute at least 6 credit hours.

For research projects of 6 or more credit hours, students must prepare and orally present a written research proposal that clearly outlines the purpose and scope of their research. In consultation with the student's advisor, this document may be prepared as a formal thesis. At the presentation, students should be prepared to respond to questions from their research committee, including questions on general topics addressed in their prior coursework. The proposal presentation must be completed before the beginning of the 3rd semester for full-time students. The final results of all research projects must be presented in a written research document (or thesis) in a format agreed upon by the student's committee. That document must be formally approved by the student's research committee. Research projects that constitute 6 or more credit hours must also be orally defended (see below).

Defense of the Research Project

When the advisor is satisfied that the student's research and writing has progressed sufficiently the research document is provided to the other members of the research committee. If they agree that the document is ready for a defense, an oral exam is scheduled. The advisor must then formally notify every member of the Department's graduate faculty of the date, time, place and the topic (title with abstract) of the defense. A copy of the document to be defended will be placed in the Geography and Earth Sciences office one week before the defense for review by all interested faculty.

Graduate Coursework

The M.S. in Earth Sciences graduate program generally follows a traditional numbering scheme with 5000 and 6000 level courses. The 5000-level numbers identify courses that cover accepted bodies of knowledge within the earth sciences with the emphasis placed on mastery and critical assessment of the theoretical and empirical foundations within the discipline. The 6000-level courses are divisible into three categories. (1) The first category is the Earth Systems topic courses, wherein graduate students review and analyze the dominant current working hypotheses that drive contemporary research within conceptual areas such as geodynamics, global biogeochemical cycles, climate change, severe weather dynamics, or urban ecology. (2) The second 6000-level category is the common core seminar course, wherein graduate students discuss holistic themes and discipline-specific issues in the Earth Sciences over the course of two separate Fall semesters. (3) The third 6000-level category is the directed research courses which provide the framework for graduate students to complete the research requirements within the program and also identifies the area of concentration of the directed research.

COURSES IN EARTH SCIENCES (ESCI)

ESCI 5000. Selected Topics in Earth Sciences. (1-4)

Prerequisites: ESCI 1101, GEOL 1200 and GEOL 1200L, or permission of instructor. In-depth treatment of specific topics selected from one of the fields of the earth sciences. *May be repeated for credit with change of topic.*

ESCI 5105. Meteorological Computer Applications.

(3) Prerequisites: METR 3140 and MATH 1241 with grades of C or above, or permission of instructor. Principles of computer programming applied to the analysis of meteorological data. Students become familiar with the Unix environment, learn programming basics, and create programs to analyze various meteorological datasets. Topics include:

program composition, compiling, data types, mathematical operators, selective execution, repetitive execution, arrays, functions, and subroutines. Three hours of combined lecture and lab per week.

ESCI 5110. Atmospheric Instrumentation. (3)

Prerequisite: METR 3210 with a grade of C or above, or permission of the instructor. An overview of common atmospheric measurements systems and their applications. Particular attention is paid to surface, sounding, radar, and satellite systems. Three hours of combined lecture and lab per week.

ESCI 5140. Hydrologic Processes. (4)

Prerequisites: ESCI 1101; GEOL 1200 and GEOL 1200L; or permission of instructor. Atmospheric, soils and geologic aspects of surface and ground water processes. Three lecture hours and one three-hour lab per week.

ESCI 5150. Applied Climatology. (3)

Prerequisite: METR 3250 or permission of instructor. Methods of acquiring and analyzing climatic data in various types of applied problems. Emphasis on methods to assess and reduce the impact of weather and climate upon human activities. Three hours of combined lecture and lab per week.

ESCI 5155. Fluvial Processes. (4)

Prerequisites: ESCI 1101 and ESCI 1101L; GEOL 1200 and GEOL 1200L; or permission of instructor. Hydrologic and geomorphic study of the transport of water and earth materials within stream systems. Erosion, mass wasting, open channel flow, sediment transport, flooding, stream channel morphology, morphometry of drainage basins, and related topics. Three lecture hours, three lab hours per week.

ESCI 5170. Fundamentals of Remote Sensing. (4)

Prerequisites: ESCI 1101 and GEOL 1200, or permission of instructor. Introduces the physical fundamentals of remote sensing, provides an overview of airborne and satellite remote sensing systems, and offers a basic instruction in the use and interpretation of remote sensing imagery. Identification, interpretation and mapping of both natural and cultural landscape features are also covered. One 2-1/2 hour lecture and one three-hour lab per week.

ESCI 5180. Digital Image Processing in Remote Sensing. (4)

Prerequisite: ESCI 5170 or permission of instructor. Offers both a basic instruction in the use and interpretation of remote sensing data, and advanced remote sensing techniques to help students understand what and how remote sensing can contribute to the information needs in various fields. 2-1/2 lecture hours and three lab hours per week.

ESCI 5205. Climate Dynamics. (3) Prerequisites: ESCI 3101 and METR 4105 with grades of C or above. Pre- or corequisite: METR 3250 or permission of instructor. Topics include: global climate, climate variability, and dynamics within the climate system, with a focus on the role of the atmosphere in the climate system. The El Niño phenomenon provides the main example of how climate variability can affect weather, and seasonal weather forecasting. Three hours of combined lecture and lab per week.

ESCI 5210. Soil Science. (4) Prerequisites: GEOL 3124 and GEOL 3115, or permission of instructor. Study of soils, soil-forming processes and soil morphology with an emphasis on soils as they relate to geologic landscapes and surficial processes. Students will learn how to describe and interpret soils in the field. Three hours lecture, three hours lab per week with occasional field trips. Graduate students will fulfill the requirements of ESCI 4210. In addition, graduate students will be required to acquire laboratory and interpretive skills in soil chemical analyses and will have additional writing assignments for the course.

ESCI 5220. Atmospheric Chemistry. (3) Prerequisites: CHEM 1251 and MATH 1242 with grades of C or above, or permission of instructor. Basic physical chemistry and a survey of major topics in atmospheric chemistry including fundamental properties of the atmosphere, tropospheric chemistry, air pollution, acid rain, stratospheric chemistry and the ozone hole, and the role of chemistry in the Earth's climate. Three hours of combined lecture and lab per week.

ESCI 5222. Watershed Science. (3) Prerequisite: ESCI 4140 or ESCI 5140, or permission of instructor. Examination of the cycling of water and chemical elements in natural and perturbed watersheds with emphasis on linkages between the hydrologic and biogeochemical processes which control runoff water quality. Topics include: runoff processes, evapotranspiration, nutrient export and stream, riparian and hyporheic zone hydrochemical dynamics.

ESCI 5233. Geoenvironmental Site Characterization. (4) Prerequisite: Earth Sciences, Geology and M.A. Geography majors: ESCI 4140 or ESCI 4155; others: permission of instructor. Advanced field-based examination of hydrologic and geologic conditions in the southeastern United States within the context of current state and federal regulatory requirements and site characterization activities currently performed by professional environmental geoscientists. Hydrologic investigation and water quality characterization, and geological and geophysical site investigations.

ESCI 5240. Boundary-Layer Meteorology. (3) Prerequisite: METR 3210 or permission of instructor. Examines the flow of mass, energy, and moisture within the planetary boundary layer including their exchange at the earth's surface and theories of interaction. Principles of air pollution including sources, sinks, and controls. Interaction of the atmosphere with underlying surfaces (i.e., soils, vegetation, oceans, glaciers). Design and operation of instruments used to monitor the atmosphere with an emphasis on practical application. Three hours of combined lecture and lab per week.

ESCI 5250. Advanced Dynamic Meteorology. (3) Prerequisites: METR 3250 with a grade of C or above, MATH 2171, and MATH 2241, or permission of instructor. In-depth examination of atmospheric dynamics, focusing on the structure and evolution of synoptic and mesoscale weather systems, wave dynamics (Rossby, topographic, inertia-gravity, etc.), scale-analysis, nondimensional numbers, and atmospheric modeling. Three hours of combined lecture and lab per week.

ESCI 5251. Advanced Synoptic Meteorology. (3) Prerequisite: METR 3250 with a grade of C or above or permission of instructor. An integrated view of synoptic and dynamic meteorology focusing on advanced conceptual models and analysis techniques for mid-latitude weather systems and regional precipitation events. Three hours of combined lecture and lab per week.

ESCI 5320. Tropical Meteorology. (3) Prerequisite: METR 3250 or permission of instructor. A comprehensive study of the tropical atmosphere, including climatology, mean structure and circulation, air-sea energy exchange, cumulus transport, synoptic waves, and tropical storms. Special attention is paid to the formation, evolution, motion, and societal impacts of hurricanes. Three hours of combined lecture and lab per week.

ESCI 5350. Mesoscale Meteorology. (3) Pre- or corequisite: METR 3250 or permission of instructor. A comprehensive study of the structure, evolution, and dynamics of atmospheric phenomena having spatial scales between 2 and 2000 km. Topics include: fronts, convective initiation, mesoscale convective systems, severe thunderstorms, tornadoes, low-level jets, drylines, land-sea breezes, shallow convection, and terrain effects. Three hours of combined lecture and lab per week.

ESCI 5400. Internship in Earth Sciences. (3-6) Prerequisite: Permission of the Graduate Committee. Research and/or work experience designed to be a logical extension of a student's academic program. The student must apply to Graduate Advisory

Committee for an internship by submitting a proposal which specifies the type of work/research experience preferred and how the internship will complement his or her academic program. The Graduate Committee will attempt to place the selected students in cooperating community organizations to complete specified research or work-related tasks which are based on a contractual arrangement between the student and community organization. The student can receive three to six hours credit, depending on the nature and extent of the internship assignment.

ESCI 5800. Individual Study in Earth Sciences. (1-4)

Prerequisite: Permission of instructor and credit hours established in advance. Tutorial study or special research problems. *May be repeated for credit with change of topic.*

ESCI 6000. Selected Topics in Earth Sciences. (1-4)

Prerequisites: permission of the Earth Sciences Graduate Program Director. In-depth treatment of specific topics selected from one of the concentrations in earth sciences (Solid Earth Sciences; Climatology and Hydrology; Environmental Systems Analysis). *May be repeated for credit with change of topic.*

ESCI 6060. Earth Sciences Field Investigations. (1-6)

Prerequisite: Permission of instructor. A concentrated field investigation of selected earth sciences topics. Course subject matter, credit hours, location and duration will be specified each time course is offered. *May be repeated for credit. Graded on a Pass/Unsatisfactory basis.*

ESCI 6105. Landscape Assessment. (4) Prerequisite: GEOL 4105 or permission of instructor. An advanced geomorphology course that examines current climatic and/or tectonic geomorphology research topics and methods with a focus on regional or disciplinary issues that will vary each offering. Using a variety of field-based quantitative and qualitative techniques such as laser surveys, GPS, trenching and/or coring, students will devise and implement a research project that includes two related but separate field sites. Three hours seminar per week with three or four mandatory field trips.

ESCI 6201. Earth Systems Analysis: Climate. (3)

Current working hypotheses and research methods are reviewed for the study of climatology and climate change. Theories and mechanisms of climate change, as well as the interrelationships between the components of the climate system, are discussed towards understanding and explaining past, present and possible future climatic behavior.

ESCI 6202. Earth Systems Analysis: Biogeochemical Cycles. (3) Examines the Earth's water and major elemental cycles including those of carbon, nitrogen,

sulfur, phosphorus and the major crustal elements. Uncertainties in the current state of understanding of global elemental cycles are examined. Special emphasis is placed on how these cycles are currently being modified through human activities.

ESCI 6250. Urban Air Quality. (3) Prerequisites:

M.S. Earth Science, M.A. Geography, and Ph.D. INES and Public Policy students: METR 4150 and STAT 2221, or permission of instructor. Examination of the relationships between climatic processes and urban air quality with emphasis on trends and patterns. Topics will include health and environmental effects of air pollution, ozone climatology, pollutant transport, transportation related emissions, risk assessment, and air quality management.

ESCI 6301. Earth Systems Analysis: Human Interactions. (3)

Current working hypotheses and research methods are reviewed for the regional and global scale coupling of categorical human activities and earth processes. The focus is on GIS-based modeling frameworks for parametric impact assessment.

ESCI 6302. Earth Systems Analysis: Statistical and Risk-based Decision Support Systems. (3)

Statistical and risk-based research/decision support methods are reviewed for local and regional environmental assessment and management. The focus is on parametric statistical analysis of large temporal and spatial datasets for the human-interface with the local and regional air, water and land resources. Valuation, ranking, prioritization, and indexing models for environmental management are also discussed.

ESCI 6600. Earth Sciences Graduate Seminar. (1)

Prerequisite: Admission into the M.S. in Earth Sciences program. Discussion of holistic themes, discipline-specific issues, and current challenges in the Earth Sciences. Students actively participate in seminars delivered by student researchers, faculty, and invited speakers. Participation counts for a total of 2 credit hours (1 credit hour for each of two academic years). Prior to graduation, each student makes at least two seminar presentations and provides at least one formal critique of a presentation. *May be repeated for credit.*

ESCI 6650. Workshop in Earth Sciences. (4) A series of lectures on the subject matter of the atmosphere and hydrosphere with accompanying laboratory sessions.

ESCI 6800. Individual Study in Earth Sciences. (1-4)

Prerequisite: Permission of instructor and credit hours established in advance. Tutorial study or special research problems. *May be repeated for credit with change of topic.*

ESCI 6900. Earth Sciences Research. (1-9)

Prerequisites: permission of the student's research advisor. Students will complete hypothesis or problem-driven research that will include formulation, implementation, analysis and presentation components. *May be repeated for credit.*

COURSES IN GEOLOGY (GEOL)

GEOL 5000. Topics in Geology. (1-4)

Prerequisites: ESCI 1101, GEOL 1200, and GEOL 1200L; or permission of instructor. In-depth treatment of specific topics selected from one of the fields of geology. *May be repeated for credit with change of topic.*

GEOL 5100. Igneous and Metamorphic Petrology. (4)

Prerequisite: GEOL 3115. Classification, mineralogy and chemical properties of igneous and metamorphic rocks including the tectonic processes by which they formed. Lab emphasizes hand specimen and petrographic description and interpretation of rocks in thin sections.

GEOL 5105. Geomorphology. (3)

Prerequisites: ESCI 1101, GEOL 1200, and GEOL 1200L. Surficial processes and landform development as controlled by climate, tectonics, rock characteristics and time with emphasis on plate tectonic, weathering, erosion, mass wasting, surface water, groundwater, glacial, wind coastal processes and climate change in landscape development.

GEOL 5105L. Geomorphology Laboratory. (1)

Pre- or corequisite: GEOL 5105. Analysis of landforms and the surficial processes responsible for landform development. One lab period of 3 hours per week.

GEOL 5110. Stratigraphy. (4)

Prerequisites: GEOL 1210 and GEOL 3124. Vertical and horizontal relationships of layered earth materials as a key to understanding basin history, past depositional environments and their transformation through time. Three lecture hours, three lab hours per week.

GEOL 5115. Applied Geophysics. (4)

Prerequisites: GEOL 3115, GEOL 3130, and introductory physics course; or permission of instructor. Instrumental analysis of the earth's physical parameters. Study of human-induced seismic and electrical signals, and natural magnetic and gravitational fields for the purposes of locating faults, ore bodies, ground water and other earth hazards or resources. Three hours of lecture and one two-hour lab per week.

GEOL 5120. Geologic Mapping and Interpretation. (4)

Prerequisites: GEOL 3130 and GEOL 5100, or

permission of instructor. Field and lab oriented study using principles of mineralogy, petrology and structural geology. Involves collection and resolution of field data, techniques of presenting data, development of geologic maps, and critical reviews of existing literature. Two hours of lecture, four hours of lab/field work per week.

GEOL 5125. Geologic Summer Field Camp. (6)

Prerequisite: Permission of instructor. Concentrated field investigation of geologic features. Data collection in the field, geologic mapping, report and map preparation and time management. Location of field camp is specified each time course is offered.

GEOL 5130. Optical Mineralogy. (4)

Prerequisite: GEOL 3115. Light optics theory, the behavior of plane polarized light in a solid medium. The laboratory emphasizes the use of petrographic microscope oil immersion techniques and identification of the common rock forming minerals. Three hours of lecture and one three-hour lab per week.

GEOL 5135. Tectonics. (4)

Prerequisite: GEOL 3130 or permission of instructor. A systematic examination of the evolution and dynamics of the earth from the perspective of plate tectonics theory. Three lecture hours, one three-hour lab per week.

GEOL 5140. Coastal Geology. (3)

Prerequisites: GEOL 1200 and GEOL 1210, or permission of instructor. Examination of coastal environments, sediments, and wave-related processes in the present and geologic past. Topics include: barrier-island and salt-marsh development, sea-level fluctuations, and the relationship between human development and natural hazards. Three hours seminar per week and one mandatory two-day field trip.

GEOL 5145. Hydrogeology. (4)

Prerequisites: GEOL 1200 or ESCI 1101; and CHEM 1251; or permission of instructor. Fundamentals of physical and chemical groundwater hydrology. Principles of flow, transport, and chemical reactions in aquifers and the vadose zone, including groundwater-surface water interactions. Three hours of lecture and three hours of lab per week, with occasional field trips.

GEOL 5165. Aqueous and Environmental**Geochemistry. (3)**

Prerequisites: CHEM 1251, CHEM 1252, and GEOL 1200, or equivalent; or permission of instructor. Water-rock interaction and processes controlling the chemical composition of natural waters (streams, lakes, and groundwater). Topics include: the carbonate system, mineral precipitation/dissolution, redox reactions, and metal speciation.

GEOL 5175. Geochemistry. (3) Prerequisites: CHEM 1251, GEOL 1200, and GEOL 1200L; or permission of instructor. Geochemical survey of origin, evolution and present composition of the earth.

GEOL 5175L. Geochemistry Laboratory. (1) Pre- or corequisite: GEOL 5175 or permission of instructor. Analytical methods and sample preparation techniques used by geochemists. One three hour meeting per week.

GEOL 5185. Mineralogy, Economics and the Environment. (3) The origin, distribution, and consumption rate of the Earth's mineral resources. This lecture-based course promotes an understanding of not only the geologic, engineering and economic factors that govern mineral production, but also the resulting environmental pollution problems.

GEOL 5410. Applied Soil Science. (4) Prerequisite: ESCI 4210, ESCI 5210, or permission of instructor. Read and discuss current literature pertaining to the application of soils to various fields of research such as surficial processes, active tectonics, ecology, stratigraphy, archaeology, and environmental assessment. Topics covered vary depending on the interests of the students. Students create and execute a semester-long soils-based field or laboratory research project of their choosing. Three hours seminar, three hours field or lab each week.

GEOL 6101. Earth Systems Analysis: Geodynamics. (3) Current working hypotheses and research methods are reviewed for the study of crustal and lithospheric processes on time scales from the seismic cycle to the long-term geologic evolution of basins and mountain belts and on physical scales ranging from the fracture and flow of rock masses to regional deformation and mountain building.

GEOL 6102. Earth Systems Analysis: Paleoenvironments. (3) Current working hypotheses and research methods are reviewed for the study of paleoenvironments. The interrelationships of tectonics, sediment supply and eustacy, and their effects on paleogeography and biogeography are discussed, and compared to studies of analogous modern depositional environments.

GEOL 6103. Earth Systems Analysis: Solid Earth Geochemistry. (3) Current working hypotheses and research methods are reviewed for the study of the geochemical evolution of the Earth's continental and oceanic crust. Hypotheses regarding coupling between solid earth geochemical processes and the evolution of the Earth's atmosphere and oceans are also briefly discussed.

GEOL 6651. Workshops in Geology. (4) A series of lectures on subject matter of the lithosphere and space science with accompanying laboratory sessions.

GEOL 6800. Individual Study in Geology. (1-4) Prerequisite: Permission of instructor and credit hours established in advance. Tutorial study or special research problems. *May be repeated for credit with change of topic.*

English

- **M.A. in English**
- **Graduate Certificate in Applied Linguistics**
- **Graduate Certificate in Technical/Professional Writing**

Department of English

english.uncc.edu

Graduate Program Directors

Dr. Pilar G. Blitvich, M.A. and Linguistics Graduate Certificate Programs

Dr. Greg Wickliff, Technical/Professional Writing Graduate Certificate Program

Graduate Faculty

Dr. JuliAnna Avila, Associate Professor

Dr. Balaka Basu, Assistant Professor

Dr. Pilar G. Blitvich, Professor

Ms. Bryn Chancellor, MFA, Assistant Professor

Dr. Paula Connolly, Professor

Dr. Boyd Davis, Professor

Mr. Christopher Davis, MFA, Professor

Dr. Paula Eckard, Associate Professor

Dr. Elizabeth Gargano, Associate Professor

Dr. Aaron Gwyn, Associate Professor

Dr. Katie Hogan, Professor

Ms. Allison Hutchcraft, MFA, Adjunct Lecturer

Dr. Tony Jackson, Professor

Dr. Jeffrey Leak, Professor

Dr. Janaka Lewis, Assistant Professor

Dr. Ronald F. Lunsford, Professor

Dr. Kirk Melnikoff, Associate Professor

Dr. Juan Meneses, Assistant Professor

Dr. Elizabeth Miller, Associate Professor

Dr. Anita Moss, Professor

Dr. Joan Mullin, Professor

Dr. Jennifer Munroe, Associate Professor

Dr. Malin Pereira, Professor

Dr. Alan Rauch, Professor

Dr. Rebecca Roeder, Associate Professor

Dr. Daniel Shealy, Professor

Dr. Maya Socolovsky, Associate Professor

Dr. Ralf Thiede, Associate Professor

Dr. Aaron Toscano, Associate Professor

Dr. Lara Vetter, Associate Professor

Dr. Heather Vorhies, Assistant Professor

Dr. Mark I. West, Chair and Professor

Dr. Greg Wickliff, Associate Professor

MASTER OF ARTS IN ENGLISH

The Master of Arts in English degree program is designed to accommodate a wide variety of students: those seeking personal enrichment through increased knowledge and understanding; those preparing to pursue a Ph.D. in English or other advanced professional degrees; and those seeking professional advancement in such fields as writing, publishing, or teaching on the primary, secondary, or college levels. There are seven concentrations available within the M.A. in English. Additionally, the Department of English offers a broad range of courses in literature, composition/rhetoric, and language, including second language studies and applied linguistics.

Additional Admission Requirements

In addition to the general requirements for admission to the Graduate School, the following are required for study in English:

- 1) 30 credit hours of undergraduate coursework in English beyond the first-year level, or evidence of equivalent academic preparation for graduate study in English, as approved by the department
- 2) A satisfactory score on the Aptitude portion of the Graduate Record Examination (GRE) or on the Miller Analogies Test (MAT)

Degree Requirements

The program requires a minimum of 36 credit hours of graduate credit with grades of A or B. (A course in which a graduate student receives a grade of C is not allowable as part of the 36 required credit hours.) At least 18 credit hours must be in English courses at the 6000-level, open only to graduate students.

Student must choose a concentration from the following offerings:

- Applied Linguistics
- Children's Literature
- Composition/Rhetoric
- Creative Writing
- English for Specific Purposes
- Literature
- Technical/Professional Writing

Courses beyond 36 hours of graduate credit may be required to remove deficiencies or to satisfy requirements for graduate licensure, or may be recommended to develop areas of need, to pursue particular interests, or to gain specific experience.

Of the 36 hours of graduate credit, 30 must be in English courses; the remaining 6 hours may be taken in English or in another discipline. If the hours are to

be taken outside of English, students must submit a written request to the Graduate Program Director, explaining how these hours will enrich their program.

No more than 6 credit hours of ENGL 6890 (Directed Reading), may be applied to the degree without written permission of the Department Chair. (*This does not apply to a Directed Reading for an M.A. Project.*)

Concentrations

Applied Linguistics Concentration

Linguistics is a broad field, and the applied linguistics concentration offers students the opportunity to apply linguistic concepts to a broad range of endeavors, including the teaching of writing, adult English language instruction, and various types of textual analyses.

Core Courses (6 credit hours)

ENGL 6101 Introduction to English Studies (3)
ENGL 6160 Introduction to the English Language (3)

Required Courses (9 credit hours)

ENGL 6127 Seminar in Language, Culture and Society (3)
ENGL 6161 Introduction to Linguistics (3)
ENGL 6163 Language Acquisition (3)

Elective Linguistics Courses (6 credit hours)

Select two of the following:

ENGL 5050 Topics in English (3) (*Linguistics topic; must be approved by the English Graduate Program Director*)
ENGL 5254 Teaching English/Communications Skills to Middle and Secondary School Learners (3)
ENGL 6070 Topics in English (3) (*Linguistics topic; must be approved by the English Graduate Program Director*)
ENGL 6162 History of the English Language (3)
ENGL 6164 Comparative Language Analysis for Teachers (3)
ENGL 6165 Introduction to English for Specific Purposes (3)
ENGL 6167 Research Methods in Applied Linguistics (3)

Elective Literature Courses (6 credit hours)

Select two of the following:

ENGL 5002 Women and Literature (3)
ENGL 5050 Topics in English (3) (*Literature topic*)
ENGL 5090 Major Authors (3)
ENGL 5102 British Children's Literature (3)
ENGL 5103 American Children's Literature (3)
ENGL 5104 Multiculturalism and Children's Literature (3)
ENGL 5114 Milton (3)

ENGL 5116 Shakespeare's Early Plays (3)
ENGL 5117 Shakespeare's Late Plays (3)
ENGL 5121 The 18th-Century British Novel (3)
ENGL 5122 The Victorian Novel (3)
ENGL 5123 The Modern British Novel (3)
ENGL 5124 Modern Irish Literature (3)
ENGL 5131 British Drama to 1600, Excluding Shakespeare (3)
ENGL 5132 British Drama from 1600-1642, Excluding Shakespeare (3)
ENGL 5133 British Drama of Wit and Intrigue, 1660-1780 (3)
ENGL 5143 The American Novel of the 19th Century (3)
ENGL 5144 The American Novel of the 20th Century (3)
ENGL 5145 Literature of the American South (3)
ENGL 5146 Contemporary Jewish-American Literature (3)
ENGL 5147 Early Black American Literature (3)
ENGL 5148 20th Century Black American Literature: Prose (3)
ENGL 5150 Contemporary Poetry (3)
ENGL 5151 Modern Drama (3)
ENGL 5152 Modern European Literature (3)
ENGL 5153 Contemporary Fiction (3)
ENGL 5155 Pan-African Literature (3)
ENGL 5156 Gender and African American Literature (3)
ENGL 5157 African American Poetry (3)
ENGL 5158 African American Literary Theory and Criticism (3)
ENGL 5210 Greek and Roman Drama in Translation (3)
ENGL 5211 Chaucer (3)
ENGL 5251 Literary Criticism Through Arnold (3)
ENGL 5252 Modern Literary Criticism (3)
ENGL 6070 Topics in English (3) (*Literature topic*)
ENGL 6102 Literary Theory (3)
ENGL 6103 Introduction to Children's Literature and Culture (3)
ENGL 6104 Major Figures and Themes in Children's Literature (3)
ENGL 6111 Shakespeare's Comedies and Histories (3)
ENGL 6112 Shakespeare's Tragedies (3)
ENGL 6113 Milton (3)
ENGL 6123 The Augustan Age, 1660-1785 (3)
ENGL 6125 The Romantic Era, 1785-1832 (3)
ENGL 6126 The Victorian Era, 1832-1900 (3)
ENGL 6141 American Romanticism (3)
ENGL 6142 American Realism and Naturalism (3)
ENGL 6143 American Modernism (3)
ENGL 6144 Stylistics (3)
ENGL 6147 Perspectives in African American Literature (3)
ENGL 6680 Seminar in British Literature (3)
ENGL 6685 Seminar in American Literature (3)

Elective Writing/Rhetoric Courses (6 credit hours)

Select two of the following:

- ENGL 5008 Topics in Advanced Technical Communication (3)
- ENGL 5050 Topics in English (3) (*Writing topic*)
- ENGL 5180 Theories of Technical Communication (3)
- ENGL 5181 Writing and Designing User Documents (3)
- ENGL 5182 Information Design and Digital Publishing (3)
- ENGL 5183 Editing Technical Documents (3)
- ENGL 5202 Writing Poetry (3)
- ENGL 5203 Writing Fiction (3)
- ENGL 5204 Expository Writing (3)
- ENGL 5205 Advanced Expository Writing (3)
- ENGL 5208 Poetry Writing Workshop (3)
- ENGL 5209 Fiction Writing Workshop (3)
- ENGL 5264 Literacy in Family and Community (3)
- ENGL 5290 Advanced Creative Project (3)
- ENGL 5400 English Composition Practicum (1 to 3)
- ENGL 6008 Topics in Advanced Technical Communication (3)
- ENGL 6062 Topics in Rhetoric (3)
- ENGL 6070 Topics in English (3) (*Writing topic*)
- ENGL 6116 Technical/Professional Writing (3)
- ENGL 6166 Rhetorical Theory (3)
- ENGL 6181 Composition Theory and Pedagogy (3)
- ENGL 6182 Research Theory and Method in Rhetoric and Composition (3)
- ENGL 6183 Critical Pedagogy and the Teaching of Writing (3)
- ENGL 6195 Teaching College English (3)

Project/Thesis (3-6 credit hours)

All students in the Applied Linguistics concentration must submit either a project or a thesis to satisfy requirements for the degree.

Project

Students electing to submit a project to satisfy this requirement enroll in a directed reading course leading to the production of a project. Students consult with the English Graduate Program Director for details on the requirements for this project.

- ENGL 6890 Directed Reading (3)

Master's Thesis

The thesis may be either scholarly or creative. Students consult with the English Graduate Program Director, who will appoint a thesis committee comprising a director and two faculty readers. Since the thesis carries 6 credit hours, students electing the thesis option will take only one course from the Elective Linguistics Courses listed above.

- ENGL 6996 Thesis (6)

Children's Literature Concentration

This concentration is premised on the assumptions that children's literature is an integral part of many literary traditions and that students studying children's literature should develop an understanding of the connection between children's literature and other forms of literature. The Children's Literature Concentration requires a total of 36 credit hours.

Core Courses (6 credit hours)

- ENGL 6101 Introduction to English Studies (3)
- ENGL 6160 Introduction to the English Language (3)

Introductory Course (3 credit hours)

- ENGL 6103 Introduction to Children's Literature and Culture (3)

Elective Children's Literature Courses (12 credit hours)

Select four of the following:

- ENGL 5050 Topics in English (*topics that relate to Children's Literature*) (3)
- ENGL 5102 British Children's Literature (3)
- ENGL 5103 American Children's Literature (3)
- ENGL 5104 Multiculturalism and Children's Literature (3)
- ENGL 6070 Topics in English (*topics that relate to Children's Literature*) (3)
- ENGL 6104 Major Figures and Themes in Children's Literature (3)
- ENGL 6890 Directed Reading (3)
- ENGL 6996 Thesis (6)
- EDUC 5000 Topics in Education (*topics that relate to Children's Literature*) (3)
- READ 6100 Current Issues and Practices in Literacy (3)

Elective Literature Courses (6 credit hours)

Select two of the following literature courses (*that aren't children's literature*):

- ENGL 5002 Women and Literature (3)
- ENGL 5050 Topics in English (3) (*Literature topic*)
- ENGL 5090 Major Authors (3)
- ENGL 5114 Milton (3)
- ENGL 5116 Shakespeare's Early Plays (3)
- ENGL 5117 Shakespeare's Late Plays (3)
- ENGL 5121 The 18th-Century British Novel (3)
- ENGL 5122 The Victorian Novel (3)
- ENGL 5123 The Modern British Novel (3)
- ENGL 5124 Modern Irish Literature (3)
- ENGL 5131 British Drama to 1600, Excluding Shakespeare (3)
- ENGL 5132 British Drama from 1600-1642, Excluding Shakespeare (3)
- ENGL 5133 British Drama of Wit and Intrigue, 1660-1780 (3)
- ENGL 5143 The American Novel of the 19th Century (3)

ENGL 5144 The American Novel of the 20th Century (3)
 ENGL 5145 Literature of the American South (3)
 ENGL 5146 Contemporary Jewish-American Literature (3)
 ENGL 5147 Early Black American Literature (3)
 ENGL 5148 20th Century Black American Literature: Prose (3)
 ENGL 5150 Contemporary Poetry (3)
 ENGL 5151 Modern Drama (3)
 ENGL 5152 Modern European Literature (3)
 ENGL 5153 Contemporary Fiction (3)
 ENGL 5155 Pan-African Literature (3)
 ENGL 5156 Gender and African American Literature (3)
 ENGL 5157 African American Poetry (3)
 ENGL 5158 African American Literary Theory and Criticism (3)
 ENGL 5210 Greek and Roman Drama in Translation (3)
 ENGL 5211 Chaucer (3)
 ENGL 5251 Literary Criticism Through Arnold (3)
 ENGL 5252 Modern Literary Criticism (3)
 ENGL 6070 Topics in English (3) (*Literature topic*)
 ENGL 6102 Literary Theory (3)
 ENGL 6111 Shakespeare's Comedies and Histories (3)
 ENGL 6112 Shakespeare's Tragedies (3)
 ENGL 6113 Milton (3)
 ENGL 6123 The Augustan Age, 1660-1785 (3)
 ENGL 6125 The Romantic Era, 1785-1832 (3)
 ENGL 6126 The Victorian Era, 1832-1900 (3)
 ENGL 6141 American Romanticism (3)
 ENGL 6142 American Realism and Naturalism (3)
 ENGL 6143 American Modernism (3)
 ENGL 6144 Stylistics (3)
 ENGL 6147 Perspectives in African American Literature (3)
 ENGL 6680 Seminar in British Literature (3)
 ENGL 6685 Seminar in American Literature (3)

Elective Writing/Rhetoric Course (3 credit hours)

Select one of the following:

ENGL 5008 Topics in Advanced Technical Communication (3)
 ENGL 5050 Topics in English (3) (*Writing topic*)
 ENGL 5180 Theories of Technical Communication (3)
 ENGL 5181 Writing and Designing User Documents (3)
 ENGL 5182 Information Design and Digital Publishing (3)
 ENGL 5183 Editing Technical Documents (3)
 ENGL 5202 Writing Poetry (3)
 ENGL 5203 Writing Fiction (3)
 ENGL 5204 Expository Writing (3)
 ENGL 5205 Advanced Expository Writing (3)
 ENGL 5208 Poetry Writing Workshop (3)
 ENGL 5209 Fiction Writing Workshop (3)

ENGL 5264 Literacy in Family and Community (3)
 ENGL 5290 Advanced Creative Project (3)
 ENGL 5400 English Composition Practicum (1 to 3)
 ENGL 6008 Topics in Advanced Technical Communication (3)
 ENGL 6062 Topics in Rhetoric (3)
 ENGL 6070 Topics in English (3) (*Writing topic*)
 ENGL 6116 Technical/Professional Writing (3)
 ENGL 6166 Rhetorical Theory (3)
 ENGL 6181 Composition Theory and Pedagogy (3)
 ENGL 6182 Research Theory and Method in Rhetoric and Composition (3)
 ENGL 6183 Critical Pedagogy and the Teaching of Writing (3)
 ENGL 6195 Teaching College English (3)

Comprehensive Examination/Thesis (0-6 credit hours)

All students in the children's literature concentration must satisfactorily complete either a written examination or a Master's thesis.

Comprehensive Examination

Students electing this option must satisfactorily complete a written examination based on a reading list proposed by the student and approved by The English Graduate Committee. Information about this list is available in the Department of English office. The written examination may not be attempted sooner than the last semester of coursework, exclusive of thesis credits.

Master's Thesis

The thesis may be either scholarly or creative. Students consult with the English Graduate Program Director, who will appoint a thesis committee comprising a director and two faculty readers. Students electing the thesis option receive six credit hours that replace the unrestricted elective course and another course as approved by the English Graduate Program Director.

ENGL 6996 Thesis (6)

Unrestricted Elective Courses (0-6 credit hours)

Students who elect the Comprehensive Examination option above select two additional elective courses. Students who elect the Thesis option above are not required to take any additional elective courses. Elective courses require approval of the English Graduate Program Director.

Composition/Rhetoric Concentration

The field of rhetoric and composition prepares students comprehensively in the theory, practice, and teaching of written public discourse. The program introduces research in the language arts, from the ancient rhetoric of Greece and Rome to modern theories of the composing process, while also emphasizing practical preparation in the teaching of

writing and the administration of composition programs, writing centers, and writing across the curriculum programs. The Composition/Rhetoric concentration may focus on rhetorical theory, composition theory, or writing and pedagogy.

Core Courses (6 credit hours)

ENGL 6101 Introduction to English Studies (3)
ENGL 6160 Introduction to the English Language (3)

Elective Writing Theory Intensive Course (3 credit hours)

Select one writing theory intensive course.

Elective Literature Courses (6 credit hours)

Select two of the following:

ENGL 5002 Women and Literature (3)
ENGL 5050 Topics in English (3) (*Literature topic*)
ENGL 5090 Major Authors (3)
ENGL 5102 British Children's Literature (3)
ENGL 5103 American Children's Literature (3)
ENGL 5104 Multiculturalism and Children's Literature (3)
ENGL 5114 Milton (3)
ENGL 5116 Shakespeare's Early Plays (3)
ENGL 5117 Shakespeare's Late Plays (3)
ENGL 5121 The 18th-Century British Novel (3)
ENGL 5122 The Victorian Novel (3)
ENGL 5123 The Modern British Novel (3)
ENGL 5124 Modern Irish Literature (3)
ENGL 5131 British Drama to 1600, Excluding Shakespeare (3)
ENGL 5132 British Drama from 1600-1642, Excluding Shakespeare (3)
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ENGL 5148 20th Century Black American Literature: Prose (3)
ENGL 5150 Contemporary Poetry (3)
ENGL 5151 Modern Drama (3)
ENGL 5152 Modern European Literature (3)
ENGL 5153 Contemporary Fiction (3)
ENGL 5155 Pan-African Literature (3)
ENGL 5156 Gender and African American Literature (3)
ENGL 5157 African American Poetry (3)
ENGL 5158 African American Literary Theory and Criticism (3)
ENGL 5210 Greek and Roman Drama in Translation (3)
ENGL 5211 Chaucer (3)

ENGL 5251 Literary Criticism Through Arnold (3)
ENGL 5252 Modern Literary Criticism (3)
ENGL 6070 Topics in English (3) (*Literature topic*)
ENGL 6102 Literary Theory (3)
ENGL 6103 Introduction to Children's Literature and Culture (3)
ENGL 6104 Major Figures and Themes in Children's Literature (3)
ENGL 6111 Shakespeare's Comedies and Histories (3)
ENGL 6112 Shakespeare's Tragedies (3)
ENGL 6113 Milton (3)
ENGL 6123 The Augustan Age, 1660-1785 (3)
ENGL 6125 The Romantic Era, 1785-1832 (3)
ENGL 6126 The Victorian Era, 1832-1900 (3)
ENGL 6141 American Romanticism (3)
ENGL 6142 American Realism and Naturalism (3)
ENGL 6143 American Modernism (3)
ENGL 6144 Stylistics (3)
ENGL 6147 Perspectives in African American Literature (3)
ENGL 6680 Seminar in British Literature (3)
ENGL 6685 Seminar in American Literature (3)

Elective Composition/Rhetoric Courses (12 credit hours)

Select four of the following:

ENGL 5050 Topics in English (3) (*Writing topic*)
ENGL 5204 Expository Writing (3)
ENGL 5205 Advanced Expository Writing (3)
ENGL 5264 Literacy in Family and Community (3)
ENGL 5400 English Composition Practicum (1 to 3)
ENGL 6062 Topics in Rhetoric (3)
ENGL 6070 Topics in English (3) (*Writing topic*)
ENGL 6166 Rhetorical Theory (3)
ENGL 6181 Composition Theory and Pedagogy (3)
ENGL 6182 Research Theory and Method in Rhetoric and Composition (3)
ENGL 6183 Critical Pedagogy and the Teaching of Writing (3)
ENGL 6195 Teaching College English (3)

Project/Thesis (3-6 credit hours)

All students in the Composition/Rhetoric concentration must submit either a project or a thesis to satisfy requirements for the degree.

Project

Students electing to submit a project to satisfy this requirement enroll in a directed reading course leading to the production of a project. Students consult with the English Graduate Program Director for details on the requirements for this project.

ENGL 6890 Directed Reading (1 to 3)

Master's Thesis

The thesis may be either scholarly or creative. Students consult with the English Graduate Program

Director, who will appoint a thesis committee comprising a director and two faculty readers.

ENGL 6996 Thesis (6)

Unrestricted Elective Courses (3-6 credit hours)

Students who elect the Project option above select two additional elective courses. Students who elect the Thesis option above select one additional elective course. Elective courses require approval of the English Graduate Program Director.

Creative Writing Concentration

The aim of this concentration is to enable students to develop their abilities as creative writers through writing practice in more than one genre and through the creatively-engaged study of literature.

Core Courses (6 credit hours)

ENGL 6101 Introduction to English Studies (3)

ENGL 6160 Introduction to the English Language (3)

Elective Fiction Writing Course (3 credit hours)

Select one of the following:

ENGL 5203 Writing Fiction (3)

ENGL 5209 Fiction Writing Workshop (3)

Elective Poetry Writing Course (3 credit hours)

Select one of the following:

ENGL 5202 Writing Poetry (3)

ENGL 5208 Poetry Writing Workshop (3)

Elective Creative Writing Courses (6 credit hours)

ENGL 6070 Topics in English (*topic in creative writing*)

ENGL 6070 Topics in English (*topic in creative writing*)

Elective Literature Courses (6 credit hours)

Select two of the Elective Literature Courses listed above in the Composition/Rhetoric Concentration.

Elective Theory Intensive Course (3 credit hours)

Select one course in writing theory or literary theory.

Project/Thesis (3-6 credit hours)

All students in the Creative Writing concentration must submit either a project or a thesis to satisfy requirements for the degree.

Project

Students electing to submit a project to satisfy this requirement enroll in a directed reading course leading to the production of a project. Students consult with the English Graduate Program Director for details on the requirements for this project.

ENGL 6890 Directed Reading (3)

Master's Thesis

The thesis may be either scholarly or creative.

Students consult with the English Graduate Program Director, who will appoint a thesis committee comprising a director and two faculty readers.

ENGL 6996 Thesis (6)

Unrestricted Elective Courses (3-6 credit hours)

Students who elect the Project option above select two additional elective courses. Students who elect the Thesis option above select one additional elective course. Elective courses require approval of the English Graduate Program Director.

Elective courses may be additional creative writing courses, if students wish to repeat any of the fiction or poetry courses listed above in order to receive additional instruction in their chosen genre.

English for Specific Purposes Concentration

With this concentration, certified English for Specific Purposes (ESP) teachers are prepared to teach adult learners in community colleges, in in-company training courses, and in English language institutes at the university level, both in the U.S. and internationally.

Core Courses (6 credit hours)

ENGL 6101 Introduction to English Studies (3)

ENGL 6160 Introduction to the English Language (3)

Required Courses (9 credit hours)

ENGL 6165 Introduction to English for Specific Purposes (3)

ENGL 6167 Research Methods in Applied Linguistics (3)

ENGL 6168 Practicum in English for Specific Purposes (3)

Elective Courses (12 credit hours)

Select four of the following:

ENGL 5050 Topics in English (3) (*Language and the Professions*)

ENGL 6070 Topics in English (3) (*Linguistics topic; must be approved by the English Graduate Program Director*)

ENGL 6127 Seminar in Language, Culture, and Society (3)

ENGL 6161 Introduction to Linguistics (3)

ENGL 6162 History of the English Language (3)

ENGL 6163 Language Acquisition (3)

Project/Thesis (3-6 credit hours)

All students in the English for Specific Purposes concentration must submit either a project or a thesis to satisfy requirements for the degree.

Project

Students electing to submit a project to satisfy this requirement enroll in a directed reading course leading to the production of a project. Students consult with the English Graduate Program Director for details on the requirements for this project.

ENGL 6890 Directed Reading (3)

Master's Thesis

The thesis may be either scholarly or creative. Students consult with the English Graduate Program Director, who will appoint a thesis committee comprising a director and two faculty readers.

ENGL 6996 Thesis (6)

Unrestricted Elective Courses (3-6 credit hours)

Students who elect the Project option above select two additional elective courses. Students who elect the Thesis option above select one additional elective course. Elective courses require approval of the English Graduate Program Director.

Literature Concentration

The literature faculty are committed to teaching a variety of national and ethnic literatures in English, including British, American, and Anglophone literatures. The Literature concentration requires a total of 36 credit hours.

Core Courses (6 credit hours)

ENGL 6101 Introduction to English Studies (3)

ENGL 6160 Introduction to the English Language (3)

Elective Literature Courses (15 credit hours)

Select five of the following, of which three must be historically oriented, two must be in one national literature and another must be in a different national literature, and one must be in literature written before 1800:

ENGL 5002 Women and Literature (3)

ENGL 5050 Topics in English (3) (*Literature topic*)

ENGL 5090 Major Authors (3)

ENGL 5102 British Children's Literature (3)

ENGL 5103 American Children's Literature (3)

ENGL 5104 Multiculturalism and Children's Literature (3)

ENGL 5114 Milton (3)

ENGL 5116 Shakespeare's Early Plays (3)

ENGL 5117 Shakespeare's Late Plays (3)

ENGL 5121 The 18th-Century British Novel (3)

ENGL 5122 The Victorian Novel (3)

ENGL 5123 The Modern British Novel (3)

ENGL 5124 Modern Irish Literature (3)

ENGL 5131 British Drama to 1600, Excluding Shakespeare (3)

ENGL 5132 British Drama from 1600-1642, Excluding Shakespeare (3)

ENGL 5133 British Drama of Wit and Intrigue, 1660-1780 (3)

ENGL 5143 The American Novel of the 19th Century (3)

ENGL 5144 The American Novel of the 20th Century (3)

ENGL 5145 Literature of the American South (3)

ENGL 5146 Contemporary Jewish-American Literature (3)

ENGL 5147 Early Black American Literature (3)

ENGL 5148 20th Century Black American Literature: Prose (3)

ENGL 5150 Contemporary Poetry (3)

ENGL 5151 Modern Drama (3)

ENGL 5152 Modern European Literature (3)

ENGL 5153 Contemporary Fiction (3)

ENGL 5155 Pan-African Literature (3)

ENGL 5156 Gender and African American Literature (3)

ENGL 5157 African American Poetry (3)

ENGL 5158 African American Literary Theory and Criticism (3)

ENGL 5210 Greek and Roman Drama in Translation (3)

ENGL 5211 Chaucer (3)

ENGL 5251 Literary Criticism Through Arnold (3)

ENGL 5252 Modern Literary Criticism (3)

ENGL 6070 Topics in English (3) (*Literature topic*)

ENGL 6102 Literary Theory (3)

ENGL 6103 Introduction to Children's Literature and Culture (3)

ENGL 6104 Major Figures and Themes in Children's Literature (3)

ENGL 6111 Shakespeare's Comedies and Histories (3)

ENGL 6112 Shakespeare's Tragedies (3)

ENGL 6113 Milton (3)

ENGL 6123 The Augustan Age, 1660-1785 (3)

ENGL 6125 The Romantic Era, 1785-1832 (3)

ENGL 6126 The Victorian Era, 1832-1900 (3)

ENGL 6141 American Romanticism (3)

ENGL 6142 American Realism and Naturalism (3)

ENGL 6143 American Modernism (3)

ENGL 6144 Stylistics (3)

ENGL 6147 Perspectives in African American Literature (3)

ENGL 6680 Seminar in British Literature (3)

ENGL 6685 Seminar in American Literature (3)

Elective Literary Theory Intensive Course (3 credit hours)

Select one literary theory intensive course.

Elective Writing/Rhetoric Course (3 credit hours)

Select one of the following:

ENGL 5008 Topics in Advanced Technical Communication (3)

ENGL 5050 Topics in English (3) (*Writing topic*)

- ENGL 5180 Theories of Technical Communication (3)
 ENGL 5181 Writing and Designing User Documents (3)
 ENGL 5182 Information Design and Digital Publishing (3)
 ENGL 5183 Editing Technical Documents (3)
 ENGL 5202 Writing Poetry (3)
 ENGL 5203 Writing Fiction (3)
 ENGL 5204 Expository Writing (3)
 ENGL 5205 Advanced Expository Writing (3)
 ENGL 5208 Poetry Writing Workshop (3)
 ENGL 5209 Fiction Writing Workshop (3)
 ENGL 5264 Literacy in Family and Community (3)
 ENGL 5290 Advanced Creative Project (3)
 ENGL 5400 English Composition Practicum (1 to 3)
 ENGL 6008 Topics in Advanced Technical Communication (3)
 ENGL 6062 Topics in Rhetoric (3)
 ENGL 6070 Topics in English (3) (*Writing topic*)
 ENGL 6116 Technical/Professional Writing (3)
 ENGL 6166 Rhetorical Theory (3)
 ENGL 6181 Composition Theory and Pedagogy (3)
 ENGL 6182 Research Theory and Method in Rhetoric and Composition (3)
 ENGL 6183 Critical Pedagogy and the Teaching of Writing (3)
 ENGL 6195 Teaching College English (3)

Comprehensive Examination

All students in the literature concentration must satisfactorily complete a written examination based on a reading list proposed by the student and approved by the Graduate Committee. Information about this list is available in the department office. The written examination may not be attempted sooner than the last semester of coursework, exclusive of thesis credits.

Master's Thesis (0-6 credit hours)

The thesis is optional for the Literature concentration. It may be either scholarly or creative. Students consult with the English Graduate Program Director, who will appoint a thesis committee comprising a director and two faculty readers.

- ENGL 6996 Thesis (6)

Unrestricted Elective Courses (3-9 credit hours)

Students who elect the Thesis option above are required to take one additional elective course. Students who do not elect the Thesis option are required to take three additional elective courses. Elective courses require approval of the English Graduate Program Director.

Technical/Professional Writing Concentration

This concentration includes courses that: 1) provide students with an understanding of the theoretical and

rhetorical foundation of the field, 2) introduce students to the methods and results of research in the field, 3) offer students an opportunity to practice theory and research through project work for clients, 4) address technology and science as socially constructed disciplines, and 5) help students build skills in written and oral communication, project management, and teamwork.

Core Courses (6 credit hours)

- ENGL 6101 Introduction to English Studies (3)
 ENGL 6160 Introduction to the English Language (3)

Required Courses (9 credit hours)

- ENGL 5181 Writing and Designing User Documents (3)
 ENGL 6116 Technical/Professional Writing (3) (*this course should be taken in the first year*)
 ENGL 6166 Rhetorical Theory (3)

Elective Technical Communication Courses (9 credit hours)

Select three of the following:

- ENGL 5008 Topics in Advanced Technical Communication (3) (*may be repeated for credit*)
 ENGL 5180 Theories of Technical Communication (3)
 ENGL 5182 Information Design and Digital Publishing (3)
 ENGL 5183 Editing Technical Documents (3)
 ENGL 5410 Professional Internship (3 or 6)
 ENGL 6008 Topics in Advanced Technical Communication (3) (*may be repeated for credit*)

Project/Thesis (3-6 credit hours)

All students in the Technical/Professional Writing concentration must submit either a project or a thesis to satisfy requirements for the degree.

Project

Students electing to submit a project to satisfy this requirement enroll in a directed reading course leading to the production of a project. Students consult with the English Graduate Program Director for details on the requirements for this project.

- ENGL 6890 Directed Reading (3)

Master's Thesis

The thesis may be either scholarly or creative. Students consult with the English Graduate Program Director, who will appoint a thesis committee comprising a director and two faculty readers.

- ENGL 6996 Thesis (6)

Unrestricted Elective Courses (6-9 credit hours)

Students who elect the Project option above select three additional elective courses. Students who elect

the Thesis option above select two additional elective courses. Elective courses require approval of the English Graduate Program Director.

Advising

The English Graduate Program Director and other graduate faculty members acting as his/her designated assistants advise graduate students.

Assistantships

A number of graduate assistantships are available each year. Applications must be submitted by March 1 for assistantships beginning the following academic year. Further information is available in the Department of English.

Internships

The Department of English offers a number of internships for graduate students (limited to 3 hours of credit), which provide program-related experience in local television and radio stations, nonprofit and government agencies, and local businesses and corporations. Further information is available in the department.

ENGL 5410 Professional Internship (3 or 6)

Licensure

For information on licensure in English, please see the requirements of the English Education concentration. For information on licensure to teach English to non-native speakers, see the requirements for the M.Ed. in Teaching English as a Second Language.

Tuition Waivers

Each year, at least one out-of-state tuition waiver is available for a new graduate assistant. In-state tuition waiver funds are often available for new graduate assistants and sometimes for other outstanding applicants.

GRADUATE CERTIFICATE IN APPLIED LINGUISTICS

The Graduate Certificate in Applied Linguistics enables professionals to focus and solidify or update their work with language teaching, with applications in the language industry, or with research. The coursework leading to this certificate grounds the participants in theory and practice, providing linguistic expertise to anyone with related degrees and professional aspirations, and helping to prepare students for work in diverse professions, including:

- Intelligence gathering
- Human-machine interfaces (improving text-to-

speech, speech recognition, and integrating language processing and real-world knowledge)

- Profiling
- Data mining
- Therapy
- Standardization of industrial terminology
- Localization of international products for a specific market or culture
- Forensics
- Translation/interpreting

Even in jobs that are not primarily language-oriented, this certificate can help students develop important market skills:

- Increased pragmatic awareness – the skill of recognizing how language works in social contexts, including how different cultures handle verbal behaviors such as requests, negotiations, conventions of politeness, and persuasion.
- Application – the ability to make the connection between theoretical knowledge and putting it to effective use, such as understanding how social power imposes specific constraints on grammar, word choice, and pronunciation.
- Clarity – the mastery of tailoring a message e towards a specific audience with maximum impact, including subliminal techniques (e.g. in advertising).
- Pattern extraction – the knowledge of how to identify and find specific patterns in very large bodies of data.
- Explication – understanding the difference between inductive modeling and deductive hypothesis forming, and the interplay between them.

This certificate is good for students interested in how people are swayed by framing a narrative one way or another, how to prepare materials for adult learners of language, how speech is produced, or how it is learned. It is also a good complement to several master's degree programs at UNC Charlotte such as psychology, computer science, or anthropology.

Admission Requirements

- Statement of purpose
- Three letters of recommendation (preferably from professors)
- Writing sample
- GPA 2.75 or higher

Transfer credits are not accepted in this certificate program.

Certificate Requirements

The Graduate Certificate in Linguistics requires 15

credit hours in approved courses, including a minimum of 6 hours at the 6000-level. Students must earn a B or above in all courses presented to the certificate. All coursework must be completed within four years from the time of first enrollment in a certificate course.

Students can orient their program towards either applied linguistics or the study of second-language research. Appropriate substitutions from other graduate programs on campus (i.e., not transfer credits) can be authorized by the Graduate Program Director of Applied Linguistics in the Department of English (if different) and by the director of the M.A. emphasis in Applied Linguistics. They will also act as advisors to those enrolled in this certificate program.

Students seeking licensure for the teaching of English at levels K-12 should consult the College of Education.

Elective Courses

- ENGL 5161 Modern English Grammar (3)
- ENGL 5165 Language and Culture (3)
- ENGL 5166 Comparative Language Studies for Teachers (3)
- ENGL 5167 The Mind and Language (3)
- ENGL 5260 History of the English Language (3)
- ENGL 5263 Linguistics and Language Learning (3)
or ENGL 6163 Language Acquisition (3)
- ENGL 6070 Topics in English (3) (*if subject is linguistics*)
- ENGL 6127 Seminar in Language, Culture, and Society (3)
- ENGL 6161 Introduction to Linguistics (3)
- ENGL 6162 History of the English Language (3)
- ENGL 6164 Comparative Language Analysis for Teachers (3)
- ENGL 6165 Introduction to English for Specific Purposes (3)
- ENGL 6167 Research Methods in Applied Linguistics (3)
- ENGL 6168 Practicum in English for Specific Purposes (3)
- ENGL 6195 Teaching College English (3)

GRADUATE CERTIFICATE IN TECHNICAL/PROFESSIONAL WRITING

The Graduate Certificate in Technical/Professional prepares students for careers that combine strong communication skills with technical expertise. Students explore the relationships among language, writing, and computing technologies. This program is specifically designed to prepare students for the challenges encountered in today's rapidly changing,

technologically global society.

With a Technical/Professional Writing background students find careers in:

- computing-related industries, software and hardware
- engineering communication
- environmental communication
- government
- medicine
- other scientific or technical fields

As a technical writer, students are called upon to research, write, test, design or edit technical information for a variety of audiences, including:

- software and hardware documentation
- grants and proposals
- electronic multi-media presentations
- websites
- training materials

In addition to strong communication skills, technical writers must know a variety of computer applications, including word processing, web design software, page layout applications, online help authoring software, and hypertext mark-up language (HTML).

Admission Requirements

Students must apply for admission to the Graduate School and must have a minimum undergraduate GPA of 2.75. Applicants will be required to submit: 1) a current GRE score; 2) a current MAT score; or 3) a portfolio of professional-level documents. Only graduate courses taken at UNC Charlotte will count towards this Graduate Certificate.

Certificate Requirements

The Graduate Certificate in Technical/Professional Writing is designed for post-baccalaureate, graduate, and post-graduate students. Students can complete the required 21 graduate credit hours in approximately two years.

Core Courses (9 credit hours)

- ENGL 6116 Technical/Professional Writing
- ENGL 5180 Theories of Technical Communication
- ENGL 5410 Professional Internship

Elective Courses (12 credit hours)

Select from the following:

- ENGL 5181 Writing and Designing User Documents
- ENGL 5182 Information Design and Digital Publishing
- ENGL 5183 Editing Technical Documents
- ENGL 5008 Topics in Technical Communication

ENGL 6008 Topics in Advanced Technical Communication

Other Courses: as appropriate and approved by the Department

COURSES IN ENGLISH (ENGL)

ENGL 5002. Women and Literature. (3) Selected topics focusing on women and literature, such as images of women, women as writers, and women as literary critics. *May be repeated for credit with change of topic and permission of department.* (However, only six hours may be used for the requirements for the English major.)

ENGL 5008. Topics in Advanced Technical Communication. (3) Exploration, both theoretically and practically, of the interrelation of written, oral, graphic, and digital communication within technical rhetorical contexts. *May be repeated for credit one time with permission of department.*

ENGL 5050. Topics in English. (3) Special topics not included in other courses. *May be repeated for credit with permission of department.*

ENGL 5090. Major Authors. (3) The works, ideas and life of one to three significant authors. May be repeated once for credit as long as different authors are studied, and with departmental approval.

ENGL 5102. British Children's Literature. (3) Focuses on works in British and British Colonial Children's Literature. *May be repeated for credit with change of topic.*

ENGL 5103. American Children's Literature. (3) Focuses on works in American Children's Literature. *May be repeated for credit with change of topic.*

ENGL 5104. Multiculturalism and Children's Literature. (3) Focuses on works that represent one or more kinds of cultural, ethnic, or social diversity of the United States and other national literatures. *May be repeated for credit with change of topic.*

ENGL 5114. Milton. (3) A study of the major poems and selections from the minor works of Milton.

ENGL 5116. Shakespeare's Early Plays. (3) A study of 10 representative plays from the comedies, histories and tragedies written 1590-1600.

ENGL 5117. Shakespeare's Late Plays. (3) A study of 10 representative plays from the period 1600-1611, including the late tragedies and tragi-comedies.

ENGL 5121. The 18th-Century British Novel. (3) The novel as narrative form and as mirror of the individual in society. Emphasis on fiction by Defoe, Richardson, Fielding, Sterne, Austen, with further readings in the novel of manners and the Gothic romance.

ENGL 5122. The Victorian Novel. (3) Readings in British fiction during the triumph of the novel in the 19th century, emphasizing major developments in realism, romance, naturalism.

ENGL 5123. The Modern British Novel. (3) Representative British novels that embody the cultural and literary developments of the 20th century: the impact of two world wars, the influence of important psychological and economic factors of modern life and their relationships to new techniques in art and literature.

ENGL 5124. Modern Irish Literature. (3) Readings in Irish literature since 1885, with consideration of the mythology, folklore, and social history of Ireland as they are expressed in poetry, drama and fiction.

ENGL 5131. British Drama to 1600, Excluding Shakespeare. (3) A survey of the development of British drama to 1600, with representative plays from the Mystery-Miracle Cycles, the Morality Plays, and Tudor drama, including Lyly, Kyd, Marlowe, Peele, Greene, Dekker.

ENGL 5132. British Drama from 1600-1642, Excluding Shakespeare. (3) A survey of Jacobean and Caroline drama, including plays by Jonson, Beaumont and Fletcher, Webster, Middleton, Shirley, Ford.

ENGL 5133. British Drama of Wit and Intrigue, 1660-1780. (3) The famous bawdy comedy of manners and the heroic drama of the Restoration, followed by the sentimental comedy and satiric burlesque of the 18th century.

ENGL 5143. The American Novel of the 19th Century. (3) Major novelists and traditions from the beginnings of the American novel through the rise of realism, including such novelists as Hawthorne, Melville, Twain, Howells, James.

ENGL 5144. The American Novel of the 20th Century. (3) Major novelists and traditions from the emergence of naturalism to the present, including such novelists as Crane, Dreiser, Hemingway, Faulkner.

ENGL 5145. Literature of the American South. (3) Selected works of Southern writers which reflect literary and cultural concerns from Colonial times to the present, including such authors as Poe, the early

humorists, local color writers, Chopin, Faulkner, Warren, O'Connor, Welty.

ENGL 5146. Contemporary Jewish-American Literature. (3) An introduction to the scope and shape of the contemporary Jewish-American literary traditions. Such writers as Bellow, Malamud, Roth, Singer, and Potok are studied.

ENGL 5147. Early Black American Literature. (3) Prerequisite: ENGL 2301. A survey of significant writings by black Americans before the Harlem Renaissance.

ENGL 5148. 20th Century Black American Literature: Prose. (3) Intensive study of selected black American 20th century writers of fiction and nonfiction, beginning with the Harlem Renaissance.

ENGL 5150. Contemporary Poetry. (3) Poetry in English (including translations) since 1940.

ENGL 5151. Modern Drama. (3) Representative Continental, British, and American plays, from Shaw to the present.

ENGL 5152. Modern European Literature. (3) Selected modern European authors, translated into English, whose works have been of special interest to readers and writers of British and American literature.

ENGL 5153. Contemporary Fiction. (3) Selected present-day fiction, with an emphasis upon works from outside the United States and Britain. Works not originally in English will be studied in translation.

ENGL 5155. Pan-African Literature. (3) Introduction to significant Pan-African literature, emphasizing the oral tradition, selected works of major authors in the Caribbean and Africa, and the relationships of these traditions to American, British and other literary traditions. Works not originally written in English will be studied in translation.

ENGL 5156. Gender and African American Literature. (3) Cross-listed as AFRS 4106. Prerequisite: ENGL 2301, 3100 and 3200, or permission of instructor or graduate status. Exploration of the intersection of gender and African American Literature, focusing on either Black women writers or Black male writers, or a combination in dialogue.

ENGL 5157. African American Poetry. (3) Cross-listed as AFRS 4107. Prerequisites: ENGL 2301, 3100 and 3200, or permission of instructor or graduate status. Intensive study of African American poetry, focusing on one period or traversing several.

ENGL 5158. African American Literary Theory and Criticism. (3) Cross-listed as EDCI 8135.

Prerequisites: ENGL 2301, ENGL 3100, and ENGL 3200, or permission of instructor or graduate status. History of an African American approach to literary analysis, including a practicum in modern criticism.

ENGL 5161. Modern English Grammar. (3) A study of the structure of contemporary English, with an emphasis on descriptive approaches.

ENGL 5165. Language and Culture. (3) Readings in and discussion and application of the interrelationships between language and culture, including basic introduction to contemporary American dialects and to social contexts of language.

ENGL 5166. Comparative Language Studies for Teachers. (3) Prerequisite: ENGL 3132, ENGL 6161, or permission of the department. An introductory course designed to aid the teacher of English as a Second Language in comparing the systems of sound and structure of another language with those systems in English.

ENGL 5167. The Mind and Language. (3) Introduction to the study of the mind from a linguistic perspective. Topics include: language growth and loss; language deficits; modularity and hierarchical processing; the interaction of cognitive and linguistic faculties; parsing/processing strategies; and limitations and applications such as therapy, forensics, computing, and teaching.

ENGL 5180. Theories of Technical Communication. (3) Rhetorical, psychological, and anthropological theories that underscore the interrelations of written graphic, and digital communication within technical, rhetorical contexts.

ENGL 5181. Writing and Designing User Documents. (3) Researching and analyzing audiences to write publishable instructions. This includes the production, testing, and revision of tutorials, reference manuals, online documents, and digital media for users of computers and other technologies.

ENGL 5182. Information Design and Digital Publishing. (3) Theoretical and practical exploration of visual communication. By rhetorically integrating text and graphics, students will write and publish documents and online content for digital environments.

ENGL 5183. Editing Technical Documents. (3) Substantive editing, copyediting, project management, and editing in hardcopy documents and web and digital environments.

ENGL 5202. Writing Poetry. (3) Further study of and practice in the writing of poetry within a workshop format. *May be repeated for credit one time with permission of department.*

ENGL 5203. Writing Fiction. (3) Further study of and practice in the writing of fiction within a workshop format. *May be repeated for credit one time with permission of department.*

ENGL 5204. Expository Writing. (3) Writing of essays, criticism, and various forms of exposition.

ENGL 5205. Advanced Expository Writing. (3)
Prerequisite: ENGL 5204. Advanced writing of essays, criticism, and various forms of exposition. *May be repeated for credit one time with permission of department.*

ENGL 5208. Poetry Writing Workshop. (3) Designed for advanced writers of poetry. Focuses primarily on student work and peer criticism of it. *May be repeated for credit one time with permission of department.*

ENGL 5209. Fiction Writing Workshop. (3) Designed for advanced writers of fiction. Focuses primarily on student work and peer criticism of it. *May be repeated for credit one time with permission of department.*

ENGL 5210. Greek and Roman Drama in Translation. (3) A study of selected plays of Aeschylus, Sophocles, Euripides, Aristophanes, Plautus, Terence, and Seneca with emphasis on dramaturgy and the development of the Greek and Roman theater.

ENGL 5211. Chaucer. (3) The poetry of Geoffrey Chaucer, including the Canterbury Tales and Troilus and Criseyde.

ENGL 5251. Literary Criticism Through Arnold. (3)
The major schools and critics of literary criticism.

ENGL 5252. Modern Literary Criticism. (3) Theories of the modern schools of criticism.

ENGL 5254. Teaching English/Communications Skills to Middle and Secondary School Learners. (1-3)
Approaches to the teaching of English, including recent theories and research related to writing and literary study, designed primarily for teaching in grades 6-12.

ENGL 5260. History of the English Language. (3)
Origins and development of the English language, both spoken and written, from its earliest forms to contemporary usage.

ENGL 5263. Linguistics and Language Learning. (3)
Cross-listed as EDCI 8129. Readings in, discussions of, and application of linguistically oriented theories of language acquisition, directed toward gaining an understanding of language-learning processes and stages.

ENGL 5264. Literacy in Family and Community. (3)
Exploration of literacy issues and outreach in schools, agencies, and work sites.

ENGL 5290. Advanced Creative Project. (3) The planning, writing, and polishing of a work of at least 20 pages of poetry or at least 40 pages of fiction or creative non-fiction with the guidance of a member of the Department's creative writing faculty. The final work may be a single piece or a collection of pieces and will evolve under the supervision of the primary instructor. With permission of the department, students who took the course as undergraduates may repeat as graduate students.

ENGL 5400. English Composition Practicum. (1-3)
Prerequisite: Permission of instructor. Through supervised tutorial experience and seminars, this course introduces the student to current developments concerning composition and to a variety of methods for teaching English composition. Highly recommended for teachers and those planning to teach. *May be repeated for credit one time with permission of department.*

ENGL 5410. Professional Internship. (3, 6)
Prerequisites: Permission of English Internship Coordinator; Junior, Senior, or Graduate standing; English major, English minor, or Communication Studies minor; minimum 2.5 GPA; and a course in professional communication (e.g., journalism, technical communication, public relations, public relations lab, or mass media). Students work 8-10 hours (for 3 credit hours) or 16-20 hours (for 6 credit hours) per week in a placement arranged by the Internship coordinator. Only three credit hours may be applied to the English major at either the undergraduate or graduate level; three additional hours may be counted as a University or Communications elective.

ENGL 5852. Independent Study. (1-3) Prerequisite: Permission of the department. Individual investigations and appropriate exposition of the results. (Unless special permission is granted by the Department Chair, no more than six hours may apply toward the English major.) *May be repeated for credit with permission of department.*

ENGL 6008. Topics in Advanced Technical Communication. (3) Theoretical and practical exploration of advanced topics in technical

communication, including projects in which students write and publish documents by rhetorically integrating text, graphics, and other media using computer aids.

ENGL 6062. Topics in Rhetoric. (3) Examination of and/or research concerning selected issues in rhetorical theory or pedagogy. *May be repeated for credit with change of topic and permission of department.*

ENGL 6070. Topics in English. (3) Selected topics of literature, rhetoric/writing, and language. *May be repeated for credit with change of topic and permission of department.*

ENGL 6101. Introduction to English Studies. (3) Cross-listed as EDCI 8131. The discipline of English--its nature, its history, and its methods. Emphasis on (1) the interrelations of literature, language, and writing; and (2) the diversity of cultural origins and critical perspectives in English studies, with concentration on selected major critical approaches. Intensive writing and practice in methods of research. Required of all M.A. in English students, preferably at or near the beginning of their programs.

ENGL 6102. Literary Theory. (3) Cross-listed as EDCI 8132. Modern literary theory focusing on the theoretical concepts which underpin literary analysis. Emphases may differ from semester to semester; readings will focus on major theoretical statements and on criticism which applies several approaches to particular literary works. Students are required to apply what they have learned.

ENGL 6103. Introduction to Children's Literature and Culture. (3) Covers a range of texts for children and adolescents, including both historical and contemporary works.

ENGL 6104. Major Figures and Themes in Children's Literature. (3) Cross-listed as EDCI 8133. Focuses on significant authors, illustrators, or themes in children's and/or adolescent literature. *May be repeated for credit with change of topic and permission of department.*

ENGL 6111. Shakespeare's Comedies and Histories. (3) Source materials, textual problems and stage conventions in selected comedies and history plays illustrating Shakespeare's dramaturgy.

ENGL 6112. Shakespeare's Tragedies. (3) Source materials, textual problems and stage conventions of the great tragedies, illustrating Shakespeare's dramaturgy.

ENGL 6113. Milton. (3) The complete poetry and selections from the prose.

ENGL 6116. Technical/Professional Writing. (3) Prerequisite: Graduate or Post-Baccalaureate Graduate standing. An introduction to the theoretical and practical exploration of key issues and developments in the field of technical/professional writing. Students will write and publish print and online documents by rhetorically integrating text and graphics. Students in the Technical/Professional Writing Concentration are expected to enroll in 6116 as their first or second course in the program.

ENGL 6123. The Augustan Age, 1660-1785. (3) Close reading of Dryden, Pope, Swift, Johnson, and a consideration of other literary figures and trends, in the light of intellectual and historical currents.

ENGL 6125. The Romantic Era, 1785-1832. (3) Development of the Romantic movement, with emphasis on the works of Wordsworth, Coleridge and other major poets.

ENGL 6126. The Victorian Era, 1832-1900. (3) Emphasis on Tennyson, Robert Browning, Arnold, Carlyle, Ruskin, Newman.

ENGL 6127. Seminar in Language, Culture, and Society. (3) Recommended prerequisite: an introductory course in linguistics. Discussions on topics such as the complex relationships between language and culture, how language affects perception and cognition, and how language affects the individual's sense of self and the group's sense of community.

ENGL 6141. American Romanticism. (3) Major writers of the 1830s, 40s, and 50s, including Hawthorne, Melville, Whitman, Emerson, Thoreau, and the Transcendental Movement.

ENGL 6142. American Realism and Naturalism. (3) Major writers of the two movements before and after the end of the 19th century, including Twain, Howells, James, Crane, Dreiser, Norris.

ENGL 6143. American Modernism. (3) Six to eight writers of the period since World War I, both prose and poetry.

ENGL 6144. Stylistics. (3) Methodologies for analysis of the style of texts, with special emphasis on diction, syntax, prose, rhythm, voice, and metaphor.

ENGL 6147. Perspectives in African American Literature. (3) Cross-listed as EDCI 8134. A survey of African American literature, emphasizing the major authors, those relevant historical and social factors,

and those specific literary movements that have influenced the development of African American literature.

ENGL 6160. Introduction to the English Language.

(3) History and nature of English, its grammar, syntax, and lexicon. Integrates the study of language-based rhetorical and literary theory, asks students to consider the nature of language in general, its impact on the user, and the development of the systems of English, concentrating on features of major British and American dialects and registers. Required of all M.A. in English students, preferably at or near the beginning of their programs.

ENGL 6161. Introduction to Linguistics. (3)

Introduction to linguistics, its techniques and objectives, descriptive and historical approaches, language families, language and culture.

ENGL 6162. History of the English Language. (3)

Origins and development of spoken and written English, from its earliest forms to contemporary usage, with some attention to dialects and lexicography. (May not also receive credit for ENGL 4260.)

ENGL 6163. Language Acquisition. (3) Prerequisite: ENGL 6160 or permission of instructor. Linguistic theories of first and second language acquisition, including processes and stages of language development. (May not also receive credit for ENGL 4263.)

ENGL 6164. Comparative Language Analysis for Teachers. (3)

An introduction to the theory and practice of contrastive language analysis. Examination of universal features of the process of second language acquisition and the effects of a learner's first language on the acquisition of a second language, and explore how teachers can use such knowledge to facilitate the learner's acquisition of a second language.

ENGL 6165. Introduction to English for Specific Purposes. (3)

Cross-listed as EDCI 8137. An introduction to learner-centered approaches to teaching English as a Second Language (ESL) and English as a Foreign Language (EFL) to non-native learners who need to learn English for a very definite academic, professional or vocational purpose.

ENGL 6166. Rhetorical Theory. (3) Cross-listed as EDCI 8138. Rhetorical theories, past and present, focusing on ways that these varied frameworks of understanding have informed the generation, understanding, and pedagogy of writing and other modes of discourse. Emphases vary from semester to semester, readings concentrate on major selected rhetorical theories and on implications of these

theories for the understanding and pedagogy of discourse.

ENGL 6167. Research Methods in Applied Linguistics. (3)

Prerequisite: ENGL 6161 or permission of instructor. An introduction to the major components of designing and carrying out a research project in applied linguistics.

ENGL 6168. Practicum in English for Specific Purposes. (3)

Prerequisite: Permission of the Graduate Program Director. Provides supervised experiences in teaching in an educational setting outside the public schools with an emphasis on developing skills as an education professional.

ENGL 6181. Composition Theory and Pedagogy. (3)

An introduction to various theories that shape composition and its teaching.

ENGL 6182. Research Theory and Method in Rhetoric and Composition. (3)

An exploration of research in Rhetoric and Composition Studies, including various methods of conducting research and their implications for knowledge-making in the field.

ENGL 6183. Critical Pedagogy and the Teaching of Writing. (3)

Explores how ideologies and ideas of literacy shape practices in the teaching of writing.

ENGL 6195. Teaching College English. (3)

Examination of major issues in the theory and practice of literature and composition instruction at the college level.

ENGL 6274. Contexts and Issues in the Teaching of English. (4)

Cross-listed as EDUC 6274. Prerequisite: Admission to the Program. Examine key concepts of the discipline. In doing so, students consider their own identities as readers, writers, teachers, researchers, and makers of meaning. Emphasizes critical approaches and pedagogical issues, with special attention given to technology in the teaching of language, composition, and literature, as well as cultural contexts for the study of English.

ENGL 6495. Internship in College Teaching. (3)

Prerequisite: ENGL 6195. Teaching in one section offered by the Department of English under the supervision of English faculty. Students will be accepted for internship only near the end of the degree program and upon approval of the Department. Students will be assigned to teach selected basic courses, and also will participate in periodic conferences and seminars. It is strongly recommended that students also take ENGL 4400 before ENGL 6195.

ENGL 6674. Applied Research Methods in the Teaching of English. (3) Cross-listed as EDCI 8121. Provides the opportunity to apply research methods in classrooms. Examine identities as readers, writers, teachers, and especially as classroom researchers.

ENGL 6680. Seminar in British Literature. (3) Study of a topic in British Literature. *May be repeated for credit with change of topic.*

ENGL 6685. Seminar in American Literature. (3) Study of a topic in American Literature. *May be repeated for credit with change of topic.*

ENGL 6890. Directed Reading. (1-3) An independent study of a topic in English that a student arranges individually with their graduate program director.

ENGL 6974. Thesis/Project in the Teaching of English. (6) Prerequisite: Permission of the department. Research integrating the fields of English and Education in a theoretical or application-oriented study. If the thesis/project is the outgrowth of previous coursework, considerable additional research and exposition must be done.

ENGL 6996. Thesis. (6) Appropriate research and written exposition of that research, which may or may not be an outgrowth of work done in previous courses. If the thesis is the outgrowth of previous coursework, considerable additional research and exposition must be done beyond that previously undertaken. The proposed thesis work, as well as the final product, will be approved by a committee of three graduate faculty appropriate to the topic, appointed by the Graduate Program Director after consultation with the student, on the basis of a written proposal from the student. It is recommended that thesis work not be undertaken until near the end of the student's program. The thesis title is to be shown on the student's final transcript. A Creative thesis option is available for students who have completed appropriate coursework in Creative Writing. (A statement of recommendations and requirements for form and procedures is available in the Department of English.)

Ethics and Applied Philosophy

- **M.A. in Ethics and Applied Philosophy**
- **Graduate Certificate in Applied Ethics**

Department of Philosophy

philosophy.uncc.edu

Graduate Program Director

Dr. Lisa Rasmussen

Graduate Faculty

Dr. Dan Boisvert, Senior Lecturer
 Dr. Gordon Hull, Associate Professor
 Dr. Robin James, Associate Professor
 Dr. Michael Kelley, Professor
 Dr. Phillip McReynolds, Assistant Professor
 Dr. Trevor Pearce, Assistant Professor
 Dr. Andrea Pitts, Assistant Professor
 Dr. Lisa Rasmussen, Associate Professor
 Dr. Mark Sanders, Senior Lecturer
 Dr. Eddy Souffrant, Associate Professor
 Dr. Shannon Sullivan, Chair and Professor

MASTER OF ARTS IN ETHICS AND APPLIED PHILOSOPHY

The M.A. in Ethics and Applied Philosophy degree program is designed to foster the application of ethical and philosophical knowledge to currently pressing concerns in social, economic, medical, legal, commercial, cultural, and political contexts and associations. The department offers both theoretical and applied courses. These courses provide students with a comprehensive, normative, politically-informed and logically consistent training relevant to current challenges encountered in business, medical associations, national and international political contexts, as well as public education.

Admission Requirements

In addition to meeting the University's graduate admission requirements, all prospective students must submit:

- A personal statement outlining why the applicant seeks admission to the program
- A philosophical writing sample, preferably addressing an ethical or other philosophical issue, uploaded within the online application system

- Three academic letters of recommendation (to be uploaded by the Recommenders), attached to the recommendation forms required by the Graduate School, which address the student's philosophical skills and/or ethical reasoning ability

Degree Requirements

The Master of Arts in Ethics and Applied Philosophy requires the completion, with a GPA of 3.0 or above, of a minimum of 30 credit hours of approved graduate coursework. The successful completion of the Master's Research Paper course is also required for the Master of Arts. Prior to starting a Master's Research Paper course, students in the M.A. program must apply for readmission if they have not taken any courses for two years. All degree requirements must be completed within six calendar years of first enrollment in the program.

Required Courses (6 credit hours)

PHIL 6110 Ethical Theory (3)
PHIL 6120 Philosophical Methods and Analysis (3)

Elective Courses (18 credit hours)

Select from:

PHIL 5050 Topics in Philosophy (1-3)
PHIL 6050 Topics in Philosophy (1-3)
PHIL 6190 Supervised Teaching (1)
PHIL 6210 Ethics and Aesthetics (3)
PHIL 6220 Health Law and Ethics (3)
PHIL 6230 Ethics, Biotechnology, New Genomics (3)
PHIL 6240 Research Ethics in the Biological and Behavioral Sciences (3)
PHIL 6250 Ethics of Public Policy (3)
PHIL 6260 Ethics and International Affairs (3)
PHIL 6310 Language and Violence (3)
PHIL 6320 Feminist Theory and Its Applications (3)
PHIL 6330 Race and Philosophy (3)
PHIL 6340 Philosophy of Mind (3)
PHIL 6350 Philosophy of Technology (3)
PHIL 6360 Philosophy of Education (3)

Capstone Course (3 credit hours)

This course is offered annually and may be repeated for credit with new material.

PHIL 6999 Master's Research Paper (3)

Advising

The Graduate Program Director serves as formal advisor to graduate students.

Transfer Credit

Up to 6 credit hours earned from other accredited institutions may be eligible for transfer credit. Formal approval must be obtained from the Graduate Program Director and the Dean of the Graduate School.

Language Requirement

Although students are not required to demonstrate proficiency in a foreign language as a formal requirement of the program, they are expected to acquire competency in and use whatever languages they need to pursue their research interests.

Application for Degree

Graduation information, including deadlines for candidacy and degree application, are available online from the Graduate School at graduateschool.uncc.edu/graduation.

GRADUATE CERTIFICATE IN APPLIED ETHICS

The Graduate Certificate in Applied Ethics is of interest to three groups of students: (1) professionals working in areas of applied ethics; (2) students just beginning to explore graduate work in philosophy; and (3) students in other master's and doctoral programs, such as biology, health administration, and public policy, who expect their careers to include work in applied ethics.

Admission Requirements

In addition to meeting the University's graduate admission requirements, all prospective students must:

- Submit a personal statement outlining why the applicant seeks admission to the program
- Submit two academic letters of recommendation, in addition to the recommendation forms required by the graduate school, which address the student's philosophical skills and/or ethical reasoning

Prerequisite Requirements

A bachelor's degree from an accredited institution and a minimum undergraduate GPA of 2.75 is required for admission to the Graduate Certificate program.

Certificate Requirements

The Graduate Certificate in Applied Ethics requires the completion of 15 credit hours of graduate coursework in philosophy. The coursework should be distributed as follows:

Required Course (3 credit hours)

PHIL 6110 Ethical Theory (3)

Elective Courses (12 credit hours)

Select from:

PHIL 6050 Topics in Philosophy (1-3)

- PHIL 6210 Ethics and Aesthetics (3)
 PHIL 6220 Health Law and Ethics (3)
 PHIL 6230 Ethics, Biotechnology, New Genomics (3)
 PHIL 6240 Research Ethics in the Biological and Behavioral Sciences (3)
 PHIL 6250 Ethics of Public Policy (3)
 PHIL 6260 Ethics and International Affairs (3)
 PHIL 6310 Language and Violence (3)
 PHIL 6320 Feminist Theory and Its Applications (3)
 PHIL 6330 Race and Philosophy (3)
 PHIL 6340 Philosophy of Mind (3)
 PHIL 6350 Philosophy of Technology (3)
 PHIL 6360 Philosophy of Education (3)

Approval of the Department of Philosophy Graduate Program Director is required in order to substitute related courses offered by other departments and programs.

Advising

The Graduate Program Director serves as formal advisor to graduate students.

Transfer Credit

Transfer credit is not accepted in the certificate program.

COURSES IN PHILOSOPHY (PHIL)

PHIL 5050. Topics in Philosophy. (1-3) Prerequisite: Permission of the department. In-depth treatment of selected problems and issues in philosophy. *May be repeated for credit with change of topic.*

PHIL 6050. Topics in Philosophy. (1-3) Prerequisite: Permission of the department. In-depth treatment of selected problems and issues in philosophy. *May be repeated for credit with change of topic.*

PHIL 6060. Independent Study. (1-3) Prerequisite: Permission of the department. Directed individual study of a philosophical topic of special interest to the student. *May be repeated for credit up to 3 credits toward the Certificate in Applied Ethics and the M.A. in Ethics and Applied Philosophy programs.*

PHIL 6110. Ethical Theory. (3) Examination of major normative and meta theories that undergird our practical judgments about morally right actions and morally good persons, organizations, or policies. This examination may include central problems and issues concerning morality's: requirements (e.g., utility, duty, virtue, care), authority (e.g., absolutism, relativism, pluralism, multiculturalism), scope (e.g., deceased or future human beings, animals, environment), justification (e.g., rationality, intuition), source (e.g., reason, sentiment, disagreement), and

nature (e.g., realism/antirealism, objectivity/subjectivity).

PHIL 6120. Philosophical Methods and Analysis. (3) Explores the distinctive and various methods within philosophy (logical, phenomenological, feminist, conceptual, linguistic, deconstructive, and others), their uses in particular contexts (including links to other disciplines), and how methodology shapes philosophy (including its social impact). One aim is to clarify "applied philosophy" by examining its methods. Students will analyze, evaluate, reconstruct, and originate arguments, judgments, and decisions. They will do so in connection with both texts shared among all the students in the class and the particular interests of individual students. Each student will develop a paper over the course of the semester to bring these issues together.

PHIL 6190. Supervised Teaching. (1) Offers an opportunity to work closely with a faculty member and to engage in supervised teaching as a form of applied philosophy exploring pedagogical practices, theories, issues, and educational research within the philosophy classroom. Normally connected with a graduate assistantship.

PHIL 6210. Ethics and Aesthetics. (3) Art often generates ethical conflicts because of its forms, content, or functions in society, and ethical debates are sometimes played out through art, so ethics and aesthetics are deeply intertwined. In turn, aesthetics has been strongly tied to politics. The course will cover a range of ethical/political issues in aesthetics across various arts (visual arts, film, music, literature, etc.), including readings from classical and contemporary authors such as Plato, Hume, Kant, Nietzsche, Adorno, Said, Nussbaum, and Piper.

PHIL 6220. Health Law and Ethics. (3) This course interprets and uses the main normative principles of bioethics (autonomy, non-maleficence, beneficence and justice) to guide the practice of healthcare professionals and policymakers. It also increases understanding, interpretation, and monitoring of the impact of legal, regulatory, and political environments on healthcare organizations. Topics include: medical malpractice, Medicare and Medicaid law, informed consent, privacy and confidentiality, reproductive freedom, death and dying, pain and suffering, allocation of scarce medical resources, developments in genetics, and regenerative medicine.

PHIL 6230. Ethics, Biotechnology, and the New Genomics. (3) This course uses a range of normative theories (e.g., deontology, utilitarianism, virtue ethics, and feminist ethics) to assess the morality of developments in biotechnology and the new genomics. It also probes the ethical, legal, political,

and social implications of genetically modifying food and animals, genetically enhancing human beings, extending the human life span, assisting human reproduction, creating chimeras, and fusing humans with machines.

PHIL 6240. Research Ethics in the Biological and Behavioral Sciences. (3) Cross-listed as GRAD 6240. Designed to identify the fundamental elements that characterize not only methodologically grounded but also morally appropriate scientific research. Class discussion and readings focus on key issues in biological and behavioral research including informed consent, privacy and confidentiality, risk-benefit assessments, mechanisms for protecting animal and human research subjects, international research, vulnerable populations, conflicts of interest and data management, publication ethics, intellectual property issues and the politics of research.

PHIL 6250. Ethics of Public Policy. (3) Examines the conceptual tools available in the development of policies, regulations and guidelines that are responsive to normative standards of character and conduct. The course will include discussion of ethical and political theory, as well as its intersection with policy-making at topics such as equity, efficiency, security, and liberty. Issues may include how specific policies express moral commitments and choices, how some policies favor certain values over others, as well as on issues such as whistle-blowing, "dirty hands" (doing wrong to do right), "many hands" (hiding accountability in bureaucracy) and professional incompetence.

PHIL 6260. Ethics and International Affairs. (3) The relations between nation states and other trans-national organizations are often assumed to be governed by realist power relations, and outside the scope of ethical deliberation. In this course we will examine what sorts of ethical norms can or should be brought to bear on international relations. Possible topic areas include both theoretical issues such as the applicability of ethical theory to the behavior of trans-cultural and international issues, the appropriateness of "Western" ethical norms to the discussion; as well as more specific topics such as global hunger, uneven development more generally, arms proliferation, and environmental security.

PHIL 6310. Language and Violence. (3) Explores philosophical theories on the relationship between language and violence, on a continuum from subtle forms of covert personal violence to grievous forms of covert institutional violence.

PHIL 6320. Feminist Theory and Its Applications. (3) This course will cover feminist critiques of the philosophical canon, feminist approaches to

philosophical problems (e.g., feminist ethics, feminist epistemology), and philosophical studies of topics related to gender, sexuality, and the intersection of these categories with race and class. Students will have the opportunity to investigate how feminist philosophy bears on their individual projects and areas of interest.

PHIL 6330. Race and Philosophy. (3) In this course, students will both study the role of race in the history of philosophy and examine, from a philosophical perspective, contemporary discourses of race and racism. Critical race theory and postcolonial theory will be studied, as well as their intersection with feminism, queer theory, among other critical political philosophies.

PHIL 6340. Philosophy of Mind. (3) Examines questions concerning the relationship between body and mind, the existence of other minds, the nature of consciousness, and the architecture of cognition. Approaches to these questions include traditional philosophical sources (emphasizing metaphysics and epistemology) and more recent developments in cognitive science (including the computational model of mind, mental representation, connectionist systems, and artificial intelligence). Also addressed are ethical and social issues involved in the design and implementation of intelligent systems. Inquiries bear on issue such as free will and determinism, emotion and reasoning, and the nature of rationality.

PHIL 6350. Philosophy of Technology. (3) Examines philosophical views on the nature of technology, focusing on its effects on society and nature. Computer technologies and other cases will be considered.

PHIL 6360. Philosophy of Education. (3) Exploration of modern philosophies of education, with a focus on the relationships between pedagogy and society.

PHIL 6410. Internship in Ethics and Applied Philosophy. (3) On-site work in ethics and applied philosophy. Site and workload to be determined in consultation with a business, agency, organization or association and one faculty-internship advisor. Provides practical and professional training experience under conditions that the University cannot duplicate.

PHIL 6999. Master's Research Paper. (3) Prerequisites: Completion of 15 credit hours of PHIL graduate courses, and permission of department. Students begin with a previously submitted course paper and spend the semester revising it. The goal is for each student to produce a polished, professional paper worthy of submission to a philosophical journal. Additional reading and research on the topic

is conducted, and multiple steps of revision and presentation of work in progress to the class are included. *May be repeated for credit with new material.*

PHIL 8050. Topics in Philosophy. (1-3) Prerequisite: Permission of the department. In-depth treatment of selected problems and issues in philosophy. *May be repeated for credit with change of topic.*

PHIL 8240. Research Ethics in the Biological and Behavioral Sciences. (3) Cross-listed as GRAD 8240. See course listing for PHIL 6240 for the course description.

Gender, Sexuality, and Women's Studies

• Graduate Certificate in Gender, Sexuality, and Women's Studies

Women's and Gender Studies Program
womensandgenderstudies.uncc.edu

Graduate Program Directors

Dr. Kent Brintnall
 Dr. Kathleen Hogan

GRADUATE CERTIFICATE IN GENDER, SEXUALITY, AND WOMEN'S STUDIES

The Graduate Certificate in Gender, Sexuality and Women's Studies can be earned in conjunction with master's or doctoral work in a wide variety of subjects. The certificate can also be earned through a freestanding course of study not linked to a graduate degree. The Graduate Certificate in Gender, Sexuality and Women's Studies exposes students from a variety of disciplines to the core theories and approaches used in studies of women, gender (which includes masculinity), feminism, and sexuality.

Additional Admission Requirements

The certificate program is open to all students who hold a bachelor's degree from an accredited university and either:

- 1.) are enrolled and in good standing in a graduate degree program at UNC Charlotte, or
- 2.) have a minimum undergraduate GPA of 3.0

All students are admitted to the Graduate School in a special category for certificate programs. In addition to the general requirements for graduate certificate programs explained under the "Degree Requirements and Academic Policies" section of the *Catalog*, students should submit a letter explaining the applicant's educational and work background, interests, and plans, with an emphasis on how this certificate will enhance, complement, or advance the applicant's work and/or education. Letters of recommendation are not required.

Certificate Requirements

The Graduate Certificate in Gender, Sexuality and Women's Studies requires the completion of a minimum of 12 credit hours of graduate coursework. This includes 2 core courses and 2 elective courses.

Core Courses (6 credit hours)

Select two of the following that most closely reflect students' interests:

- WGST 5160 Race, Sexuality, and the Body (3)
- WGST 5170 Queer Theory (3)
- WGST 6601 Theoretical Approaches to Sexuality (3)
- WGST 6602 Theoretical Approaches to Gender (3)
- WGST 6603 Language, Gender and Power (3)
- WGST 6627 Feminist Theory and its Applications (3)

Elective Courses (6 credit hours)

Select two from the following:

WGST 5000-6999 (3)

For elective courses from other departments and programs to count as an elective, students must submit a course description and/or syllabus and receive written approval from the Graduate Program Director prior to registration.

Transfer Credit

Transfer credit is not accepted in the certificate program.

COURSES IN WOMEN'S AND GENDER STUDIES (WGST)

WGST 5050. Topics in Women's Studies. (1-3)

Prerequisite: Varies with change of topic. Special topics in Women's Studies. *May be repeated for credit with change of topic.*

WGST 5131. Culture, Pregnancy, and Birth. (3)

Cross-listed as ANTH 5131. Explores how culture shapes the experience and practice of pregnancy and birth. Some of the topics explored include the birthing experience, midwifery, infertility, new reproductive technologies, and surrogate motherhood.

WGST 5151. Women, Biology, and Health. (3)

An understanding of the structure and functions of women's bodies and examines the social, economic, environmental, behavioral, and political factors associated with women's health.

WGST 5152. Ecological Feminism. (3) Examines the cultural conditions that make possible the marginalization of both women and nature, the connections between feminism and environmentalism, and the relation between the norms and practices that inform developmental and environmental policies.

WGST 5160. Race, Sexuality, and the Body. (3)

Examines how biological, historical, and cultural interpretations of race and gender influenced and

characterized definitions of sexuality and body image among persons of color.

WGST 5170. Queer Theory. (3) Introduction to key issues in queer theory, a field of studies that questions and redefines the identity politics of early lesbian and gay studies by investigating the socially constructed nature of identity and sexuality and critiquing normalizing ways of knowing and being.

WGST 6050. Topics in Women's Studies. (1-3)

Prerequisite: Varies with change of topic. Special topics in Women's Studies. *May be repeated for credit with change of topic.*

WGST 6601. Theoretical Approaches to Sexuality. (3)

An interdisciplinary examination of the history of sexuality and contemporary theories of sexuality and the body. Topics include: historical aspects of sexuality, representations of sexuality, politics of sexuality, critiques of psychoanalytic approaches to sexuality, feminist engagement with biological constructions of sexuality, and queer theory.

WGST 6602. Theoretical Approaches to Gender. (3)

Cross-listed as ANTH 6612. An interdisciplinary examination of the core theories about the role of gender in identity formation and social organization. Topics include: the feminist critique of biological essentialism; gender as a continuum; the social construction of gender; gender performativity; historical changes in gender; masculinity studies; the intersection of race, class and gender; and the economics of gender.

WGST 6603. Language, Gender and Power. (3) An examination of the ways language constructs sexual difference and power relations among groups. Topics include: the role of language in structuring individual identity and human relations; how that process informs the nature of social institutions; and the control language exercises over human society, from the private to the public domain.

WGST 6627. Feminist Theory and its Applications. (3)

An examination of selected works in feminist thought across the disciplines.

WGST 6800. Directed Reading/Research. (3)

Prerequisites: Prior written permission of instructor and Women's and Gender Studies Director. Independent investigation of a problem or a topic in Gender, Sexuality or Women's Studies, culminating in a research paper or a final report. Student must provide a written plan of work before registering for the course. *May be repeated for credit.*

Geography

- **Ph.D. in Geography and Urban Regional Analysis**
- **M.A. in Geography**

Department of Geography and Earth Sciences

geoearth.uncc.edu

Graduate Program Director

Dr. Heather Smith

Graduate Faculty

Dr. Craig Allan, Professor
 Dr. Andy Bobyarchick, Associate Professor
 Dr. Robert Boyer, Assistant Professor
 Dr. Harrison Campbell, Associate Professor
 Dr. Gang Chen, Assistant Professor
 Dr. Casey Davenport, Assistant Professor
 Dr. Elizabeth Delmelle, Assistant Professor
 Dr. Eric Delmelle, Associate Professor
 Dr. John Diemer, Professor
 Dr. Matthew Eastin, Associate Professor
 Dr. Martha Cary Eppes, Associate Professor
 Dr. Patricia Fall, Professor
 Dr. Sara Gagné, Assistant Professor
 Dr. Bill Graves, Associate Professor
 Dr. Edd Hauser, Professor
 Dr. Brian Magi, Assistant Professor
 Dr. Tyrel Moore, Professor
 Dr. Heather Smith, Professor
 Dr. Janni Sorensen, Associate Professor
 Dr. Wenwu Tang, Assistant Professor
 Dr. Jean-Claude Thill, Knight Distinguished Professor
 Dr. David Vinson, Assistant Professor
 Dr. Qingfang Wang, Associate Professor
 Dr. Wei-Ning Xiang, Professor

PH.D. IN GEOGRAPHY AND URBAN REGIONAL ANALYSIS

The Ph.D. in Geography and Urban Regional Analysis focuses on the theoretical and empirical analysis of metropolitan areas and their broader regional, national and global contexts. At the core of this program is the recognition that cities are complex systems made up of environmental and human elements, with critical multiscale interactions and outcomes. Although the processes and issues that frame urban-regional analysis are global in scope, the research lens of the Ph.D. program is focused on the United States, and, especially regional topics and research questions. Indeed, the Charlotte area and other urban and metropolitan regions in the

southeastern United States offer laboratories for examining economic, social, and environmental change processes that are at work across the world.

Building on the strengths and research interests of the graduate geography faculty and colleagues across campus, there are currently three broad research clusters within the doctoral program. These include:

- Urban/Regional Systems
- Human-Environmental Interactions
- Geographic Information Science (GIScience)

The theoretic and empirical understanding of these research areas is guided by multiscale analytical techniques, both quantitative and qualitative.

The research clusters provide opportunities for integration and complementarity, with shared methods and theoretic structures; as well as, the focus on the urban-regional scale. In line with current research trends, scholarship that bridges human geography and environmental systems is an area of significant interest. In this context, GIScience is both a research focus and fundamental research tool.

A cornerstone of the program is the student's research dissertation. Each dissertation is expected to be based on independent and original research which contributes to the body of knowledge in the field, leading to publication in peer-reviewed journals.

Additional Admission Requirements

In addition to the general requirements for admission to the Graduate School, the following are required for study to the Ph.D. in Geography and Urban Regional Analysis:

Under most circumstances, students admitted to the program will have:

- 1) A M.A or M.S. degree in geography or field related to the primary emphases of the Program.
- 2) A master's level GPA of 3.5 out of 4.0. In exceptional cases, students with baccalaureate degrees may be admitted if they have an overall undergraduate GPA of at least 3.6 and meet other admission requirements. Students without master's degrees may be required to complete substantial prerequisites necessary to work at a Ph.D. level.
- 3) Graduate Record Examination (GRE) with minimum scores of 150 on both the verbal and quantitative sections and a 3.5 or above on the analytical portions. Applicants must have taken the GRE; no other test will be accepted in its place.
- 4) TOEFL exam scores of at least 84 on the Internet-based test for applicants whose native language is

not English. The program expects a minimum score of in the low to mid 20s on each of the components of the TOEFL. In addition, international students who will be teaching assistants will be required to undergo evaluation by the English Language Training Institute at UNC Charlotte prior to beginning their assistantship.

- 5) GIS proficiency at a minimum of the applications level is required. Other remedial coursework, as determined by the Geography Graduate Advisory Committee, may also be required depending on the background of the student.
- 6) Three letters of recommendation, at least two of which must come from faculty in the student's previous academic programs.
- 7) A personal statement which directly addresses why the student wishes to do graduate work in geography and why they wish to participate in the Ph.D. program in Geography and Urban Regional Analysis at UNC Charlotte. The statement should address directly how the program at UNC Charlotte fits career and/or professional goals and how the applicant would benefit from and contribute to the Ph.D. in Geography and Urban Regional Analysis at UNC Charlotte. This statement is very important in determining the applicant's commitment to graduate education and to a professional career in geography or a related field.

Degree Requirements

The Ph.D. acknowledges the value of coursework as background and preparation for research, but the primary emphasis is on the development of research skills and the completion of a research project on a problem significant to urban regions.

51 credit hours of approved coursework is required, encompassing 33 credit hours in core and elective courses and 18 credit hours of dissertation units.

While the curriculum and experiential background of all students accepted into the program will be evaluated upon entry, students entering the program would, at a minimum, be required to demonstrate proficiencies at the level of Intermediate GIS (UNC Charlotte equivalent GEOG 4120 or a minimum of two courses such as basic and intermediate GIS); a Master's level research design course (UNC Charlotte equivalent GEOG 6131 or a Master's level research thesis); and a Master's level quantitative methods course (UNC Charlotte equivalent of GRAD 6101). Students who fail to meet these minimum requirements would not be permitted to enroll in courses for which they do not have the prerequisites.

Core Courses (9 credit hours)

GEOG 8123 Urban Regional Environment (3)

GEOG 8124 Seminar in Geographic Theory and Research Design (3)

GRAD 8101 Linear Regression (3)

Elective Courses (24 credit hours)

Select from the following:

GEOG 7000-8799 (3)

Note: GEOG 8800 (Directed Problems in Geography) must have prior approval from the Graduate Program Director.

Grade Requirements

All graduate students are subject to academic suspension and/or termination. Department academic standards deviate slightly from university policies stated in appropriate catalogs. A student must maintain a cumulative average of 3.0 in all coursework taken in the program. An accumulation of one (1) marginal (C) grade results in the student being placed on probationary status within the program and could lead to the student being required to re-take the course, and a potential loss of funding if the student is receiving University-sourced funding. An accumulation of two (2) marginal (C) grades results in suspension of the student's enrollment in the graduate program. A graduate student whose enrollment has been suspended because of grades is ineligible to register in any semester or summer session unless properly reinstated through the suspension appeal process. An accumulation of three (3) marginal (C) grades or one (1) unsatisfactory (U) or one (1) NC grade results in termination of the student's enrollment in the graduate program. A second failure in the candidacy examination; the dissertation proposal defense; or final dissertation defense also results in dismissal from the program. In order to continue a program of study, the student must pursue reinstatement through the termination appeal process or wait a period of two years before applying for readmission to the program.

Transfer Credit

Six credit hours or two courses of Ph.D.-level coursework can be transferred from another accredited graduate program as part of the 51 credit hour requirement. Transfer credit beyond this limit must be approved by the Graduate Program Director, in consultation with the student's advisor.

Comprehensive Exams

Following successful completion of the core coursework and upon the recommendation of the Faculty Advisor, a student will take a written, comprehensive examination. The purpose of the examination is to evaluate the student's mastery of the body of knowledge in his/her research focus area, as well as to demonstrate the research skills and methods

that characterize scholars in this subfield of geography.

The comprehensive exam will be comprised of three parts. Part I addresses the theoretic and contemporary literature of geography generally covered in the core coursework and seminars. Part II will assess student's competency in research methods and techniques. GIScience is a key element of this component. Finally, Part III will evaluate student competence in his/her research concentration.

The comprehensive examination will be written and graded by an Examination Committee made up of faculty teaching in the doctoral program. This committee will be appointed by the Graduate Program Director in consultation with the Faculty Advisor.

If a student fails the comprehensive examination or any portion of the exam, he/she must wait until the next semester to retake the examination. During the interim period, the student may be required to retake courses in which the Examination Committee determines there is a deficiency.

Advisor/Advisory Committee

All students in the program will have both a Dissertation Advisor approved by the Program Coordinator and an Advisory Committee. The Dissertation Advisor will help a student formulate a Program of Study including a potential dissertation topic by no later than the end of the second semester of study (or 12 hours of coursework in the case of part-time students). The Dissertation Advisor serves as Chair of the Advisory Committee and must be a member of the Graduate Faculty of UNC Charlotte. The Advisory Committee should have at least four members, three of whom are chosen by the student. The final member of the Committee will be a Graduate School representative to the Committee. That appointment will be made by the Dean of the Graduate School.

Dissertation Proposal and Advancement to Candidacy

Advancing to candidacy requires that the student pass the comprehensive exam and write and successfully defend a dissertation proposal. The proposal must be submitted to the student's Advisory Committee for preliminary approval and then to the Program Coordinator and the Dean of the Graduate School. Successful defense of the dissertation proposal is followed by advancement to candidacy.

Dissertation

The student must complete and defend a dissertation. The dissertation represents an original and substantial

research product. The student must orally present and defend the dissertation before his/her Advisory Committee in a defense that is open to the university community. A copy of the dissertation must be made available to the Geography Graduate Faculty at least three weeks prior to the defense. While the defense presentation is open to the university community, the deliberations of the Advisory Committee are held in Executive Session. The dissertation will be graded on a Pass/Unsatisfactory basis by the student's Advisory Committee and the Dean of the Graduate School. The dissertation defense is the final examination. It is a Graduate School requirement that a student that fails the final examination twice will be terminated from the program.

Time Limits for Completion of the Degree

It is generally expected that full-time students will complete coursework within a three-year time frame and the dissertation will be completed one to two years later. Students must achieve admission to candidacy within six years after admission to the program. All requirements for the degree must be completed within eight years after first registration as a doctoral student. Further, the oral examination in defense of the dissertation must be passed within five years after being advanced to candidacy.

Residency Requirements

Residency requirements for the program include completing 21 credit hours of continuous enrollment, either as coursework or dissertation credits. Residence is considered to be continuous if the student is enrolled in one or more courses in successive semesters until 21 credit hours are earned.

MASTER OF ARTS IN GEOGRAPHY

The M.A. in Geography at UNC Charlotte emphasizes the application of geographic skills, methods, and theories to problem solving in contemporary society. To this end, students are offered a solid foundation in research methods, problem formulation and solution, quantitative methods, computer applications and Geographic Information Systems (GIS). Faculty and students are active in the community and, when possible, students are encouraged to complete their programs with either funded or unfunded private or public sector internships.

One of the program's greatest strengths is the close relationship between its students and faculty and among the students themselves. Small class sizes, close student and faculty contact and a strong sense of community are considered essential components of the learning and teaching environment at UNC Charlotte.

The applied geography program at UNC Charlotte is recognized as one of the best of its kind in the country. Its graduates go directly into jobs as professional geographers, research and/or marketing specialists, location analysts, planners, transportation specialists, and consulting. About 10 percent of the more than 250 graduates of the program have gone on to study in Ph.D. programs.

Additional Admission Requirements

It is the policy of the Department of Geography and Earth Sciences to provide equal opportunities to all students regardless of race, creed, color, gender, or national origin. The Department maintains slightly different requirements than the general requirements for admission to graduate study at UNC Charlotte. The Department requires that applicants demonstrate evidence of suitability for the programs via evaluation in the five major areas listed below. These are weighted equally.

All applications for admission to the M.A. in Geography program are reviewed by the Geography Graduate Advisory Committee. The Department admits applicants on a competitive basis as space in the program allows and grants exceptions to the minimum standards if deemed in the best interests of the program.

- **Grade Point Average (GPA):** In general, the Department would prefer an overall undergraduate GPA above 3.1 (or a 3.1 for the last 2 years) and a GPA of 3.2 in the major. However, averages less than these will not exclude applicants if the other elements of the application are strong.
- **Letters of Recommendation:** Three letters of reference are required. Letters from college or university teachers who have worked with and/or taught applicants are preferred. These letters will be evaluated on the basis of how well the applicant is suited in terms of intellect, motivation and temperament to do graduate coursework.
- **Personal Essays:** Applicants must write a personal essay which directly addresses why they wish to do graduate work in geography and why they wish to participate in the M.A. program at UNC Charlotte. They should address directly how the program at UNC Charlotte fits their career and/or professional goals and how they would benefit from and contribute to the M.A. in Geography at UNC Charlotte. This essay is very important in determining the applicant's commitment to graduate education and to a professional career in geography or a related field. Careful consideration of what goes into this essay is time well spent.

- **Scores on the Graduate Record Exam (GRE):** In general, the department would prefer scores in the range of 150 or more on each of the Verbal and Quantitative portions of the GRE. Analytical scores are expected to be above 3.5. Again, scores less than these suggested minimums will not automatically exclude applicants if the remainder of the applicant's file is strong.
- **Transcripts of College Coursework:** The transcripts will be evaluated on the basis of types of courses attempted, range of geography, statistical and computer coursework attempted. Not only will the applicant be evaluated on the strength of the performance in these areas, but also on the range, depth and suitability of the applicant's preparation for graduate level coursework.

Additional Requirements for International Applicants

Applicants whose native language is not English must demonstrate their proficiency in English by taking the Test of English as a Foreign Language (TOEFL) examination. Overall scores of 84 with scores of 21 or above on individual sections (listening comprehension; structure and written expression; vocabulary and reading comprehension) are preferred.

Prerequisite Requirements

(Minimum Preparation Suggested for Students Entering the Program)

All prospective graduate students must demonstrate competence in the undergraduate subject matter in their area of study. While the department does not require that applicants have a degree in Geography, prospective graduate students should provide evidence that they are prepared to immediately take full advantage of graduate level coursework in Geography.

Students applying to the program should, at a minimum, be familiar with the concepts and materials offered in courses such as basic Economic Geography, Introduction to Spatial Analysis, Location Theory, and Introduction to Research Methods or Statistics. Any student wishing to pursue additional training in Geographic Information Systems (GIS) should have basic cartography preparation and computer file management and data base skills.

Assistantships

Graduate assistantships are awarded on a competitive basis and arranged for either one entire semester or for an entire academic year (2 semesters or 9 months). They are normally scheduled for 16 weeks per semester and the student works 20 hours per week.

Degree Requirements

The M.A. in Geography requires a minimum of 36 credit hours of graduate work. Three specific courses (12 credit hours) are required of all students except those pursuing the Community Planning Track. Of the remaining 24 credit hours, a minimum of 12 credit hours must be completed through 5000-6000 level geography coursework. Up to 12 credit hours may be taken in related work, which includes all transfer credit, credit by exam, and coursework in other departments at or above the 5000 level. At the discretion of the department, transfer credit totaling up to 6 hours may be accepted from accredited universities. No student may take more than 6 credit hours in graduate level independent study (GEOG 6800).

Required Courses *(for all except the Community Planning Track)*

GEOG 6131 Research Design Fundamentals (3)
GEOG 7900 Individual Research Project (6)
GRAD 6101 Linear Regression (3)

Elective Courses

- Other 5000 or 6000-level courses in Geography with a minimum of 12 credit hours
- Related work (outside the department) or transfer credits in courses numbered 5000 and above with a maximum of 12 credit hours

Advising

Upon admission to the program each student will be assigned a faculty advisor from the student's declared area of interest. This advisor will help guide the student through the design and implementation of a program of study tailored to the student's specific needs and career goals. The advisor will be available to the student for advice on academic and other matters. Students must confer with their advisors regularly concerning academic matters.

More often than not, students will not work with the same advisor throughout the entire program. Once the student has become familiar with the program and the faculty, it is possible to change advisors by obtaining prior approval from the faculty member with whom the student wishes to work. Advisors should be chosen to match, as nearly as possible, the student's academic and career interests. No student will be allowed to register for a course without an advising session with their advisor. The advisor will remove the advising hold at this session.

All students are required to formulate a complete plan for their M.A. during pre-registration for second semester. This plan must be approved by their advisor and will serve as a guide to their course of study while at UNC Charlotte.

Academic Standards

From the date of admission to graduation, the Department conducts a continuous review of student academic and professional performance. In addition to evaluations conducted within the courses taken by students, the faculty conduct a thorough review of student performance on a regular basis. Continuation in the program is contingent upon a favorable review during these evaluations. Students who consistently show borderline course performance, who are not developing good applied skills in the practice of their chosen area of study, who fail to complete coursework on a timely basis, or who otherwise perform unprofessionally or unsatisfactorily, may be required to complete additional courses or may be terminated from the program.

All graduate students are subject to academic suspension and/or termination. Department academic standards deviate slightly from University policies stated in appropriate catalogs. A student must maintain a cumulative average of 3.0 in all coursework taken in the program. An accumulation of one (1) marginal (C) grade results in the student being placed on probationary status within the program and could lead to the student being required to re-take the course, and a potential loss of funding if the student is receiving departmental or internship funding. An accumulation of two (2) marginal (C) grades results in suspension of the student's enrollment in the graduate program. A graduate student whose enrollment has been suspended because of grades is ineligible to register in any semester or summer session unless properly reinstated through the suspension appeal process. An accumulation of three (3) marginal (C) grades or one (1) unsatisfactory (U) or one (1) NC grade results in termination of the student's enrollment in the graduate program. In order to continue a program of study, the student must pursue reinstatement through the termination appeal process or wait a period of two years before applying for readmission to the program.

Special care should be exercised in completing the requirements of a course in which a grade of Incomplete (I) is received. With the exception of GEOG 6131, where incomplete grades are not normally given, incomplete work must be finished during the next semester in residence, but not later than 12 months after the end of the term in which the "I" was assigned, whichever comes first. However, the course instructor has the option of specifying a completion deadline anytime within the 12-month period. If the "I" is not removed during the specified time, a grade of U is automatically assigned. In any case, a student will not be allowed to schedule the final comprehensive examination until all incomplete grades are removed. Also, with the exception of

GEOG 7900, no student may have more than two incomplete grades at any time. Students with two or more incompletes may not register for another term.

Concentrations and Tracks

Students may elect to study in one or a combination of three concentrations (Location Analysis, Urban-Regional Analysis, GIS&T) and one track (Community Planning).

Location Analysis Concentration

The Concentration in Location Analysis offers coursework in retail location, applied population analysis, facility siting, office and industrial location, trade area analysis, real estate development, location research, and regional economic development.

This concentration prepares students for jobs in location research with retail companies, real estate developers, consulting firms, commercial banks, and economic development agencies or for continued academic training in economic geography and location analysis. Some courses are taught by practitioners in the career fields listed above.

Courses

The following courses are suggested for a concentration in location analysis:

- GEOG 5108 Sport, Place and Development (3)
- GEOG 5155 Retail Location (3)
- GEOG 5255 Applied Population Analysis (3)
- GEOG 6000 Selected Topics in Economic Geography (3)
- GEOG 6030 Topics in Geographic Techniques (3)
- GEOG 6103 Real Estate Development (3)
- GEOG 6301 Industrial Location (3)
- GEOG 6305 Site Feasibility Analysis (3)
- GEOG 6306 Store Location Research (3)

Urban-Regional Analysis Concentration

The Concentration in Urban-Regional Analysis offers coursework in community development, regional development, GIS based analysis, site feasibility analysis, public facility siting, urban economics and social geography.

Students normally gain employment in public sector community development and economic development as well as the private sector.

Graduates of the M.A. in Geography program hold positions in a number of local and regional agencies in North Carolina and South Carolina as well as in other states such as California, Colorado, Connecticut, Florida, Georgia, Kentucky, New York, and Washington. They have responsibility for a broad range of development issues and tasks including economic development, geographic information

systems, housing, land use, community and neighborhood analysis. Job placement for graduates has been very successful.

Courses

Students normally choose courses from the following for a Concentration In Urban-Regional Analysis:

- GEOG 5101 Cartographic Techniques (3)
- GEOG 5103 Computer Mapping (3)
- GEOG 5108 Sport, Place and Development (3)
- GEOG 5120 Introduction to Geographic Information Systems (4)
- GEOG 5130 Advanced Geographic Information Systems (4)
- GEOG 5210 Urban Planning Methods (3)
- GEOG 5255 Applied Population Analysis (3)
- GEOG 5260 Transportation Policy Formulation (3)
- GEOG 5265 Transportation Analysis Methods (3)
- GEOG 6015 Topics in Regional Geography (3)
- GEOG 6103 Real Estate Development (3)
- GEOG 6123 Urban Regional Environment (3)
- GEOG 6210 The Restructuring City (3)
- GEOG 6211 Cities and Immigrants (3)
- GEOG 6212 Urban Labor Markets (3)
- GEOG 6300 Applied Regional Analysis (3)
- GEOG 6301 Industrial Location (3)
- GEOG 6305 Site Feasibility Analysis (3)
- GEOG 6400 Spatial Decision Support Systems (4)
- GEOG 6500 Urban Planning: Theory & Practice (3)

Geographic Information Science and Technologies (GIS&T) Concentration

Given the increasingly diverse uses of geospatial technology in government, industry, and academia, this concentration prepares students for jobs with public agencies and private companies, such as GIS systems designers, geospatial analysts, geospatial project coordinators, geospatial information technologists, cartographers, spatial planners, and remote sensing analysts.

The Concentration in Geographic Information Science and Technologies (GIS&T) offers coursework giving each student the opportunity to acquire and apply GIS&T tools and techniques, specifically digital image processing, environmental, transportation and urban applications of GIS, GPS, GIS programming and customization, geocomputation, geovisualization, location modeling, network analysis, planning applications of GIS, remote sensing, spatial database design, spatial decision support systems, spatial optimization spatial statistics and geostatistics.

Required Courses

- GRAD 6101 Linear Regression (3)
- GEOG 6131 Research Design Fundamentals (3)
- GEOG 7900 Individual Research Project (6)

Elective Courses

A total of 24 credit hours originating from the following lists of GIS&T elective courses are recommended for a Concentration in GIS&T*. In customizing their programs, students should endeavor to take at least 3 to 6 elective hours of geography courses in the areas of community planning, transportation, locational analysis, or urban regional analysis.

GIS&T Tools and Techniques Elective Courses

GEOG 5120 Introduction to Geographic Information Systems** (4)
 GEOG 5102 Cartographic Design and Map Construction (3)
 GEOG 5150 Spatial Database Development with GPS/GIS (3)
 GEOG 5000 GIS Programming and Spatial Database (3)
 GRAD 6104 Spatial Statistics (3)
 ESCI 5170 Fundamentals of Remote Sensing (4)
 ESCI 5180 Digital Image Processing in Remote Sensing (4)

GIS&T Applications Elective Courses

GEOG 5101 Applied Cartographic Design (3)
 GEOG 5131 Environmental Modeling with GIS (4)
 GEOG 5132 Spatial Modeling for Social and Economical Applications (3)
 GEOG 6030 Topics in Geographic Techniques (3)
 GEOG 6121 Advanced Seminar on Spatial Modeling (3)
 GEOG 6122 GIS&T and Urban Regional Analysis (3)
 GEOG 6400 Advanced Seminar in Spatial Decision Support Systems (4)
 GEOG 6402 Multi-Attribute Assessment/Evaluation for Planning and Decision-Making (3)
 GEOG 6404 Spatial Data Analysis in GIS (3)
 GEOG 6406 Spatial Information and Mobility Systems (3)
 GEOG 6407 Geocomputation (3)
 GEOG 6408 Spatial Optimization (3)

**In addition, selected coursework offered by the Department of Civil and Environmental Engineering and the College of Computing and Informatics is available to students with the approval of their academic advisor, provided that course prerequisites are satisfied. Students can also elect to complete an internship with a private company or a public agency for credit to acquire practical experiences in GIS&T.*

***Unless students have had a substantial introductory GIS course prior to entering the M.A. program, GEOG 5120 is strongly recommended as this course serves as a foundation for the other GIS&T courses.*

Community Planning Track

The Community Planning Track is structured to provide students with grounding in planning skills,

methods and theory, and practical experience for careers in community planning. That structure is supported by interdisciplinary perspectives from core coursework in Architecture, Economics, Geography, and Public Administration.

Graduates have been hired by local and regional planning agencies to give the track an excellent placement success rate. Perhaps a third of the students who pursue the program are practicing planners who wish to build and improve their professional skills.

The track comprises an interdisciplinary curriculum of 36 required credit hours. Core requirements and approved electives are listed below:

Required Courses (21 credit hours)

GEOG 5210 Urban Planning Methods (3)
 GEOG 6500 Urban Planning: Theory and Practice (3)
 GEOG 6501 Community Planning Workshop (3)
 or ARCH 6050 Architectural Elective (3)
 (Community Planning Workshop topic)
 ARCH 5214 Architectural Elective (3) *(Dilemmas of Modern City Planning topic)*
 ECON 6250 Advanced Urban and Regional Economics (3)
 GRAD 6101 Linear Regression (3)
 MPAD 6128 Foundations of Public Policy (3)

Elective Courses (9 credit hours minimum)

Select from the following:

GEOG 5120 Introduction to Geographic Information Systems (4)
 GEOG 5130 Advanced Geographic Information Systems (4)
 GEOG 5209 Small Town Planning (3)
 GEOG 5255 Applied Population Analysis (3)
 GEOG 5260 Transportation Policy Formulation (3)
 GEOG 5265 Transportation Analysis Methods (3)
 ARCH 6050 The Architecture of Settlements (3)
 ARCH 6050 Public Spaces in Cities (3)
 ARCH 6050 Urban Transit and City Form (3)
 ARCH 7103 Design Studio: Topical (6)
 or ARCH 7104 Final Project/Thesis Studio (6)
 MPAD 6102 Foundations of Public Administration (3)
 MPAD 6131 Public Budgeting and Finance (3)

Capstone Research Project (6 credit hours)

GEOG 7900 Individual Research Project (6) *(taken in final semester)*

Research Options

The program requires all students to complete a thesis-quality, individual capstone research project. Although individual research experiences may differ, students should pursue research experiences that are appropriate to departmental faculty resources, individual student's programs and career goals, and

the availability of opportunities that exist to work with allied agencies or clients on or off campus. One of three options, depending on the previously stated stipulations, will be available: 1) a research experience similar to that of a traditional academic thesis; 2) a research experience which involves a paid internship funded by and arranged with a public or private agency or client; and 3) a research experience involving an internship that is not funded, but arranged with a public or private agency or client. Each of these options fulfills program requirements equally. Each will produce a finished research effort of thesis quality.

Not every student can expect to develop a capstone research project that is similar to a traditional academic thesis. It does, however, provide a choice for students to pursue a research problem in a direction of his/her individual interest. Students who ultimately plan to pursue a Ph.D. degree might be more inclined and encouraged toward that option. The same is true of students who wish to complete their master's program with that kind of individual research activity. In all cases, students must work closely with their advisor and program committee to choose the option which best fits both their particular program and prevailing circumstances.

Not every student can expect to engage in a capstone research project that is a paid internship because the number of students frequently exceeds a matching number of opportunities funded in that manner. Unpaid internships provide the same caliber of experience and training in an applied environment. In some cases, that experience may relate student with nonprofit agencies or social services that simply do not have the resources to fund an internship. In either case, the topic of the internship is defined by the client's problem or needs.

Committees

All GEOG 7900 Research Projects are evaluated by a committee of faculty. Committees must have a minimum of three members composed of the graduate faculty of the department--or related departments. Committee members may include outside members from other departments or internship coordinators from off-campus agencies when appropriate.

Comprehensive Examination and Capstone Defense

To complete the program, each student must pass a written comprehensive examination covering both general aspects of the discipline and an oral defense of the individual capstone research project. It is the responsibility of the advisor or committee chair, in consultation with the student, to arrange both the examination and defense.

The Written Exam

The student must respond to three questions submitted by the faculty. These questions are solicited from the entire graduate faculty of the department by a memo sent by student's advisor who then administers the examination. The written comprehensive exam is normally taken during the third semester (for full-time students) and in no case should the student take this exam before accumulating 27 credit hours of completed coursework including courses in progress. This exam may not be administered if the student has outstanding incomplete grades in any coursework.

The Defense

The defense of the individual research project (GEOG 7900), the capstone, is generally administered at the discretion of the committee chair and the student. When the advisor is satisfied that the student's research and writing has progressed sufficiently, the research document is provided to the other members of the independent research committee; if they agree that the document is ready for a defense, an oral exam is scheduled.

COURSES IN GEOGRAPHY (GEOG)

GEOG 5000. Topics in Geography. (3) Major topics in Geography. *May be repeated for credit with change of topic.*

GEOG 5040. Transportation Topics. (3) Prerequisite: Permission of department. Investigation of special topics in transportation including: transit systems, mobility and travel patterns, land use/transportation interface, air pollution, and information systems.

GEOG 5101. Cartographic Techniques. (3) Prerequisite: GEOG 2100. Preparation of maps, figures and charts at a professional level of competence. Techniques to be emphasized include desktop mapping with computers, high resolution imagesetting output, color separation techniques which include computer separations as well as scribing and various related photographic processes. Two laboratories of three hours each per week.

GEOG 5102. Cartographic Design and Map Construction. (3) Design process and basic map construction techniques with particular emphasis on the graphic elements of map design, planning map design, creating visual hierarchies, the uses of color, and basic mechanical color separation.

GEOG 5103. Computer Mapping. (3) Prerequisites: GEOG 2100 and CSCI 1100 or 1201 and its lab, or permission of instructor. Automated methods of

gathering, storing, manipulating and displaying spatial data. Emphasis on the use of existing software and the design and implementation of geographic data structures and algorithms.

GEOG 5108. Sport, Place and Development. (3)

Prerequisites: GEOG 1105. Examines sport and its impact on the landscape of cities and communities. Implications of sport are examined in terms of urban use, urban social structure, markets, franchise movement and expansion, urban politics, its role in defining sense of place, and its impact on the development of communities and regions.

GEOG 5110. GIS for Nonmajors. (3) Examines the fundamental concepts and techniques of Geographic Information System (GIS) technology and its application to social and physical sciences. Students learn processing, collecting, organizing, displaying, and analyzing geographic data from address geocoding, GPS, CD-ROM, World Wide Web, and other sources. Emphasis placed on data preparation, analysis, and presentation. Labs introduce students to ArcGIS.

GEOG 5120. Introduction to Geographic Information Systems. (4) Prerequisite: Permission of instructor. Development, current state-of-the-art and future trends in geographic information processing with emphasis on data gathering, storage, and retrieval, analytical capabilities and display technologies. A laboratory component will include development and completion of an applied GIS research project. Additional requirements for graduate credit. Three lecture hours, one two-hour lab per week.

GEOG 5130. Advanced Geographic Information Systems. (4) Prerequisite: GEOG 5120 or permission of instructor. Advanced GIS study with emphasis on (1) advanced skills for database development and management; (2) spatial analysis and modeling; and (3) Macro language programming and user interface design. Three lecture hours and a two-hour lab session each week.

GEOG 5131. Environmental Modeling with GIS. (4) Prerequisite: GEOG 5120 or permission of instructor. Theories and practices of modeling the environment with GIS. Topics include: types of spatial modeling frameworks; GIS data sources and measurement technologies for environmental modeling; development, calibration, and validation of environmental models; 3-dimensional modeling and visualization of physical processes; and spatial analysis of human-environment interactions.

GEOG 5132. Spatial Modeling for Social and Economical Applications. (3) Theories and practices

of spatial modeling with social and economical applications. Topics include: overview of modeling in human geography, socioeconomic data sources, and building and evaluating spatial models. Examples of models covered in class include: spatial accessibility, interaction, diffusion, tipping points, segregation (simulation), geodemographic/segmentation, and Markov models (stochastic).

GEOG 5150. Spatial Database Development with GPS and GIS. (3) The fundamentals of database management systems and their relevance in GIS.

Emphasis placed on the effective creation, maintenance, and retrieval of data from a spatially enabled database. Topics include: relational database theory and design, entity-relationship diagrams, Structured Query Language (SQL), spatial queries, geodatabase design.

GEOG 5155. Retail Location. (3) Spatial attributes of retailing and related activities. Location patterns, store location research, trade area delineation and consumer spatial behavior.

GEOG 5160. The Geography of Transportation Systems. (3) Geographical and human factors that affect the movement of goods and people from place to place. Emphasis on transportation routes and networks, commodity flow patterns and the locational implications of freight rates.

GEOG 5209. Small Town Planning. (3) Explores small town population dynamics, rural-urban fringe land use dynamics, and changes in small towns' community identity and sense of place. Emphasis placed on the issues and techniques that typify small town planning environments. Students investigate these issues via field work and data collection at municipal scales within the Charlotte region.

GEOG 5210. Urban Planning Methods. (3) Scope and methods of urban planning. Emphasis on analytical techniques, projections, and data sources used in developing comprehensive planning tasks and strategies.

GEOG 5215. Urban Ecology. (3) An introduction to the emerging field of urban ecology. Explores the biological, physical, and social components of the urban ecosystem at local, regional, and global scales. Emphasis on the interplay among components and the sustainability of cities during lectures, field trips, and group discussions.

GEOG 5216. Landscape Ecology. (3) An introduction to landscape ecology, the study of the interplay between spatial pattern and ecological process. Lectures and in-depth group discussions focus on the fundamental and applied aspects of topics such as

habitat fragmentation, animal movement in human-dominated landscapes, landscape legacies, road ecology, and landscape planning.

GEOG 5240. Geography of Knowledge and Information. (3) Examination of the factors that influence the location of economic activities in the information age. Discussions and lectures explore the geographic aspects of the transition away from manufacturing to information processing as the primary mode of production. The transition is examined in terms of technology development, urban and regional development, information flows, and the location of quaternary industry.

GEOG 5255. Applied Population Analysis. (3) Population data sources; measuring population change; elementary projection and estimation techniques; spatial sampling; migration; survey design; applications in the public and private sectors.

GEOG 5260. Transportation Policy Formulation. (3) Prerequisite: Permission of department. Structure of transportation policy at federal, state, and local levels including policies concerning highway financing and investments, congestion, safety, and use and development, energy, transit, and the provision of intercity services.

GEOG 5265. Transportation Analysis Methods. (3) Prerequisite: Permission of department; statistics recommended. Procedures for analyzing the operation and performance of transportation systems; includes network planning models, minimum path algorithms and assignments; energy, air pollution, and activity analysis models; and research approaches, data sources, time and activity budgets, infrastructure condition and needs assessment.

GEOG 5310. Urban Social Geography. (3) Prerequisites: GEOG 1105 and at least one of GEOG 2200, GEOG 2165, GEOG 3100, or GEOG 3205, or permission of instructor. Examines the reflexive relationship between society and urban space. Explores the intersection between urban geography and social theory, the evolution of city, community and personal spaces, and the relations and constructions of class, race, gender, and sexuality that shape and are shaped by the urban spaces in which we live and work.

GEOG 5405. Urban Field Geography. (6) Prerequisite: six hours of urban-related undergraduate courses or permission of instructor. Intensive field studies of cities of the Carolinas, including one-day and overnight trips to cities of the mountains and coastal areas. Emphasis on day study trips within the Piedmont. Exercises include land-use mapping, trip journals, interviews and comparisons of the results of

zoning and urban development practices within satellite cities of the Charlotte Metropolitan Statistical Area.

GEOG 6000. Topics in Economic Geography. (3) Cross-listed as GEOG 8000. Major topics in the location of economic activity. *May be repeated for credit with change of topic.*

GEOG 6005. Topics in Urban Geography. (3) Cross-listed as GEOG 8005. Major topics in the form and structure of urban areas examined generally and in a specific local occurrence. *May be repeated for credit with change of topic.*

GEOG 6010. Topics in Political Geography. (3) Cross-listed as GEOG 8010. Major topics in the spatial aspects of political systems with special emphasis on urban and regional spatial patterns examined generally and in a specific local occurrence. *May be repeated for credit with change of topic.*

GEOG 6015. Topics in Regional Geography. (3) Intensive examination of major spatial questions in a given region. *May be repeated for credit with change of topic.*

GEOG 6030. Topics in Geographic Techniques. (3) Cross-listed as GEOG 8030. Cartographic, remote sensing, quantitative techniques or field techniques. *May be repeated for credit with change of topic.*

GEOG 6103. Real Estate Development. (3) Cross-listed as MBAD 6159 and MSRE 6159. An introduction to the real estate development process. Identification and evaluation of the critical assumptions and issues related to market and site feasibility, financial feasibility, planning, acquisition, and operation of economically viable commercial real estate projects. Students work in groups on a semester project to select a site and prepare an appropriate development plan that emphasizes the market and financial feasibility of the real estate development.

GEOG 6105. Applied Real Estate Development. (3) Cross-listed as MBAD 6259 and MSRE 6259. Prerequisite: MBAD 6159 or GEOG 6103. The application of the processes involved in real estate development. Students work in groups on a semester project to select a site and prepare an appropriate development plan that emphasizes the market and financial feasibility of the real estate development.

GEOG 6121. Advanced Seminar on Spatial Modeling. (3) Cross-listed as GEOG 8121. Prerequisite: GEOG 5131, GEOG 5132, or permission of instructor. This seminar focuses on the theories of spatial modeling

and simulation. Topics include, but are not limited to, spatial systems, models for spatial analysis, models for spatial simulation, modeling life-cycle, model verification, validation, and accreditation.

GEOG 6122. GIS&T and Urban Regional Analysis.

(3) Cross-listed as GEOG 8122. Prerequisite: Permission of instructor. This course focuses on the spatial thinking, spatial analytic methods and their GIS applications suited for urban and regional analyses. Modeling approaches include spatial interaction models, spatial optimization methods, spatial diffusion, space-time modeling of individual behavior and integrated transportation land-use models.

GEOG 6123. Urban Regional Environment. (3)

Cross-listed as GEOG 8123 and PPOL 8610. Examination of the nature of urban regions and the basic factors that shape urban regions as they grow. Impact of: geography; history; social factors; economic factors; concerns about gender, race and ethnicity, and class; and other determinants of the nature of urban regions, their problems, and possible policy solutions.

GEOG 6124. Seminar in Geographic Theory and Research Design. (3)

Cross-listed as GEOG 8124. Prerequisite: Permission of instructor. Critical examination of trends in the history and philosophy of geographic thought and research. Principles of research in geography and urban regional analysis.

GEOG 6131. Research Design Fundamentals. (3)

Cross-listed as GEOG 8131. Scientific research and problem solving. Problem identification, bibliographic search, data sources and collection, techniques selection and preparation of reports and proposals.

GEOG 6132. Seminar in Geography. (3) Study of the current trends in geographic thought and research methods. *Graded on a Pass/Unsatisfactory basis.*

GEOG 6210. The Restructuring City. (3) Cross-listed as GEOG 8210 and PPOL 8615. Critical assessment of the causes and consequences of contemporary urban restructuring. Evaluation of theoretical, planning and policy challenges facing urban society associated with global-local change.

GEOG 6211. Cities and Immigrants. (3) Cross-listed as GEOG 8211. Prerequisite: Permission of instructor. Examination of changing patterns and dynamics of immigrant settlement and adjustment in U.S. and Canadian urban areas. Topical areas include assimilation and integration, identity formation, transnationalism, enclave development, labor market involvement, gateway versus new destinations, immigrant suburbanization and socio-spatial isolation.

GEOG 6212. Urban Labor Markets. (3) Cross-listed as GEOG 8212. Prerequisite: Permission of instructor. This course will explore the changing social and spatial structure of urban labor markets in post-industrialized cities. Special reference to immigrant and minority labor markets in the U.S. Topics include: discrimination, industry and occupation concentrations, job queues, ethnic networks, ethnic entrepreneurs, technological change and economic restructuring.

GEOG 6213. Development Issues on the Rural-Urban Fringe. (3)

Cross-listed as GEOG 8213. Prerequisite: Permission of instructor. This course focuses on changes in the rural-urban fringe and the resulting fringe geographies including challenges that local and regional governments face with growth management, sense of place, and sustainable integration into their new regional settings.

GEOG 6300. Applied Regional Analysis. (3) Cross-listed as GEOG 8300. Prerequisite: Basic computer skills including spreadsheets. Introduction to methods and techniques used in regional analysis. Topical areas include data sources and collection, regional delineation, community and regional profiles, regional accounts, methods of analysis and impact assessment. Topics are discussed in terms of theory, use, and role in economic geography and regional development. Emphasis is placed on application of economic and demographic methods at the regional level.

GEOG 6301. Industrial Location. (3) Cross-listed as GEOG 8301. Addresses factors influencing the location of industrial and service activities. Classical theories of industrial location are augmented with contemporary interpretations of the economic landscape. Emphasis is placed on theoretical foundations and new developments in industrial location theory, patterns and trends of industrial location, the site selection process, community impacts of locational decision-making, and the role of governments. Patterns and trends are examined in regional, national, and international perspectives.

GEOG 6302. Regional Economic Development. (3) Cross-listed as GEOG 8302 and PPOL 8642. Neo-classical and contemporary theories of trade, economic geography and urban and regional development. Topics include: theories of urban and regional growth, location theories including industry, central places, and growth centers; human capital, labor force, and entrepreneurial contributions to growth; policy dimensions of urban growth and development are addressed from theoretical and empirical perspectives.

GEOG 6304. The Transforming North Carolina Economy. (3) Cross-listed as GEOG 8304.

Prerequisite: Permission of instructor. An examination of the contemporary and historic forces which shape the economic geography of the state. Themes examined will include human-land interactions, past and present economic transitions and the rural-urban balance within the state. Emphasis will be placed on understanding the economic forces which will most dramatically impact the future. Seminar format.

GEOG 6305. Site Feasibility Analysis. (3) Cross-listed as MBAD 6258 and MSRE 6258. Prerequisite: Permission of instructor. Examination of factors affecting the feasibility of land parcels for commercial and residential development with emphasis on the physical evaluation of a given site, the market support for its intended use, and the financial support for the proposed development.

GEOG 6306. Store Location Research. (3)

Prerequisite: GRAD 6101 or permission of instructor. Market area analysis and site evaluation methods, including the application of multivariate statistical models, spatial interaction-gravity models, and location-allocation techniques to the retail location analysis task.

GEOG 6400. Advanced Seminar in Spatial Decision Support Systems (SDSS). (4) Cross-listed as GEOG 8400 and PPOL 8642. Prerequisite: GEOG 5120 or permission of instructor. Theoretical aspects of spatial DSS including technical, social, political and psychological consideration; systems design; systems manipulation; and case studies. Three hours of lecture and one two-hour lab per week.

GEOG 6401. GIS Programming and Customization. (3) Cross-listed as GEOG 8401. Prerequisite: GEOG 4120/5120 or permission of instructor. This course consists of tutorials, readings, projects, and discussions of how to customize and to program ArcObjects within various programming environments: to program automatic repetitive tasks, to build their own applications, to write geoprocessing scripts, and to develop and customize the Web applications.

GEOG 6402. Multi-Attribute Assessment/Evaluation for Planning and Decision-Making. (3) Cross-listed as GEOG 8402. Prerequisite: Permission of instructor. A survey and comparison of multi-attribute assessment and evaluation methods in spatial planning and decision-making; and discusses the implementation of these methods with the aid of geographic information techniques. Topics include: land suitability/vulnerability assessment, environmental and social impact assessment, risk

assessment, site selection, plan evaluation, and multi-criteria decision analysis.

GEOG 6404. Spatial Data Analysis in GIS. (3) Cross-listed as GEOG 8404. Prerequisite: GEOG 5120 or permission of instructor. Advanced analytical methods used in GIS and spatial data analysis to advance the understanding of spatial patterns and to invoke powerful principles of spatial thinking. Examination of theoretical and conceptual aspects of algorithms used in GIS software to analyze spatial data. Critical assessment of the use, misuse, abuse and limitations of GIS analytical techniques.

GEOG 6405. Three Dimensional Visualization. (3) Cross-listed as GEOG 8405. Prerequisite: GEOG 4130/5130 or permission of instructor. This course consists of tutorials, readings, projects, and discussions concerned with how geo-visualization techniques can be used to display geographic information driven from spatial analyses in 3D GIS. Students who successfully complete the course are able to understand advanced geographic information systems, focusing on multi-dimensional data models and three-dimensional geo-visualization as spatial analyses tools. In addition, students work on independent and group projects to develop 3D GIS applications such as 3D Urban Simulation System using existing 3D GIS and visualization software.

GEOG 6406. Spatial Information and Mobility. (4) Cross-listed as GEOG 8406. Prerequisite: GEOG 5120 or permission of instructor. Issues related to the collection, storage, and dissemination of data and information used in transportation analysis, planning, and operations. Students are exposed to the functionality of geographic information systems and concepts of Geographic Information Science that enable these tasks, as well as to traditional travel data collection techniques. Advanced data collection and information dissemination approaches are also discussed, including the use of probes, sensors, GPS, and other wireless communication devices. The fundamentals of Intelligent Transportation Systems form a central part of the course. Finally, the state-of-the-art and future of location-based services and telematics systems is discussed from the perspective of personal mobility and spatial information.

GEOG 6407. Geocomputation. (3) Cross-listed as GEOG 8407. Prerequisite: GEOG 5120 or permission of instructor. The implementation of computational techniques and resources for the exploration and analysis of (large) spatially referenced databases. Provides an assessment of the place and contribution of computational methods in spatial data handling. Explores "new" computationally intensive approaches to doing geography. Topics include: artificial neural networks, machine learning induction algorithms,

genetic and other evolutionary algorithms, and other algorithms for spatial data mining.

GEOG 6408. Spatial Optimization. (3) Cross-listed as GEOG 8408. Prerequisite: GEOG 5120 or permission of instructor. Spatial Optimization is articulated around the explicit use of GIS tools and techniques to solve coverage, distance-decay problems as well as routing problems integrating geographic information. Case studies in various domains such as urban retailing or transportation. Problem formulation and solution techniques to optimally preserve existing natural reserves, such as reservoir resources or locating natural corridors between biologically rich areas to protect diversity.

GEOG 6500. Urban Planning: Theory and Practice. (3) Cross-listed as GEOG 8500 and PPOL 8616. Critical assessment of alternative planning theories and their application to planning practices. Examination of economic, political, social, cultural and geographical factors affecting the operations of cities and resource distribution.

GEOG 6501. Community Planning Workshop. (3) Cross-listed as ARCH 6050. Problem-solving, client-based course designed to give students experience in applying planning theory and methods to actual problems. Types of problems include growth management, land use planning, regional planning, community development, urban design, infrastructure financing, economic development, and environmental management. Students will gain experience compiling and analyzing community scale data, working with citizens, professional planners, and elected officials and preparing oral reports and technical documents. The workshop setting will build upon and extend conventional classroom instructions.

GEOG 6600. Transportation Policy. (3) Cross-listed as GEOG 8600 and PPOL 8613. Examination of surface transportation from a public policy perspective. Institutional components and role of government at all levels influencing investment; changes in technology, environment, security, safety, equity, cost-effectiveness, public health and welfare are covered.

GEOG 6612. Advanced Geography of Transportation Systems. (3) Cross-listed as GEOG 8612. Prerequisite: GRAD 6101, GRAD 8101, or permission of instructor. Exploration of transportation systems from a geographic perspective. The course emphasizes the importance of these systems in the past, present and future. The course explores the relationships between the organization of the space economy and transportation, the flow of people, commodity and ideas at different scales of observation from the small picture (urban transportation) to the

big, global picture (international transportation), mobility issues in everyday life and in the economy. The social, economic, physical, and political contexts of transportation systems are discussed. The course is also designed to develop analytical capabilities by using a few fundamental techniques of transportation planning and analysis.

GEOG 6643. Rural Development Issues. (3) Cross-listed as GEOG 8643. Prerequisite: Permission of instructor. This course provides research experiences that focus on policy formulation, and demographic, economic and planning issues in rural areas.

GEOG 6800. Directed Problems in Geography. (1-4) Cross-listed as GEOG 8800. Individual research into geographic topics. *May be repeated for credit one time with change of topic.*

GEOG 7900. Individual Research Project. (1-6) Individual research report based on directed study of a topic of geographic significance. *Graded on a Pass/Unsatisfactory basis. May be repeated for credit (required minimum total of 6 credits).*

COURSES IN GEOGRAPHY AND URBAN REGIONAL ANALYSIS (GEOG)

GEOG 8000. Topics in Economic Geography. (3) Cross-listed as GEOG 6000. Major topics in the location of economic activity. *May be repeated for credit with change of topic.*

GEOG 8005. Topics in Urban Geography. (3) Cross-listed as GEOG 6005. Major topics in the form and structure of urban areas examined generally and in a specific local occurrence. *May be repeated for credit with change of topic.*

GEOG 8010. Topics in Political Geography. (3) Cross-listed as GEOG 6010. Major topics in the spatial aspects of political systems with special emphasis on urban and regional spatial patterns examined generally and in a specific local occurrence. *May be repeated for credit with change of topic.*

GEOG 8030. Topics in Geographic Techniques. (3) Cross-listed as GEOG 6030. Cartographic, remote sensing, quantitative techniques or field techniques. *May be repeated for credit with change of topic.*

GEOG 8121. Advanced Seminar on Spatial Modeling. (3) Cross-listed as GEOG 6121. Prerequisite: GEOG 5131, GEOG 5132, or permission of instructor. This seminar focuses on the theories of spatial modeling

and simulation. Topics include, but are not limited to, spatial systems, models for spatial analysis, models for spatial simulation, modeling life-cycle, model verification, validation, and accreditation.

GEOG 8122. GIS&T and Urban Regional Analysis.

(3) Cross-listed as GEOG 6122. Prerequisite: Permission of instructor. This course focuses on the spatial thinking, spatial analytic methods and their GIS applications suited for urban and regional analyses. Modeling approaches include spatial interaction models, spatial optimization methods, spatial diffusion, space-time modeling of individual behavior and integrated transportation land-use models.

GEOG 8123. Urban Regional Environment. (3)

Cross-listed as GEOG 6123 and PPOL 8610. Examination of the nature of urban regions and the basic factors that shape urban regions as they grow. Impact of: geography; history; social factors; economic factors; concerns about gender, race and ethnicity, and class; and other determinants of the nature of urban regions, their problems, and possible policy solutions.

GEOG 8124. Seminar in Geographic Theory and Research Design. (3) Cross-listed as GEOG 6124.

Prerequisite: Permission of instructor. Critical examination of trends in the history and philosophy of geographic thought and research. Principles of research in geography and urban regional analysis.

GEOG 8131. Research Design Fundamentals. (3)

Cross-listed as GEOG 6131. Scientific research and problem solving. Problem identification, bibliographic search, data sources and collection, techniques selection and preparation of reports and proposals.

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social and spatial structure of urban labor markets in post-industrialized cities. Special reference to immigrant and minority labor markets in the U.S. Topics include: discrimination, industry and occupation concentrations, job queues, ethnic networks, ethnic entrepreneurs, technological change and economic restructuring.

GEOG 8213. Development Issues on the Rural-Urban Fringe. (3) Cross-listed as GEOG 6213.

Prerequisite: Permission of instructor. This course focuses on changes in the rural-urban fringe and the resulting fringe geographies including challenges that local and regional governments face with growth management, sense of place, and sustainable integration into their new regional settings.

GEOG 8300. Applied Regional Analysis. (3) Cross-

listed as GEOG 6300. Prerequisite: Basic computer skills including spreadsheets. Introduction to methods and techniques used in regional analysis. Topical areas include data sources and collection, regional delineation, community and regional profiles, regional accounts, methods of analysis and impact assessment. Topics are discussed in terms of theory, use, and role in economic geography and regional development. Emphasis is placed on application of economic and demographic methods at the regional level.

GEOG 8301. Industrial Location. (3) Cross-listed as

GEOG 6301. Addresses factors influencing the location of industrial and service activities. Classical theories of industrial location are augmented with contemporary interpretations of the economic landscape. Emphasis is placed on theoretical foundations and new developments in industrial location theory, patterns and trends of industrial location, the site selection process, community impacts of locational decision-making, and the role of governments. Patterns and trends are examined in regional, national, and international perspectives.

GEOG 8302. Regional Economic Development. (3)

Cross-listed as GEOG 6302 and PPOL 8642. Neo-classical and contemporary theories of trade, economic geography and urban and regional development. Topics include: theories of urban and regional growth, location theories including industry, central places and growth centers; human capital, labor force and entrepreneurial contributions to growth; policy dimensions of urban growth and development are addressed from theoretical and empirical perspectives.

GEOG 8304. The Transforming North Carolina Economy. (3) Cross-listed as GEOG 6304.

Prerequisite: Permission of instructor. An examination of the contemporary and historic forces

which shape the economic geography of the state. Themes examined will include human-land interactions, past and present economic transitions and the rural-urban balance within the state. Emphasis on understanding the economic forces which will most dramatically impact the future. Seminar format.

GEOG 8400. Advanced Seminar in Spatial Decision Support Systems (SDSS). (4) Cross-listed as GEOG 6400 and PPOL 8642. Prerequisite: GEOG 5120 or permission of instructor. Theoretical aspects of spatial DSS including technical, social, political and psychological consideration; systems design; systems manipulation; and case studies. Three hours of lecture and one two-hour lab per week.

GEOG 8401. GIS Programming and Customization. (3) Cross-listed as GEOG 6401. Prerequisite: GEOG 4120/5120 or permission of instructor. This course consists of tutorials, readings, projects, and discussions of how to customize and to program ArcObjects within various programming environments: to program automatic repetitive tasks, to build their own applications, to write geoprocessing scripts, and to develop and customize the Web applications.

GEOG 8402. Multi-Attribute Assessment/Evaluation for Planning & Decision-Making. (3) Cross-listed as GEOG 6402. Prerequisite: Permission of instructor. The course provides a survey and comparison of multi-attribute assessment and evaluation methods in spatial planning and decision-making; and discusses the implementation of these methods with the aid of geographic information techniques. Topics include: land suitability/vulnerability assessment, environmental and social impact assessment, risk assessment, site selection, plan evaluation, and multi-criteria decision analysis.

GEOG 8404. Spatial Data Analysis in GIS. (3) Cross-listed as GEOG 6404. Prerequisite: GEOG 5120 or permission of instructor. Advanced analytical methods used in GIS and spatial data analysis to advance the understanding of spatial patterns and to invoke powerful principles of spatial thinking. Examination of theoretical and conceptual aspects of algorithms used in GIS software to analyze spatial data. Critical assessment of the use, misuse, abuse and limitations of GIS analytical techniques.

GEOG 8405. Three Dimensional Visualization. (3) Cross-listed as GEOG 6405. Prerequisite: GEOG 4130/5130 or permission of instructor. This course consists of tutorials, readings, projects, and discussions concerned with how geo-visualization techniques can be used to display geographic information driven from spatial analyses in 3D GIS.

Students who successfully complete the course are able to understand advanced geographic information systems, focusing on multi-dimensional data models and three-dimensional geo-visualization as spatial analyses tools. In addition, students work on independent and group projects to develop 3D GIS applications such as 3D Urban Simulation System using existing 3D GIS and visualization software.

GEOG 8406. Spatial Information and Mobility. (4) Cross-listed as GEOG 6406. Prerequisite: GEOG 5120 or permission of instructor. Issues related to the collection, storage, and dissemination of data and information used in transportation analysis, planning, and operations. Students are exposed to the functionality of geographic information systems and concepts of Geographic Information Science that enable these tasks, as well as to traditional travel data collection techniques. Advanced data collection and information dissemination approaches are also discussed, including the use of probes, sensors, GPS, and other wireless communication devices. The fundamentals of Intelligent Transportation Systems form a central part of the course. Finally, the state-of-the-art and future of location-based services and telematics systems is discussed from the perspective of personal mobility and spatial information.

GEOG 8407. Geocomputation. (3) Cross-listed as GEOG 6407. Prerequisite: GEOG 5120 or permission of instructor. The implementation of computational techniques and resources for the exploration and analysis of (large) spatially referenced databases. Provides an assessment of the place and contribution of computational methods in spatial data handling. Explores "new" computationally intensive approaches to doing geography. Topics include: artificial neural networks, machine learning induction algorithms, genetic and other evolutionary algorithms, and other algorithms for spatial data mining.

GEOG 8408. Spatial Optimization. (3) Cross-listed as GEOG 6408. Prerequisite: GEOG 5120 or permission of instructor. Spatial Optimization is articulated around the explicit use of GIS tools and techniques to solve coverage, distance-decay problems as well as routing problems integrating geographic information. Case studies in various domains such as urban retailing or transportation. Problem formulation and solution techniques to optimally preserve existing natural reserves, such as reservoir resources or locating natural corridors between biologically rich areas to protect diversity.

GEOG 8500. Urban Planning: Theory and Practice. (3) Cross-listed as GEOG 6500 and PPOL 8616. Critical assessment of alternative planning theories and their application to planning practices. Examination of economic, political, social, cultural

and geographical factors affecting the operations of cities and resource distribution.

GEOG 8600. Transportation Policy. (3) Cross-listed as GEOG 6600 and PPOL 8613. Examination of surface transportation from a public policy perspective. Institutional components and role of government at all levels influencing investment; changes in technology, environment, security, safety, equity, cost-effectiveness, public health and welfare are covered.

GEOG 8612. Advanced Geography of Transportation Systems. (3) Cross-listed as GEOG 6612.

Prerequisite: GRAD 6101, GRAD 8101, or permission of instructor. Exploration of transportation systems from a geographic perspective. The course emphasizes the importance of these systems in the past, present and future. The course explores the relationships between the organization of the space economy and transportation, the flow of people, commodity and ideas at different scales of observation from the small picture (urban transportation) to the big, global picture (international transportation), mobility issues in everyday life and in the economy. The social, economic, physical, and political contexts of transportation systems are discussed. The course is also designed to develop analytical capabilities by using a few fundamental techniques of transportation planning and analysis.

GEOG 8643. Rural Development Issues. (3) Cross-listed as GEOG 6643. Prerequisite: Permission of instructor. This course provides research experiences that focus on policy formulation, and demographic, economic and planning issues in rural areas.

GEOG 8800. Directed Problems in Geography. (1-4)

Cross-listed as GEOG 6800. Individual research into geographic topics. *May be repeated for credit with change of topic.*

GEOG 8901. Dissertation. (1-9) Under the direction of a dissertation advisor and committee, students are expected to design and execute an original research study. This study should address a significant issue or problem related to geography and urban regional analysis. *May be repeated for credit (required minimum total of 18 hours).*

Gerontology

- **M.A. in Gerontology**
- **Graduate Certificate in Gerontology**

Gerontology Program

gerontology.uncc.edu

Gerontology Program Director

Dr. Julian Montoro-Rodriguez

Graduate Program Director

Dr. Dena Shenk

Graduate Faculty

Dr. Anita Blowers, Associate Professor, Criminal Justice and Criminology

Dr. Martha Bramlett, Adjunct Faculty, Nursing

Dr. Allison Burfield, Assistant Professor, Nursing

Dr. Maria-Carla Chiarella, Lecturer, Psychology

Dr. Maren Coffman, Assistant Professor, Nursing

Dr. Boyd Davis, Bonnie E. Cone Professor of Teaching, Professor, English

Dr. Christine Davis, Professor, Communication Studies

Dr. Mark Faust, Assistant Professor, Psychology

Dr. Scott Gordon, Professor and Chair, Kinesiology

Dr. Cynthia Hancock, Senior Lecturer, Sociology, Gerontology

Dr. Sonya Hardin, Professor, Nursing

Dr. Susan Kennerly, Professor and Director – Graduate Division, Nursing

Dr. James Laditka, Associate Professor, Public Health Sciences

Dr. Sarah Laditka, Associate Professor, Public Health Sciences

Dr. Othelia Lee, Assistant Professor, Social Work

Dr. Lisa Merriweather, Assistant Professor, Educational Leadership

Dr. Trudy Moore-Harrison, Lecturer and Practicum Supervisor, Kinesiology

Dr. Louise Murray, Adjunct Faculty, Gerontology

Dr. Jane Neese, Associate Dean for Academic Affairs, College of Health and Human Services

Dr. Tara O'Brien, Assistant Professor, Nursing

Dr. Amy Peterman, Associate Professor, Psychology

Dr. Emily Roberts, Adjunct Faculty, Gerontology

Dr. Rachel Seymour, Adjunct Faculty, Gerontology

Dr. Dena Shenk, Professor, Anthropology

Dr. Dorothy Smith-Ruiz, Associate Professor, Africana Studies

Dr. Jamie Strickland, Lecturer, Geography and Earth Sciences

Dr. Lori Thomas, Associate Professor, Social Work

Dr. Meredith Troutman-Jordan, Associate Professor,
Nursing
Dr. Jennifer Troyer, Associate Professor, Economics
Dr. Jillian Tullis, Assistant Professor, Communication
Studies
Dr. Michael Turner, Associate Professor, Kinesiology
Dr. Jan Warren-Findlow, Associate Professor, Public
Health Sciences
Dr. Diane Zablotzky, Associate Professor, Sociology;
Director, Levine Scholars Program
Dr. Nigel Zheng, Assistant Professor, Mechanical
Engineering

MASTER OF ARTS IN GERONTOLOGY

The Master of Arts in Gerontology is designed to prepare graduates with the knowledge and skills to fill a wide variety of positions in the developing field of aging. Interdisciplinary Gerontology courses integrate materials from various disciplines. Multidisciplinary Gerontology courses are also included, requiring students to study aging from a variety of disciplinary perspectives. The core of essential materials included in the required courses are augmented by the selection of elective courses in an individually designed program for each student. Students work with their advisor to develop a program that will best prepare them to meet their goals.

Potential students are encouraged to apply to begin the program in the fall semester, although applications are reviewed throughout the year. The program can be completed on either a full-time or part-time basis with all required courses and a selection of electives offered in the evening. Some courses may require prerequisites and it is the responsibility of the candidate to meet any prerequisites (e.g., statistics is a required prerequisite for GRNT 6201). Students will work in conjunction with their advisor and graduate committee to design and implement their individual program.

Additional Admission Requirements

- Grade point average (GPA) of at least 2.75 overall and 3.0 in courses in Gerontology
- Satisfactory GRE or MAT scores (*A standardized test score is waived for a student who completes the Graduate Certificate Program in Gerontology with grades of all B or above*)
- Three letters of recommendation from persons familiar with the applicant's personal and professional qualifications
- An essay is required describing the applicant's relevant experience and objectives in undertaking graduate study in Gerontology

Degree Requirements

The Gerontology Program requires a minimum of 36 credit hours of graduate coursework. Students have a choice of completing (1) a thesis or (2) an applied project.

Thesis Option

Students completing a thesis complete 21 credit hours of core courses, 6 credit hours of thesis, and 9 credit hours of elective courses. Students must also pass an oral defense of both the thesis proposal and thesis, and oral comprehensive exams at the time of the thesis proposal defense.

Applied Project (Non-Thesis) Option

Students completing an applied project complete 21 credit hours of core courses, 3 credit hours of applied projects, and 12 credit hours of elective courses. Students must also pass an oral defense of both the applied project proposal and the project, and oral comprehensive exams at the time of the project proposal defense.

Core Courses (21 credit hours)

GRNT 6124 Psychology of Aging (3)
or PSYC 6124 Psychology of Aging (3)
GRNT 6130 Sociology of Aging: Theories and
Research (3)
or SOCY 6130 Sociology of Aging: Theories and
Research (3)
GRNT 6201 Research and Methods in Aging I (3)
GRNT 6202 Research and Methods in Aging II (3)
GRNT 6400 Practicum (3)
GRNT 6600 Current Issues in Gerontology (3)
GRNT 6275 Health Promotion, Nutrition, and
Wellness for Older Adults (3)
or NURS 6275 Health Promotion, Nutrition, and
Wellness for Older Adults (3)
or KNES 5232 Physiology of Human Aging (3)

Thesis/Applied Project (3-6 credit hours)

Select one of the following:

GRNT 6990 Applied Project (3)
GRNT 6999 Master of Arts Thesis (6)

Elective Courses (9-12 credit hours)

Select from the following:

CSLG 7681 Grief and Loss (3)
EIST 6101 The Adult Learner (3)
GRNT 5050 Topics in Gerontology (1-4)
GRNT 5134 Families and Aging (3)
GRNT 5150 Older Individual and Society (3)
GRNT 5250 Programs and Services for the Aging (3)
GRNT 5260 Women: Middle Age and Beyond (3)
GRNT 5270 Intergenerational Relationships &
Programs (3)
GRNT 5280 The Experience of Dementia (3)
GRNT 5353 Environments for Aging (3)
GRNT 6050 Topics in Gerontology (1-4)

GRNT 6210 Aging and Public Policy (3)
or MPAD 6210 Aging and Public Policy (3)
GRNT 6211/MPAD 6211 Administration of Aging
Programs (3)
or MPAD 6211 Administration of Aging Programs
(3)
GRNT 6800 Independent Research Study (3) (*may
be repeated; up to 6 credits may be counted
towards M.A. electives*)
MPAD 6128 Foundations of Public Policy (3)
MPAD 6172 Admin of the Healthcare System in the
U.S. (3)
NURS 6115 Health Planning in the Healthcare
System (3)

Other electives may be selected in consultation with
the student's advisor.

Comprehensive Examination

Each student will complete an oral comprehensive
exam at the time of the thesis or applied project
proposal defense.

The grading options for each question are "High Pass,"
"Pass," "Low Pass," and "Fail." In order to pass,
students may not earn more than one "Low Pass." In
the case of failing one question, students may be
allowed to prepare an essay answering the question, if
they have not received a "Low Pass" on any other
questions. With this option, students cannot receive
more than a "Low Pass" for that question, and if
students get more than one low pass, they have failed.
If students fail the oral exam, they will be allowed to
retake it one time and the questions may be revised.

Students should discuss with their Graduate
Committee Chair in advance of the Proposal Defense
about how to prepare for the Comprehensive Exam.

Committee

Each student should select his/her Graduate
Committee before completion of GRNT 6201.

Application to Candidacy

In order to apply for Candidacy, students must have
passed the Oral Comprehensive Exam and Thesis or
Applied Project Defense before the deadline for
applying for Candidacy for the given semester.

Financial Aid/Financial Assistance

The program offers the NMR Gerontology Graduate
Scholarship annually with all application materials
due by June 1.

Early Entry Program

Exceptional undergraduate students may be accepted
into the M.A. in Gerontology program and begin work
toward a graduate degree before completion of the

baccalaureate degree.

GRADUATE CERTIFICATE IN GERONTOLOGY

The Graduate Certificate in Gerontology is designed
to provide graduate education in Gerontology for
those who already have a graduate degree in another
field, those currently completing a graduate degree in
another field, who are interested in working with
older adults, and others seeking a credential to work
in the aging field. It requires completion of a set of
core and elective courses related to the study of aging.
Applications for admission to the Graduate Certificate
Program in Gerontology are considered as they are
received and admissions are ongoing. Students are
admitted to the Graduate School in a special category
for certificate students.

Additional Admission Requirements

In addition to the general requirements for admission
to a certificate program, applicants must provide:

- Official transcripts of all baccalaureate and
graduate work attempted.
- Three letters of recommendation from persons
familiar with the applicant's professional and
personal qualifications. These letters may be
waived if the student is already enrolled in a
Master's or doctoral program.
- An essay describing the applicant's relevant
experience and objectives in undertaking
graduate study in Gerontology.

Degree Requirements

The Graduate Certificate Program requires completion
of a minimum of 15 credit hours of graduate
coursework related to aging and older adults.

Core Course

GRNT 6600 Current Issues in Gerontology (3)

Elective Courses

Primary Elective Courses

Select at least one of the following:

GRNT 6124 Psychology of Aging (3)
or PSYC 6124 Psychology of Aging (3)
GRNT 6130 Sociology of Aging: Theories of
Research (3)
or SOCY 6130 Sociology of Aging: Theories of
Research (3)
GRNT 6275 Health Promotion, Nutrition, and
Wellness for Older Adults (3)
or NURS 6275 Health Promotion, Nutrition, and
Wellness for Older Adults (3)
GRNT 6400 Practicum (3)
KNES 5232 Physiology of Human Aging (3)

Secondary Elective Courses

Remaining credit hours should come from the following:

CSLG 7681 Grief and Loss Counseling (3)
 EIST 6101 Learning Principles in Instructional Systems Technology (3)
 GRNT 5050 Topics in Gerontology (1-4)
 GRNT 5134 Families and Aging (3)
 GRNT 5150 Older Individual and Society (3)
 GRNT 5250 Aging Programs and Services (3)
 GRNT 5260 Women: Middle Age and Beyond (3)
 GRNT 5270 Intergenerational Relationships & Programs (3)
 GRNT 5280 The Experience of Dementia (3)
 GRNT 6050 Topics in Gerontology (3)
 GRNT 6210 Aging and Public Policy (3)
 GRNT 6211 Administration of Aging Programs (3)
 KNES 5232 Physiology of Human Aging (3)
 MPAD 6128 Foundations of Public Policy (3)
 MPAD 6172 Administration of the Healthcare Systems in the United States (3)
 MPAD 6210 Aging and Public Policy (3)
 MPAD 6211 Administration of Aging Programs (3)
 NURS 6115 Health Policy and Planning in the U.S. (3)

Secondary elective courses may also be chosen from other appropriate courses as offered with the approval of the Gerontology Graduate Program Director.

Transfer Credit

Transfer credit is not accepted toward a Graduate Certificate in Gerontology program.

COURSES IN GERONTOLOGY (GRNT)

GRNT 5050. Topics in Gerontology. (1-4)

Investigation of specific issues in Gerontology, either from the perspective of a single discipline or from a multidisciplinary perspective. *May be repeated for credit with change of topic.*

GRNT 5134. Families and Aging. (3) Theories explaining the formation and functioning of American families with emphasis on the impact of the aging of society. Examination of the current demographic trends and expectations of multigenerational families, as well as the future demands and modifications.

GRNT 5150. Older Individual and Society. (3) Study of the social and cultural context on the lives of aging individuals in American society. Will include a focus on expectations, social interactions, and psychological well-being in the context of retirement, caregiving, and health

GRNT 5250. Aging Programs and Services. (3)

Examination of federal, state and local framework of services and programs for the aging. Graduate students required to complete a more extensive final paper.

GRNT 5260. Women: Middle Age and Beyond. (3)

Position of older women in society and the particular problems and issues for women as they age.

GRNT 5270. Intergenerational Relationships and Programs. (3)

Exploration of the importance of and consequences of intergenerational relationships and the range of programming currently available to encourage interaction between people of different ages.

GRNT 5280. The Experience of Dementia. (3)

Provides an overview of Alzheimer's disease and related disorders using a person-centered perspective. This topic is explored from the perspectives of the person diagnosed, family members and concerned friends, and both informal and formal caregivers. Students who successfully complete this course will gain a holistic insight into these disorders and their implications for both individuals and society.

GRNT 5353. Environments for Aging. (3) With roots in environmental psychology, this course explores the ways in which older adults experience and interact with their physical environment at both the macro and micro levels. Students are introduced to the values and practices of a broad spectrum of housing alternatives for an aging population, which include traditional and household models of long term care, therapeutic environments for individuals with dementia, Naturally Occurring Retirement Communities (NORCS), as well as co-housing and intentional community options.

GRNT 6050. Topics in Gerontology. (3) Prerequisite: Permission from graduate program director.

Investigation of specific issues in Gerontology, either from the perspective of a single discipline or from a multidisciplinary perspective.

GRNT 6124. Psychology of Aging. (3) Psychology of aging with particular emphasis on issues related to community / clinical psychology and industrial / organizational psychology. Topics include: myths and stereotypes about aging, problems faced by older workers, retirement, mental health and normal aging, counseling the older adult, and psychological disorders in later life.

GRNT 6130. Sociology of Aging: Theories and Research. (3)

Application of stratification theories and demography are applied to the older population. Issues of race, gender, socio-economic status, age,

and geographic distribution are examined to investigate the diversity of the older age group and their access to resources.

GRNT 6201. Research and Methods in Aging I. (3)

Prerequisite: Statistics. Examination of variety of qualitative and quantitative methods used in research on aging and analysis of Gerontology research from a range of disciplines. Students will develop a working draft of their thesis-applied project proposal.

GRNT 6202. Research and Methods in Aging II. (3)

Prerequisite: GRNT 6201. Examination of the variety of qualitative and quantitative methods used in evaluation research in applied settings. Students will develop an evaluation project plan.

GRNT 6210. Aging and Public Policy. (3) Cross-listed as MPAD 6210. Examination of the public policy making process with attention to aging policy. Consideration of determinants of aging policy and institution and actors in the policy making process and piecemeal development of legislation will be analyzed as factors related to the making of policy for the aged.

GRNT 6211. Administration of Aging Programs. (3)

Cross-listed as MPAD 6211. Focus will be implementation of public policies and programs for the aged and the development and administration of these programs. Students will become familiar with the process through which policies are transformed into aging programs and the budgetary, management and evaluative considerations that must be taken into consideration.

GRNT 6238 Intergenerational Issues of Justice. (3)

Cross-listed as PHIL 6238. Examination of intergenerational issues of justice in public policy toward the elderly and their healthcare needs. Issues of justice and morality will be explored in terms of the distribution of limited healthcare resources among competing age groups.

GRNT 6275. Health Promotion, Nutrition, and

Wellness for Older Adults. (3) Cross-listed as NURS 6275. Explores self-care measures and health promotion practices with an emphasis on nutrition, that promote a healthy lifestyle in later life. Topics include: principles of teaching and learning adapted to diverse older adults' needs and learning styles. Common barriers to healthcare and appropriate nutrition in older adults are also examined. Current findings from research will be integrated throughout the course. A foundational knowledge of human development is expected.

GRNT 6400. Practicum. (3) Completion of a field-based educational experience which relates to the

student's career goals and objectives. *Graded on a Pass/Unsatisfactory basis.*

GRNT 6600. Current Issues in Gerontology. (3) Study of current topics and issues in the field of Gerontology from an interdisciplinary perspective. An ethical framework will be used to examine the issues.

GRNT 6800. Independent Research in Gerontology.

(3) Graduate students meet individually or in small groups with the instructor and will complete readings and/or research on a topic in gerontology according to a contract. Attendance at lectures of an undergraduate course in Gerontology may be included among course requirements. *May be repeated for credit up to 6 credits.*

GRNT 6990. Applied Project. (3) Prerequisite:

Permission of graduate program director. Individual project based on directed study of a topic in gerontology. *Graded on a Pass/Unsatisfactory basis.*

GRNT 6999. Master of Arts Thesis. (6) Prerequisite:

Admission to the M.A. in Gerontology thesis option. The thesis is coordinated with the student's interests and practical experience to allow the development of an area of specialization. A completed paper and oral presentation are required. *Graded on a Pass/Unsatisfactory basis.*

Health Psychology

• Ph.D. in Health Psychology

Ph.D. Program in Health Psychology

healthpsych.uncc.edu

Graduate Program Director

Dr. Virginia Gil-Rivas

Director of Clinical Training

Dr. Amy Peterman

Graduate Faculty

Communication Studies

Dr. Christine Davis

Dr. Margaret M. Quinlan

Dr. Jillian Tullis

Counseling

Dr. Lyndon Abrams

Gerontology

Dr. Dena Shenk

Dr. Julian Montoro-Rodriguez

Kinesiology

Dr. Michael Turner

Nursing

Dr. Maren Coffman

Dr. Christine Elnitsky

Philosophy

Dr. Lisa Rasmussen

Dr. Shannon Sullivan

Psychology

Dr. Laura Armstrong

Dr. Jeanette Bennett

Dr. Fary Cachelin

Dr. Lawrence G. Calhoun

Dr. Amy Canevello

Dr. Arnie Cann

Dr. James Cook

Dr. George Demakis

Dr. Mark Faust

Dr. Paul Foos

Dr. Jane Gaultney

Dr. Virginia Gil-Rivas

Dr. Mason Haber

Dr. Susan Johnson

Dr. Ryan P. Kilmer

Dr. Sarah Levens

Dr. Richard McAnulty

Dr. Amy Peterman

Dr. Charlie Reeve

Dr. Richard Tedeschi

Dr. Jennifer Webb

Public Health Sciences

Dr. Andrew Harver

Dr. Crystal N. Piper

Dr. Sharon G. Portwood, J. D.

Dr. Jan Warren-Findlow

Dr. Michele Issel

Social Work

Dr. Shanti Kulkarni

Dr. Othelia Lee

Sociology

Dr. Teresa Scheid

Dr. Rosemary L. Hopcroft

Special Education and Child Development

Dr. Lyndon Abrams

PH.D. IN HEALTH PSYCHOLOGY

Health Psychology is dedicated to conducting basic and applied research examining the contribution of biological, psychological, behavioral, social, cultural, and environmental factors to health and illness.

Health Psychology builds from principles and theories of other areas of psychology, biology, health, and social sciences. Health psychologists are concerned with promotion and maintenance of health, the prevention and treatment of illness across the lifespan, and improvement of systems that promote and maintain health.

A particular emphasis of the Health Psychology program is on the development, implementation, and evaluation of prevention and treatment interventions that involve multiple disciplines. The program has links with other colleges, departments, and programs in the University including the College of Health and Human Services, College of Education, and the Gerontology Program which allows students to select health courses across disciplines.

The Health Psychology doctoral program at UNC Charlotte offers students an opportunity to obtain their Ph. D. in Health Psychology in one of three concentrations: General, Clinical, or Community.

Admission Requirements

Applicants are expected to have a minimum of 18 hours of coursework in psychology including Introductory Psychology and Research Methods, coursework in undergraduate statistics, excellent scores on the GRE Exam, and an excellent academic

track record as demonstrated by undergraduate or graduate grade point averages.

Documents to be Submitted for Application for Admission

Applicants are expected to complete an application online to the Graduate School. The application also must include transcripts of all completed academic work, an official score on the GRE exam, three letters of reference from persons, preferably psychologists, who can speak to the applicant's promise as a doctoral student, a two page statement of professional goals and research interests, and a current resume or CV. International students must submit official TOEFL or IELTS test scores. Minimum score required for the TOEFL: of at least 557 on the written test or 83 on the computer-based test. Minimum overall band score required for the IELTS is 6.5. All tests must be taken within the last two years.

Admission Assessment

Admissions reviews are conducted by faculty in each concentration. The deadline for all application materials is November 15. Review of applications typically occurs in January, interviews in February, and admissions offers typically made in March.

Student Responsibility

Students who succeed in the Health Psychology program are hardworking, competent, disciplined scholars with interests in the science of Health Psychology and other health-related fields. Students must demonstrate intellectual curiosity and a passion for the science of psychology. It is important for student applicants to determine if their professional interests are well matched to the expertise of our faculty members.

Degree Requirements

For the Community and General concentrations, 78 credit hours (post-baccalaureate) are required. All coursework taken at UNC Charlotte that counts toward the Ph.D. is at the 6000 level or above. The majority of the coursework is at the 8000 level. For the Clinical Health concentration, which enables students to become eligible for licensure as a Health Services Provider, 88 credit hours (post-baccalaureate) are required.

Each concentration's curriculum has 5 major components:

- 1) Core Health Psychology
- 2) Research Methodology and Analytics
- 3) Concentration (General, Clinical, or Community)
- 4) Interdisciplinary Content
- 5) Electives

Specific requirements within each component vary by concentration.

General Concentration

Core Health Psychology Courses (12 credit hours)

PSYC 8200 Health Psychology I (3)
 PSYC 8201 Health Psychology II (3)
 PSYC 8243 Diversity in Health Psychology (3)
 PHIL 8240 Research Ethics in the Biological and Behavioral Sciences (3)

Research Methodology and Analytics Courses (24 credit hours)

PSYC 8102 Research Design and Quantitative Methods in Psychology (3)
 PSYC 8103 Basic Quantitative Analyses for Behavioral Sciences (3)
 PSYC 8262 Practicum in Health Psychology (3)
 PSYC 8899 Readings and Research in Psychology (*up to 3 credit hours allowed*)
 PSYC 8999 Doctoral Dissertation Research (*up to 9 credit hours allowed*)

Advanced Methodology Courses

Select two of the following:

HLTH 8221 Qualitative Research I: Theory Generation in Behavioral Sciences (3)
 HLTH 8222 Qualitative Research II: Theory Generation and Analysis in Behavioral Sciences (3)
 HLTH 8282 Health Survey Design and Research (3)
 HLTH 8602 Communicating and Disseminating Research (3)
 PPOL 8000 Topics in Public Policy (3) (*Categorical Data Analyses*)
 PPOL 8665 Analytical Epidemiology (3)
 PSYC 8099 Topics in Psychology (3) (*Measurement and Scale Development*)
 or HLTH 8281 Measurement and Scale Development (3)
 PSYC 8104 Advanced Quantitative Analyses for Behavioral Sciences (3)
 PSYC 8145 Applied Research Design and Program Evaluation (3)

Concentration Courses (9 credit hours)

Select three courses from three of the four domains (i.e., at least three of the four domains must be covered):

Biological/Physiological Domain

PSYC 6113 Physiological Psychology (3)
 PSYC 6115 Sensation and Perception (3)

Cognitive Domain

PSYC 6111 Psychology of Learning and Memory (3)
 PSYC 6216 Introduction to Cognitive Science (3)

PSYC 6116 Cognition (3)
or PSYC 8099 Topics in Psychology (3) (*Cognition and Motivation*)

Developmental Domain

PSYC 6124 Psychology of Aging (3)
PSYC 8099 Topics in Psychology (3) (*Developmental Psychology*)

Social-Personality Domain

PSYC 6130 Social Psychology (3)
PSYC 6135 Psychology of Personality (3)

Interdisciplinary Courses (15 credit hours)

Select five of the following:

COMM 6000 Topics in Communication Studies (3)
(*Narratives of Health and Illness*)
GRNT 6210 Aging and Public Policy (3)
or MPAD 6210 Aging and Public Policy (3)
GRNT 6600 Current Issues in Gerontology (3)
HLTH 6201 Social and Behavioral Foundations of Public Health (3)
HLTH 6207 Community Health Planning and Evaluation (3)
HLTH 6221 Community Health (3)
HLTH 8220 Theories and Interventions in Behavioral Sciences (3)
HSRD 8000 Topics in Health Services Research (3)
HSRD 8002 Healthcare Systems and Delivery (3)
HSRD 8004 Economics of Health and Healthcare (3)
or PPOL 8667 Economics of Health and Healthcare (3)
KNES 6285 Advanced Cardiopulmonary Physiology (3)
NUDN 8202 Community Epidemiology (3)
NURS 6115 Health Policy and Planning in the U.S. (3)
PPOL 8661 Social Organization of Healthcare (3)
PPOL 8663 Health Policy (3)
PSYC 8145 Applied Research Design and Program Evaluation (3)
PSYC 8155 Community Psychology (3)
PSYC 8255 Community Interventions (3)
PSYC 8455 Practicum in Community Psychology (3)
SOCY 6090 Topics in Sociology (3)
or PSYC 8099 Topics in Psychology (3)

Elective Courses (18 credit hours)

Select six courses from the following:

PSYC 6111 Psychology of Learning and Memory (3)
PSYC 6113 Physiological Psychology (3)
PSYC 6115 Sensation and Perception (3)
PSYC 6116 Cognition (3)
PSYC 6124 Psychology of Aging (3)
PSYC 6130 Social Psychology (3)
PSYC 6135 Psychology of Personality (3)
PSYC 6216 Introduction to Cognitive Science (3)

PSYC 6999 Thesis (*up to 6 credit hours allowed*) (*if student is co-enrolled in an M.A. in Psychology program*)

PSYC 8099 Topics in Psychology (3) (*Developmental Psychology*)

PSYC 8260 Topics in Health Psychology (3)
(*Mindfulness*)

Clinical Concentration

Core Health Psychology Courses (12 credit hours)

PSYC 8107 Ethical and Professional Issues in Psychology (3)
PSYC 8200 Health Psychology I (3)
PSYC 8201 Health Psychology II (3)
PSYC 8243 Diversity in Health Psychology (3)

Research Methodology and Analytics Courses (18 credit hours)

PSYC 8102 Research Design and Quantitative Methods in Psychology (3)
PSYC 8103 Basic Quantitative Analyses for Behavioral Sciences (3)
PSYC 8899 Readings and Research in Psychology (*up to 3 credit hours allowed*)
PSYC 8999 Doctoral Dissertation Research (*up to 9 credit hours allowed*)

Advanced Methodology Course

Select one of the following:

HLTH 8221 Qualitative Research I: Theory Generation in Behavioral Sciences (3)
HLTH 8222 Qualitative Research II: Theory Generation and Analysis in Behavioral Sciences (3)
HLTH 8282 Health Survey Design and Research (3)
HLTH 8602 Communicating and Disseminating Research (3)
PPOL 8000 Topics in Public Policy (3) (*Categorical Data Analyses*)
PPOL 8665 Analytical Epidemiology (3)
PSYC 8099 Topics in Psychology (3) (*Measurement and Scale Development*)
or HLTH 8281 Measurement and Scale Development (3)
PSYC 8104 Advanced Quantitative Analyses for Behavioral Sciences (3)
PSYC 8145 Applied Research Design and Program Evaluation (3)

Concentration Courses (49 credit hours)

Clinical Courses

PSYC 8050 Topics in Psychological Treatment (3)
PSYC 8141 Intellectual Assessment (4)
PSYC 8142 Personality Assessment (4)
PSYC 8150 Introduction to Psychological Treatment (4)
PSYC 8151 Behavior Disorders (4)
PSYC 8240 History and Systems of Psychology (3)
PSYC 8245 Clinical Supervision and Consultation (3)

PSYC 8450 Practicum in Clinical Psychology (9) (*At least 6 credit hours to be completed in residence in the program*)
 PSYC 8950 Internship (3)

Breadth Courses

PSYC 6113 Physiological Psychology (3)
 PSYC 6116 Cognition (3)
 or PSYC 8099 Topics in Psychology (3) (*Cognition and Motivation*)
 PSYC 6130 Social Psychology (3)
 PSYC 8099 Topics in Psychology (3)
 (*Developmental*)

Interdisciplinary Courses (9 credit hours)

Select three of the following:

COMM 6000 Topics in Communication Studies (3)
 (*Narratives of Health and Illness*)
 GRNT 6210 Aging and Public Policy (3)
 or MPAD 6210 Aging and Public Policy (3)
 GRNT 6600 Current Issues in Gerontology (3)
 HLTH 6201 Social and Behavioral Foundations of Public Health (3)
 HLTH 6207 Community Health Planning and Evaluation (3)
 HLTH 6221 Community Health (3)
 HLTH 8220 Theories and Interventions in Behavioral Sciences (3)
 HSRD 8000 Topics in Health Services Research (3)
 HSRD 8002 Healthcare Systems and Delivery (3)
 HSRD 8004 Economics of Health and Healthcare (3)
 or PPOL 8667 Economics of Health and Healthcare (3)
 KNES 6285 Advanced Cardiopulmonary Physiology (3)
 NUDN 8202 Community Epidemiology (3)
 NURS 6115 Health Policy and Planning in the U.S. (3)
 PPOL 8661 Social Organization of Healthcare (3)
 PPOL 8663 Health Policy (3)
 PSYC 8145 Applied Research Design and Program Evaluation (3)
 PSYC 8155 Community Psychology (3)
 PSYC 8255 Community Interventions (3)
 PSYC 8455 Practicum in Community Psychology (3)
 SOCY 6090 Topics in Sociology (3)
 PSYC 8099 Topics in Psychology (3)

Community Concentration

Core Health Psychology Courses (12 credit hours)

PSYC 8200 Health Psychology I (3)
 PSYC 8201 Health Psychology II (3)
 PSYC 8243 Diversity in Health Psychology (3)
 PHIL 8240 Research Ethics in the Biological and Behavioral Sciences (3)

Research Methodology and Analytics Courses (18 credit hours)

PSYC 8102 Research Methodologies in Behavioral Sciences (3)
 PSYC 8103 Basic Quantitative Analyses for Behavioral Sciences (3)
 PSYC 8455 Practicum in Community Psychology (3)
 PSYC 8899 Readings and Research in Psychology (1-3)
 PSYC 8999 Doctoral Dissertation Research (*up to 9 credit hours allowed*)

Advanced Methodology Course

Select one of the following:

HLTH 8221 Qualitative Research I: Theory Generation in Behavioral Sciences (3)
 HLTH 8222 Qualitative Research II: Theory Generation and Analysis in Behavioral Sciences (3)
 HLTH 8282 Health Survey Design and Research (3)
 HLTH 8602 Communicating and Disseminating Research (3)
 PPOL 8000 Topics in Public Policy (3) (*Categorical Data Analyses*)
 PPOL 8665 Analytical Epidemiology (3)
 PSYC 8099 Topics in Psychology (3) (*Measurement and Scale Development*)
 or HLTH 8281 Measurement and Scale Development (3)
 PSYC 8104 Advanced Quantitative Analyses for Behavioral Sciences (3)
 PSYC 8145 Applied Research Design and Program Evaluation (3)

Concentration Courses (12 credit hours)

PSYC 8145 Applied Research Design & Program Evaluation (3)
 PSYC 8155 Community Psychology (3)
 PSYC 8255 Community Interventions (3)
 PSYC 8455 Practicum in Community Psychology (3)

Interdisciplinary Courses (15 credit hours)

Select five of the following:

COMM 6000 Topics in Communication Studies (3)
 (*Narratives of Health and Illness*)
 GRNT 6210 Aging and Public Policy (3)
 or MPAD 6210 Aging and Public Policy (3)
 GRNT 6600 Current Issues in Gerontology (3)
 HLTH 6201 Social and Behavioral Foundations of Public Health (3)
 HLTH 6207 Community Health Planning and Evaluation (3)
 HLTH 6221 Community Health (3)
 HLTH 8220 Theories and Interventions in Behavioral Sciences (3)
 HSRD 8000 Topics in Health Services Research (3)
 HSRD 8002 Healthcare Systems and Delivery (3)
 HSRD 8004 Economics of Health and Healthcare (3)
 or PPOL 8667 Economics of Health and Healthcare (3)

KNES 6285 Advanced Cardiopulmonary Physiology (3)
 NUDN 8202 Community Epidemiology (3)
 NURS 6115 Health Policy and Planning in the U.S. (3)
 PPOL 8661 Social Organization of Healthcare (3)
 PPOL 8663 Health Policy (3)
 PSYC 8145 Applied Research Design and Program Evaluation (3)
 PSYC 8155 Community Psychology (3)
 PSYC 8255 Community Interventions (3)
 PSYC 8455 Practicum in Community Psychology (3)
 SOCY 6090 Topics in Sociology (3)
 PSYC 8099 Topics in Psychology (3)

Elective Courses (21 credit hours)

Select seven courses from the following:

PSYC 6111 Psychology of Learning and Memory (3)
 PSYC 6113 Physiological Psychology (3)
 PSYC 6115 Sensation and Perception (3)
 PSYC 6116 Cognition (3)
 PSYC 6124 Psychology of Aging (3)
 PSYC 6130 Social Psychology (3)
 PSYC 6135 Psychology of Personality (3)
 PSYC 6216 Introduction to Cognitive Science (3)
 PSYC 6999 Thesis (*up to 6 credit hours allowed*) (*if student is co-enrolled in an M.A. in Psychology program*)
 PSYC 8099 Topics in Psychology (3) (*Developmental Psychology*)
 PSYC 8260 Topics in Health Psychology (3) (*Mindfulness*)

Transfer Credit

The maximum amount of transfer credit that a Ph.D. student may count towards a doctorate is 30 credit hours. The student's advising committee recommends transfer credits that are consistent with the student's program of study to the Graduate School for approval.

Grade Requirements

Graduate students must have a 3.0 GPA in the courses on their degree plan of study in order to graduate. More than two grades of C or one U results in termination from the program.

Plan of Study

Students develop a plan of study with their advising committees.

Admission to Candidacy

After successfully passing the qualifying examination, students must successfully propose and defend a dissertation topic. A student advances to candidacy after the dissertation topic has been approved by the student's doctoral committee. Candidacy must be achieved at least 6 months before the degree is conferred.

Student Advising

Students are assigned an advisor before the first semester. Students in consultation with the advisor create an advising committee constituted by three health psychology faculty. The student meets with the committee regularly for issues of professional development and guidance in the program. Students may change advisors with permission of the Program Director.

Other Requirements

- Master's thesis or second year research project
- Written comprehensive project prior to beginning dissertation research
- Dissertation
- Year-long, pre-doctoral internship (Clinical concentration students only)

Time Limits for Completion

Students are admitted for full-time study only. Students entering the doctoral program post-baccalaureate must complete their degree, including the dissertation, within 8 years. Full-time students must meet benchmark requirements each year to maintain their status as a doctoral student. Part-time students also must meet benchmark requirements that occur approximately every two years. These benchmarks are intended to help students achieve their goal of completing the doctorate in a timely manner. See the *Health Psychology Student Handbook* for a detailed description of the timeline for completing programmatic milestones.

The graduate school has specific requirements that students should be familiar with. Please see the relevant sections of this *Catalog* for specific details.

Second Year Project

The second year project is meant to immerse students in a practical research experience that will help them develop skills to conduct independent research projects. Students are expected to develop and carryout this project under close supervision from their primary academic advisor. A manuscript that follows the format of typical empirical articles in psychology and should be turned into the student's primary advisor and members of their advisory committee.

Comprehensive (Qualifying) Project

Qualifying projects are meant to demonstrate broad competence as a scholar in the disciplines of Health Psychology, interdisciplinary health, and the concentration-specific discipline (General, Clinical, or Community). The Comprehensive Project results in a practical product that demonstrates integration of

knowledge from these three areas. In addition, it provides an opportunity to strengthen and develop a student's skills, as specified by his/her advisory committee. Projects are identified via a collaborative process, involving the student and his/her committee. The Comprehensive Project acts as the gateway into the 4th year and dissertation. Students must pass their Comprehensive Project successfully to continue in the program.

Each student's advisory committee, in consultation with the Program Director, tailors the content and format of the Comprehensive Project with attention to the student's professional goals. The Comprehensive Project process includes three main components: written project, brief integrative paper, and oral presentation.

Students must complete their second year research projects prior to proposing the comprehensive project, must have at least a 3.0 GPA, must not be on probation, and must have removed any conditions placed upon them at the time at admission. Comprehensive Projects should be in process no later than the third academic year in the program. Comprehensive Projects must be completed successfully before students may rise to doctoral candidacy and propose their dissertation project

Doctoral Committee

The doctoral committee is formed after successful completion of the qualifying project. The student must complete the graduate student petition to create the committee. The committee must include at least three members of the health psychology faculty as well as the Graduate School-appointed Graduate Faculty representative.

Dissertation

The dissertation must be successfully proposed and defended before being undertaken. The major advisor directly supervises the student on the dissertation project with support from the dissertation committee. See Graduate School policies regarding dissertations. Additional information regarding the dissertation project can be found in the *Health Psychology Student Handbook*.

Application for Degree

Each student should make application for his/her degree by completing the online Application for Degree through Banner Self Service no later than the filing date specified in the University Academic Calendar.

Research Opportunities

Students in health psychology are expected to engage in collaborative and independent research activities.

Many opportunities are available through the program, including experience in qualitative and quantitative research methods. Many Health Psychology faculty members engage in grant funded research and opportunities exist for research assistantships.

COURSES IN HEALTH PSYCHOLOGY (PSYC)

PSYC 8000. Interdisciplinary Approaches to Health.

(3) Prerequisite: PSYC 8200 and doctoral student standing. Provides an overview of conceptualizations of health as approached from different disciplines, including psychology, medicine, nursing, and public health. Examines ways that the construct of health is used in research and treatment by various disciplines. Facilitation of understanding of interdisciplinary models of research addressing health issues is a primary goal of the course. In addition, it fosters the development of appreciation for contributions that various disciplines make to treatment of illness and promotion of health. It also emphasize the development of effective communication with multiple disciplines in research and treatment settings.

PSYC 8050. Topics in Psychological Treatment. (3)

Cross-listed as PSYC 6050. A topical course which focuses on issues in treatment, alternative treatment perspectives, special client populations. *May be repeated for credit with permission of department.*

PSYC 8099. Topics in Psychology. (3)

Cross-listed as PSYC 6099. A discussion of selected topics in psychology. *May be repeated for credit with change of topic.*

PSYC 8102. Research Design and Quantitative Methods in Psychology. (3)

Cross-listed as OSCI 8102. Prerequisite: Admission to the Ph.D. in Health Psychology program, or permission of instructor. This interdisciplinary course provides a broad overview of the major research methodologies and methodological considerations in the behavioral sciences. Using examples drawn from the literature, the course focuses on general principles and perspectives of social science research. Topics include: foundational concepts across the behavioral sciences (e.g., sampling, measurement, ethics, logic of hypothesis testing, etc.), and the evaluation of specific methodologies (e.g., experimentation, observation, survey, archival, epidemiological/ecological designs, etc.). Practical research considerations are also covered (e.g., basics of APA writing, IRB process and forms, data management and data cleaning, development of experimental protocols, etc.).

PSYC 8103. Basic Quantitative Analyses for Behavioral Sciences. (3) Cross-listed as OSCI 8103. Prerequisite: PSYC 8102. Introduction to quantitative data analysis and interpretation. Focuses on the strategic application of the multiple regression and correlational framework (including specific instantiations such as ANOVA, path analyses, etc.) including the incorporation of manipulated or categorical independent and categorical dependent variables.

PSYC 8104. Advanced Quantitative Analyses for Behavioral Sciences. (3) Cross-listed as OSCI 8104. Prerequisite: PSYC 8103 or equivalent; admission to the Ph.D. in Health Psychology program; or permission of instructor. A topical course that focuses on selected advance quantitative analyses used within behavioral sciences. Topics may include: survival analysis, repeated measures analyses, latent model analyses, multi-level modeling, advanced categorical variable analyses, meta-analysis. *May be repeated for credit with change of topic.*

PSYC 8107. Ethical and Professional Issues in Psychology. (3) Cross-listed as PSYC 6107. Roles and responsibilities of psychologists, including ethical standards in professional practice, testing and research; expectations and problems confronting psychologists in industrial, clinical and professional organizations.

PSYC 8112. Applied Behavior Analysis. (3) Cross-listed as PSYC 6112. Use of behavior principles in applied settings. Topics include: behavioral assessment, positive and negative reinforcement, punishment, extinction, stimulus control, maintenance and generalization of behavior change. Each student will design and carry out a behavior change project.

PSYC 8141. Intellectual Assessment. (4) Cross-listed as PSYC 6141. Theories of intelligence and methods of intellectual assessment, including practice in administering intelligence tests, interpreting results, and writing evaluation reports. Three lecture hours and one two-hour lab per week.

PSYC 8142. Personality Assessment. (4) Cross-listed as PSYC 6142. Prerequisites: PSYC 8141, PSYC 8151, or permission of department. Theories and methods used in the assessment of personality and psychopathology, including practice in administering personality tests, interpreting results and writing evaluation reports. Three lecture hours and one two-hour lab per week.

PSYC 8145. Applied Research Design and Program Evaluation. (3) Cross-listed as PSYC 6145. Prerequisite: PSYC 6102. Models of evaluative

research; also techniques, designs and administration of program evaluation. Topics include: role conflicts, entry issues, goal setting, research for program planning and implementation and examples of actual program design and evaluation.

PSYC 8150. Introduction to Psychological Treatment. (4) Cross-listed as PSYC 6150. Prerequisite: PSYC 8151. Major approaches to psychological intervention, including psychodynamic, behavioral, humanistic and cognitive-behavioral systems. Emphasis on practical therapy considerations, including crisis intervention, client behaviors at various stages of therapy, handling difficult clients and ethical and professional issues. Three lecture hours and one two-hour lab per week.

PSYC 8151. Behavior Disorders. (4) Cross-listed as PSYC 6151. Diagnostic systems in current use and the implications of these systems for psychologists; several perspectives on psychological processes, behavior disorders and diagnosis including psychodynamic, behavioral and social models; practice in diagnostic interviewing. Three lecture hours and one two-hour lab per week.

PSYC 8155. Community Psychology. (3) Cross-listed as PSYC 8155. Research, intervention techniques and settings associated with major approaches in community psychology including the mental health, organizational, ecological, and social action models.

PSYC 8200. Health Psychology I. (3) Cross-listed as PSYC 6200. Prerequisite: Admission to the Ph.D. program in Health Psychology or permission of instructor. Intensive review of the contributions of the discipline of psychology to the promotion and maintenance of health, the prevention and treatment of illness, and the examination of health behaviors. Presents an historical overview of psychosomatic medicine and behavioral medicine. Focuses on biological, cognitive, affective, social and developmental approaches to health and illness experiences. Topics include: stress, coping, adherence to treatment, pain, chronic disease, psychoneuroimmunology and health behavior changes among others. Emphasizes the biopsychosocial model in understanding health and disease.

PSYC 8201. Health Psychology II. (3) Cross-listed as PSYC 6202. Prerequisite: PSYC 8200. Continuation of Health Psychology I.

PSYC 8203. Research Seminar. (1) Prerequisite: Admission to the Health Psychology Ph.D. Program. A seminar course introducing students to health psychology research in the university. Topics include: a discussion of specific ongoing health psychology

research, IRB procedures, presenting data at professional conferences, and submission of journal articles and research grants. The course must be taken once in the fall and once in the spring of the student's first full year in the Ph.D. program in Health Psychology. *May be repeated for credit one time.*

PSYC 8222. Teaching of Psychology. (3) Prerequisite: Admission to the Ph.D. program in Health Psychology and permission of instructor. Strategies for, and issues related to, teaching undergraduate courses in psychology as part of a general undergraduate education.

PSYC 8240. History and Systems of Psychology. (3) Prerequisite: Graduate standing and permission of instructor. Explores major developments and ideas in the discipline of psychology from its founding in the late 19th century through the early 21st century. Consideration of the systems of psychology, past and present; major controversies and their relevance to contemporary psychology; and the relation between psychology and other disciplines.

PSYC 8243. Diversity in Health Psychology. (3) Prerequisite: Doctoral student standing. This course covers the central ideas and theories related to the role of culture, gender, and socioeconomic status in influencing behavior, cognitions, and emotions as they relate to physical and mental health outcomes. The materials reviewed examine the importance of considering the role of these factors in research, prevention intervention efforts, treatment, and the delivery of health services.

PSYC 8245. Clinical Supervision and Consultation in Psychology. (3). Prerequisite: doctoral graduate standing or permission of instructor. Explores major theories, approaches, and techniques in clinical supervision and consultation in professional psychology. Students are provided with the knowledge and skills necessary to work as effective clinical supervisors and psychological consultants.

PSYC 8255. Community Interventions. (3) Cross-listed as PSYC 6255. Prerequisite: PSYC 8155 and doctoral student standing. Intensive review of the use of system- and organizational-level interventions to promote and maintain health, prevent illness, and improve quality of life. Presents an historical overview of the effectiveness of different types of interventions, and theoretical and empirical background regarding the conditions and factors that contribute to successful community interventions. Students develop and implement a community intervention, in collaboration with a local organization, and develop a grant proposal that would fund a community intervention.

PSYC 8260. Topics in Health Psychology. (3) Cross-listed as PSYC 6260. Prerequisite: PSYC 8200. An examination of selected topics in Health Psychology. *May be repeated for credit with permission of department.*

PSYC 8262. Practicum in Health Psychology. (1-3) Cross-listed as PSYC 6262. Prerequisites: PSYC 8200 and permission of the department. Experience in assessment and treatment with clients at local health agencies under supervision from a faculty member on campus. Applications of the principles of health psychology to special problems with in a healthcare organization or setting. *May be repeated for credit with permission of department.*

PSYC 8355. Community Research Practicum. (3) Cross-listed as PSYC 6355. Prerequisites: PSYC 8155 and doctoral student standing. Methods for conducting applied community research. Students develop and implement applied research project.

PSYC 8422. Advanced Practicum in the Teaching of Psychology. (1-3) Prerequisites: PSYC 8222 and permission of graduate program director. The advanced training and supervision in the teaching of psychology course feature application of the principles of good teaching in psychology to address problems encountered in the classroom and to suggest opportunities for greater effectiveness. Readings from professional journals, discussion, and practical application in the classroom, including instructor observation, are used to meet course objectives. *May be repeated for credit with department approval.*

PSYC 8450. Practicum in Clinical Psychology. (1-3) Cross-listed as PSYC 6450. Prerequisites: PSYC 8150 and permission of department. Experience in clinical assessment and/or psychotherapy with clients at local agencies under supervision from a faculty member on campus. *May be repeated for credit with permission of department.*

PSYC 8455. Practicum in Community Psychology. (1-3) Cross-listed as PSYC 6455. Applications of the principles of community psychology to special problems within an organization or community setting. The project might include, but would not be limited to, consultation, program development, training, community education or program evaluation. *May be repeated for credit with permission of department.*

PSYC 8636. The Social Context of Mental Health. (3) Cross-listed as SOCY 6635, SOWK 6635, and PPOL 8636. Prerequisite: Admission to a graduate program or permission of instructor. Draws upon contributions from the field of psychiatry, psychology, social work, and anthropology. Focuses on mental health and

illness it is social context, with an emphasis on the relationship between social structure and mental health/disorder. Examines the social factors which shape psychiatric diagnosis, the effects of socio-demographic variables on mental health, and the role of social support and stress for different groups. Also examines the organization, delivery, and evaluation of mental health services, and mental healthcare policy.

PSYC 8899. Readings and Research in Psychology.

(1-4) Cross-listed as PSYC 6899. Prerequisite: Permission of instructor and department to be obtained in the semester preceding the semester in which the course is to be taken. Individual study in psychology which may take the form of conducting empirical research or formulating a critique and synthesis of existing research. *May be repeated for credit.*

PSYC 8950. Internship. (1-3) Prerequisites: Good standing in the program, completed all relevant coursework, successfully completed comprehensive examinations (clinical and programmatic), successfully proposed doctoral dissertation, and approval by the Director of Clinical Training. Placement in a pre-doctoral clinical internship at an American Psychological Association approved site or at another site approved by the Director of Clinical Training. Internship typically lasts for one continuous year. *May be repeated for credit for a total of 3 to 6 credits over a one year period.*

PSYC 8999. Doctoral Dissertation Research. (1-9)

Prerequisites: Admission to Health Psychology Ph.D. Program, satisfactory completion of comprehensive examination, and approval of research topic by dissertation committee. Execution of original research that culminates in the preparation and presentation of a doctoral dissertation in a topic of health psychology. *May be repeated for credit. Graded on a Pass/Unsatisfactory or IP basis.*

History

• M.A. in History

Department of History

history.uncc.edu

publichistory.uncc.edu

Graduate Program Director

Dr. Christine Haynes

Public History Director

Dr. Aaron Shapiro

Graduate Faculty

Dr. Benny Andres, Associate Professor
 Dr. Jurgen Buchenau, Professor and Chair
 Dr. Christopher Cameron, Associate Professor
 Dr. Karen Cox, Professor
 Dr. Daniel Dupre, Associate Professor
 Dr. Erika Edwards, Assistant Professor
 Dr. Maren Ehlers, Assistant Professor
 Dr. Karen Flint, Associate Professor
 Dr. Ella Frantantuono, Assistant Professor
 Dr. David Goldfield, Robert Lee Bailey Professor
 Dr. Christine Haynes, Associate Professor
 Dr. Cheryl Hicks, Associate Professor
 Dr. David Johnson, Associate Professor
 Dr. Jill Massino, Assistant Professor
 Dr. Gregory Mixon, Professor
 Dr. Heather Perry, Associate Professor
 Dr. Amanda Pipkin, Associate Professor
 Dr. Ritika Prasad, Associate Professor
 Dr. Sonya Ramsey, Associate Professor
 Dr. Steven Sabol, Associate Professor
 Dr. Aaron Shapiro, Associate Professor
 Dr. John Smail, Professor and Dean of University College
 Dr. John David Smith, Charles H. Stone Distinguished Professor
 Dr. Carmen Soliz, Assistant Professor
 Dr. Peter Thorsheim, Professor
 Dr. Mark Wilson, Professor

MASTER OF ARTS IN HISTORY

The Master of Arts in History program at UNC Charlotte is designed to give motivated students an opportunity to pursue advanced studies in close collaboration with accomplished scholars. The program emphasizes the development of methodological, literary, and conceptual skills that graduates can employ as students in a doctoral program, as professionally oriented history teachers in secondary schools, as staff at museums or historic

sites, or as citizens more acutely aware of the historical evolution of their society. Offering both day and evening courses, the Department of History attracts a diverse group of traditional and non-traditional students. Candidates may pursue the M.A. in History degree on either a full-time or part-time basis.

The Department offers courses in United States, European, and Latin American history, with particular expertise in the following areas:

- African American and Black Women's History
- American South, Old and New
- Colonial and Modern Latin America
- Comparative Slavery, Race and Race Relations, and the African Diaspora
- Early Modern and Modern Europe
- Environment, Labor and Business, Science, Medicine, and Technology
- Military, War, and International Relations
- Nationalism and Colonialism in World History
- Urban History, Immigration, and Ethnicity
- Women's History, Gender, and the Body

The Department also offers a concentration in the field of Public History. The program emphasizes museum studies, historic preservation, and the creation of new media projects such as websites, digital collections, and documentaries.

Admission Requirements

In addition to the general requirements for admission to the Graduate School, the following are ordinarily required for admission to the M.A. in History program:

- A minimum undergraduate GPA of 3.0 in History or a related discipline
- Acceptable performance on the verbal and math portions of the GRE
- A personal statement outlining the candidate's background, interest, and goals in History
- Three letters of recommendation from former instructors and/or employers
- A writing sample of at least 6-8 pages

Degree Requirements

The Master of Arts degree in History requires completion, with a GPA of 3.0 or above, of at least 30 credit hours in approved graduate courses. These courses must include at least 24 credit hours in History, of which at least 15 credit hours are in seminars or colloquia open only to graduate students, and no more than 6 credit hours in individually designed readings or research courses. Students taking the comprehensive examination may take 3

credit hours of exam preparation and students completing a thesis may take 6 credit hours of thesis preparation toward their 30 credit hours.

Students who pursue the Concentration in Public History must complete 30 credit hours of required and elective coursework, 3 credit hours for an internship in some area of Public History, and 3 credit hours of thesis work, for a total of 36 credit hours.

Students must complete all degree requirements, including the comprehensive examination or thesis defense, within six calendar years of first enrollment in the program.

All students in the program are expected to maintain an overall B (3.0) average. Students who do not meet this expectation will be subject to suspension on recommendation of the Graduate Committee of the Department of History.

Required Courses for the M.A. in History

History Colloquia

Select three of the following:

- HIST 6001 Colloquium in United States History Before 1865 (3)
- HIST 6002 Colloquium in United States History Since 1865 (3)
- HIST 6101 Colloquium in 19th-Century European History (3)
- HIST 6102 Colloquium in 20th-Century European History (3)
- HIST 6201 Colloquium in Colonial Latin American History (3)
- HIST 6202 Colloquium in Modern Latin American History (3)

Other Required Courses

- HIST 6693 History and Methodology (*to be taken in the Spring, after completion of at least six credit hours*)
- HIST 6694 Seminar in Historical Writing (*to be taken in the Fall of the second year, after completion of HIST 6693*)

Comprehensive Exam or Thesis

Select one of the following:

- HIST 6698 Exam Preparation (3)
- HIST 6999 Thesis (taken for 6 credit hours)

Required Courses for the M.A. in History with Concentration in Public History

History Colloquia

Select two of the following:

- HIST 6001 Colloquium in United States History Before 1865 (3)
- HIST 6002 Colloquium in United States History Since 1865 (3)

- HIST 6101 Colloquium in 19th-Century European History (3)
 HIST 6102 Colloquium in 20th-Century European History (3)
 HIST 6201 Colloquium in Colonial Latin American History (3)
 HIST 6202 Colloquium in Modern Latin American History (3)

Other Required Courses

- HIST 6300 Topics in Public History (3) (*or another approved public history elective*)
 HIST 6310 Museum Studies (3)
 HIST 6320 Historic Preservation (3)
 HIST 6330 History in the Digital Age (3)
 HIST 6400 Internship (3)
 HIST 6999 Thesis (3)

Consult the department website at history.uncc.edu for a more detailed description of program requirements and suggested courses of study.

Elective Courses

- HIST 5000 Problems in American History (3)
 HIST 5001 Problems in European History (3)
 HIST 5002 Problems in Non-Western History (3)
 HIST 6000 Topics in History (3)
 HIST 6300 Topics in Public History (3)
 HIST 6894 Readings in History (3)
 HIST 6901 Directed Readings/Research (3)
 HIST 6997 Directed Research (3)

In addition to the above listed courses, all other History courses at the 6000 level may count as an elective, including the colloquia, if students take additional credit hours beyond the already completed requirements. For example, if a student takes four colloquia, the fourth counts as an elective.

Students may also elect to take up to 6 or 9 credit hours of graduate-level coursework in disciplines other than History, depending on whether they pursue the thesis or comprehensive exam, respectively. Candidates seeking graduate-level teacher certification may use the elective option to take courses in professional education selected in consultation with the College of Education. If a student needs more than that number of elective hours to satisfy certification requirements, those hours will be added to the total required for the M.A. in History.

Assistantships

The Department of History currently supports eight students with teaching assistantships, two students with editorial assistantships, and occasionally provides support for other students via administrative assistantships. Assistantships are currently funded at

\$9,000 per academic year. From time to time, the department also provides students with other employment opportunities.

See the section Financial Assistance below for additional information on resources available to graduate students in the Department of History.

Internships

Internships are available to all students and required for those in the Public History program. Some are available within the department; others with a variety of historical museums and sites.

Advising

Students may not register for graduate-level courses without the permission of the Department of History. Consequently, students must be advised by the Graduate Program Director, either in person or by phone or email, prior to registering for courses each semester, as well as prior to filing their application for degree.

Transfer Credit

No more than six transferred credit hours may be approved for application to the requirements for the degree.

Language Requirement

Although students are not required to demonstrate proficiency in a foreign language, they are expected to be able to use whatever languages they need to pursue their research interests.

Thesis/Comprehensive Examination

After completing the required courses, students must either prepare a Master's thesis based on original primary research or take three comprehensive written examinations based on reading lists compiled in consultation with faculty members. Students intending to write theses must first write and then defend a thesis proposal. M.A. candidates completing either the thesis or exam must then pass an oral defense of their written work.

An Examining Committee, consisting of two graduate faculty members from the Department of History and a third member selected from History or another department, oversees the student's thesis work or conducts the comprehensive written and oral examinations.

Financial Aid/Financial Assistance

Students may obtain limited financial support from paid internships, summer or adjunct teaching in the department, archival work in the library's Special Collections, and teaching opportunities at local community colleges. Students doing thesis research

or presenting papers at professional conferences may receive modest travel grants from the department or from the Graduate and Professional Student Government.

Information on non-departmental forms of financial assistance is available from the Office of Student Financial Aid.

COURSES IN HISTORY (HIST)

HIST 5000. Problems in American History. (3)

Prerequisite: Permission of the department. A readings course designed around a problem in American history, requiring reading, discussion, reports and a major paper. *May be repeated for credit with change of topic.*

HIST 5001. Problems in European History. (3)

Prerequisites: Permission of the department. A readings course designed around a problem in European history, requiring reading, discussion, reports and a major paper. *May be repeated for credit with change of topic.*

HIST 5002. Problems in Non-Western History. (3)

Prerequisite: Permission of the department. A readings course designed around a problem in non-Western history, requiring reading, discussion, reports and a major paper. *May be repeated for credit with change of topic.*

HIST 6000. Topics in History. (3) Prerequisite: Permission of the department. Intensive treatment of a period or broader survey of a topic, depending on student needs and staff resources. *May be repeated for credit with change of topic.*

HIST 6001. Colloquium in United States History Before 1865. (3) Prerequisite: Permission of the department. A reading colloquium focused on the major events and historiographical approaches in U.S. history to the Civil War.

HIST 6002. Colloquium in United States History Since 1865. (3) Prerequisite: Permission of the department. A reading colloquium focused on the major events and historiographical approaches in U.S. history since the Civil War.

HIST 6101. Colloquium in 19th-Century European History. (3) Prerequisite: Permission of the department. A reading colloquium focused on the major events and historiographical approaches in European history during the long 19th Century (1789-1914).

HIST 6102. Colloquium in 20th-Century European History. (3) Prerequisite: Permission of the department. A reading colloquium focused on the major events and historiographical approaches in European history from World War I to the late 20th Century.

HIST 6201. Colloquium in Colonial Latin American History. (3) Cross-listed as LTAM 6251. Prerequisite: Permission of the department. A topical colloquium devoted to selected themes in colonial Latin American history. Provides an introduction to research methods, documentary sources, and the critical analysis of historical literature. Topics will change. *May be repeated for credit.*

HIST 6202. Colloquium in Modern Latin American History. (3) Cross-listed as LTAM 6252. Prerequisite: Permission of the department. A topical colloquium devoted to selected themes in modern Latin American history. Provides an introduction to research methods, documentary sources, and the critical analysis of historical literature. Topics will change. *May be repeated for credit.*

HIST 6300. Topics in Public History. (3) Prerequisite: Permission of department. Intensive treatment of a field of public history, depending on student needs and staff resources. *May be repeated for credit with change of topic.*

HIST 6310. Museum Studies. (3) Prerequisite: Permission of the department. Introduces students to the management, curatorial, public relations, and fundraising aspects of historical museums and related historical sites. These skills are acquired through readings, term projects, and a "hands-on" experience at local museums and historical sites.

HIST 6320. Historic Preservation. (3) Prerequisite: Permission of the department. An introduction to the theory and practice of identifying, preserving and restoring buildings, sites, structures and objects in the historic built environment of the United States.

HIST 6330. History in the Digital Age. (3) Prerequisite: Permission of the department. Analyzes the impact of new media technology on the discipline of history as well as the ways in which new media enhances the discipline by making history accessible to a much broader audience. Involves a new media project that will require students to learn to work as a team, important to their preparation for careers in public history settings. Coursework includes common readings of texts and encounters with online studies, with emphasis on the media projects.

HIST 6400. Internship. (3) Prerequisite: Permission of the Director of Public History and faculty advisor. Completion of 145 hours of work as an intern, plus a journal and reflection paper.

HIST 6693. Historiography and Methodology. (3) Prerequisite: Six hours of graduate study in History and permission of the department. A study of historians and their philosophical and methodological approaches. Required of all M.A. candidates.

HIST 6694. Seminar in Historical Writing. (3) Prerequisites: HIST 6693 and permission of department. Seminar on the process of writing a history thesis, including evidence, argument, narrative, and organization. In this seminar, students write a thesis chapter or research paper. Required of all M.A. candidates.

HIST 6894. Readings in History. (3) Prerequisites: Prior written permission of instructor and Graduate Program Director. Coverage of historical periods or topics through individually designed reading programs; scheduled conference with a staff member. *May be repeated for credit.*

HIST 6901. Directed Readings/Research. (3) Prerequisites: Prior written permission of instructor and Graduate Program Director. Graduate students will meet individually or in small groups with the instructor and will be assigned readings and/or research on a theme that relates to the lectures of an undergraduate course. Attendance at the lectures is a course requirement. *May be repeated for credit.*

HIST 6997. Directed Research. (3) Prerequisites: Prior written permission of instructor and Graduate Program Director. Investigation of a historical problem culminating in a research paper. *May be repeated for credit.*

HIST 6998. Exam Preparation. (3) Prerequisite: Permission of department. Preparation for comprehensive exams in three fields of historical study.

HIST 6999. Thesis. (3 or 6) Appropriate research and written exposition of research is required. May be repeated by permission, if taken for three hours credit. Six hours of Thesis may be taken during a single semester.

Languages and Culture Studies

- **M.A. in Spanish**
- **Graduate Certificate in Languages and Culture Studies: Translating**

Department of Languages and Culture Studies

languages.uncc.edu

Graduate Program Director

Dr. Anton Pujol

Graduate Faculty

Spanish

Dr. José Manuel Batista, Associate Professor
 Dr. Carlos Coria-Sánchez, Associate Professor
 Dr. Michael Scott Doyle, Professor
 Dr. Ann B. González, Professor
 Dr. Concepción Godev, Associate Professor
 Dr. Jeffrey A. Killman, Assistant Professor
 Dr. Sheri Spaine Long, Department Chair and Professor
 Dr. Samuel Monder, Associate Professor
 Dr. Maryrica Ortiz Lottman, Associate Professor
 Dr. Anton Pujol, Associate Professor
 Dr. Mónica Rodríguez, Assistant Professor

Classical Languages

Dr. Dale Grote, Associate Professor

French

Dr. Michèle Bissière, Professor
 Dr. Allison Stedman, Associate Professor
 Dr. Katherine Stephenson, Associate Professor

German

Dr. Anabel Aliaga-Buchenau, Associate Professor
 Dr. Robert Reimer, Professor
 Dr. Kai-Uwe Werbeck, Assistant Professor

Japanese

Dr. Fumie Kato, Associate Professor

MASTER OF ARTS IN SPANISH

The Master of Arts in Spanish serves individuals who seek a greater understanding of Spanish language, literatures and cultures, and who seek career and professional advancement opportunities in education, translation, applied language (Business Spanish), and who contemplate pursuing a Ph.D. in fields such as Hispanic literature, linguistics, translation studies,

intercultural communication, or international studies.

The M.A. in Spanish provides a rich variety of graduate coursework in a major world language that is becoming increasingly important in the United States. The program builds on a comprehensive undergraduate curriculum and consists of two concentrations:

- 1) Language, Literature and Culture (LLC)
- 2) Translating and Translation Studies (TTS)

Admission Requirements

In addition to the general requirements for admission to the Graduate School, the following are required for the M.A. in Spanish:

- A baccalaureate degree in Spanish or in a related field that required upper-division coursework in undergraduate Spanish (e.g., Latin American Studies, International Studies, International Business), with an overall GPA of at least 2.75 (on a 4.0 scale)
- An acceptable score on the Aptitude Portion of the Graduate Record Examination (GRE)
- An essay that addresses the applicant's motivation for enrolling in the M.A. in Spanish, to include particular areas of research interests and career or professional goals (*Students seeking enrollment in the LLC concentration must write this essay in Spanish and demonstrate a high level of proficiency in Spanish by attaching an additional writing sample (a college term paper or similar document). Students seeking enrollment in the TTS concentration may write the essay in either English or Spanish but must demonstrate high levels of literacy and proficiency in both languages by providing writing samples in each.*)
- An oral interview with the Graduate Program Director
- Three letters of reference. (*For those interested in the LLC concentration, at least two of the letters must be from professors. For those interested in the TTS concentration, at least one of the letters must come from a professor, and letters not written by a professor must be from professionals working in the field of Spanish, translation and interpreting, or a closely related area (e.g., Latin American Studies, International Studies, International Business). Letters not written by professors should not come from a friend or family member, but from a work supervisor or somebody in a similar professional capacity.*)

Prerequisite Requirements

LLC concentration applicants who do not have advanced-level undergraduate coursework in Spanish language and the literature and culture of Spain and

Latin America will be required to take a minimum of two courses in these areas as part of their preparation for enrollment in the M.A. program. Such coursework may be taken as a post-baccalaureate graduate student (PBG), and up to 6 credit hours of such coursework with a grade of B or higher may be transferred forward to the M.A. program upon admission to the program. Applicants should consult with the Program Director for counseling.

Degree Requirements

The Master of Arts in Spanish requires 30 graduate credit hours. For any course to count toward the M.A. in Spanish, it must have been taken within six years from the date of enrollment in the program. No more than 6 credit hours evaluated with a grade of C may be counted toward the minimum hours required for the master's degree. Up to 6 credit hours of appropriate graduate coursework may be accepted for transfer from another accredited institution. Additional non-residence credit for graduate study abroad may be possible via departmental pre-approval.

Concentrations

Language, Literature, and Culture (LLC) Concentration (30 credit hours)

The LLC concentration allows for an in-depth development of Spanish language skills and is especially recommended for teachers of Spanish. It also provides excellent preparation for individuals who may wish to pursue the Ph.D. in Spanish, for whom courses in literature and linguistics are especially recommended. Students may take either: (1) 30 credit hours of elective courses or (2) 24 credit hours of elective courses plus a master's thesis (6 credit hours).

Elective Courses (24-30 credit hours)

- SPAN 5050 Selected Topics in Spanish (1-3)
- SPAN 5121 Advanced Business Spanish II (3)
- SPAN 5122 Studies in Advanced Business Spanish (3)
- SPAN 5201 Nineteenth Century Spanish Literature (3)
- SPAN 5202 Twentieth Century Spanish Literature (3)
- SPAN 5205 Novel of the Golden Age (3)
- SPAN 5206 Theater of the Golden Age (3)
- SPAN 5210 Studies in Spanish American Poetry (3)
- SPAN 5211 Studies in Spanish American Prose Fiction (3)
- SPAN 5212 Studies in Spanish American Theater (3)
- SPAN 5213 Don Quijote (3)
- SPAN 5410 Professional Internship in Spanish (1-6)
(up to 3 credit hours may be applied toward the degree)
- SPAN 6003 Studies in Hispanic Culture and Civilization (3)
- SPAN 6005 Advanced Studies in Spanish Literature (3)

SPAN 6007 Advanced Studies in Spanish American Literature (3)

SPAN 6201 Hispanic Language and Culture through Media (3)

SPAN 6901 Advanced Project (1-3)

Note: With the approval of the department, students may take 3 elective credit hours in related areas as part of the 24-30 credit hours. To do so, students must submit a written request to the Graduate Program Director explaining how these hours of elective courses will enrich their program.

Thesis (0-6 credit hours)

SPAN 6902 Thesis (1-6)

The master's thesis may include Spanish and Spanish American literature; Spanish and Spanish American civilization and culture (including literature and film studies); Spanish linguistics, methodology, applied language (Spanish for business and international trade); and other special topics in Spanish.

Translating and Translation Studies (TTS) Concentration

The TTS concentration serves individuals interested in a career in professional translation or in enhancing their career or work opportunities as specialists in the language and culture industries. It also provides preparation for those who may wish to pursue a Ph.D. in fields such as Spanish, linguistics, translating and translation studies, intercultural communication, or international studies. Students may take either: (1) 30 credit hours of elective courses or (2) 24 credit hours of elective courses plus a master's thesis (6 credit hours).

Spanish Elective Courses (6 credit hours)

Select two from:

SPAN 5000-6999 (excluding SPAN 6902)

Translating and Translation Studies Elective Courses (18-24 credit hours)

TRAN 6001 History, Theory, and Method of Translation (3)

TRAN 6002 Linguistics for Translators (3)

TRAN 6003 Computer-Assisted Translating (3)

TRAN 6004 Translation Project Management (3)

TRAN 6472 Workshop on Non-Literary Topics I (Business, Legal, Governmental) (3)

TRAN 6476 Workshop on Literary and Cultural Topics (3)

TRAN 6480 Translation Internship (1-6) (*up to 3 credit hours may be applied toward the degree*)

TRAN 6481 Translation Cooperative Education (1-3)

TRAN 6900 Special Topics in Translation Studies (3)

TRAN 6901 Advanced Project in English↔Spanish Translating (1-3)

Note: With the approval of the department, students may take 3 elective credit hours in related areas as part of the 24-30 credit hours. To do so, students must submit a written request to the Graduate Program Director explaining how these hours of elective courses will enrich their program.

Thesis (0-6 credit hours)

TRAN 6902 Thesis (1-6)

The master's thesis may include the history, theory, and method of translation; linguistics for translators; translation project management and technologies; and the analysis and translation of different types of texts and discourse: business, technical, medical, legal, scholarly, and literary.

Advising

Graduate students are advised by the Graduate Program Director and by designated graduate faculty members in good standing.

Comprehensive Examination

After Admission to Candidacy, students must successfully complete a four-hour comprehensive examination, based partly on a core Reading List and partly on the coursework completed. The Reading List is published online at languages.uncc.edu. Students must be enrolled during the semester in which they take the comprehensive examination, which is usually taken during their final semester of enrollment in the program. The exams are scheduled twice a year: usually in mid to late November of each Fall semester and in mid to late April of each Spring semester.

Application for Degree

Students should make application for their degree by completing the online Application for Degree through Banner Self Service no later than the filing date specified in the University Academic Calendar.

Assistantships

A limited number of graduate assistantships are available on a competitive basis each year. Applications must be received no later than April 15 for assistantships beginning the following academic year. Further information is available in the Department of Languages and Culture Studies.

Cooperative Education

The Department offers TRAN 6481 (Translation Cooperative Education) to provide on-site work in translating texts or interpreting, English↔Spanish, with site, workload, and remuneration to be determined in consultation with employer and one faculty co-op advisor. Provides practical and

professional training experience under conditions that the University cannot duplicate.

Internships

The Department approves a limited number of internships (SPAN 5410 and TRAN 6480) which provide program-related experience for graduate students who seek to develop their Spanish skills in a professional setting. Further information is available in the Department of Languages and Culture Studies.

Licensure

Students seeking licensure in Spanish should obtain information on requirements from the Teacher Education Advising, Licensure, and Recruitment Office (TEALR) in the College of Education.

Tuition Waivers

A limited number of in-state as well as out-of-state tuition waivers may be available for new graduate assistants and/or outstanding applicants.

GRADUATE CERTIFICATE IN LANGUAGES AND CULTURE STUDIES: TRANSLATING

The Department of Languages and Culture Studies offers a Graduate Certificate in Languages and Culture Studies: Translating with options in the following language pairs: English-French, English-German, English-Japanese, English-Russian, and English-Spanish. It is designed for Early Entry, post-baccalaureate, graduate, and post-graduate students. Students typically complete the required 12 graduate credit hours in 2-3 semesters, and may begin the program in either the Fall or Spring semester.

Students in the certificate program study the history, theory, methodology, and profession of translation; work intensively in the analysis and translation of different types of discourse, including non-literary and literary texts; become familiar with computer-assisted translation; and develop advanced post-editing skills. Graduate level coursework may also include special topics courses in translation and up to 3 credit hours of professional internship credit in translating. Translating is done in both directions of a given language pair:

- English ↔ French
- English ↔ German
- English ↔ Japanese
- English ↔ Russian
- English ↔ Spanish

Admission Requirements

Students must apply for admission to the Graduate School and must have a minimum undergraduate GPA of 2.75. Applicants will generally have a baccalaureate degree in one of the certificate languages: French, German, Japanese, Russian, or Spanish, or in a closely related area that requires sufficient upper-division coursework in that language (e.g., for Spanish, Latin American Studies, International Studies, International Business), or an undergraduate degree, certificate, or minor in translation.

Applicants are required to submit:

- A current GRE or MAT score (international students have an additional requirement of submitting official scores on the Test of English as a Foreign Language [TOFEL])
- A well-developed essay in English that addresses the applicant's motivation for enrolling in the Graduate Certificate
- Three letters of reference (from professors, specialists in translation, and/or employers, preferably in the field)
- An oral interview with the Graduate Program Director
- A sample of translations into or from the language pair selected (with original text to accompany each translation submitted)

Note: Students interested in adding this Graduate Certificate to the M.A. in Spanish must apply separately for the certificate program. One application does not cover both programs.

Certificate Requirements

Core Courses (6 credit hours)

Select two of the following:

- TRAN 6001 History, Theory, and Method of Translation (3)
- TRAN 6002 Linguistics for Translators (3)
- TRAN 6003 Translating and the Computer (3)
- TRAN 6900 Special Topics in Translation Studies (3)

Language-Specific Translation Courses (6 credit hours)

Select courses from the language being studied. With permission of the department, students may substitute one of the Core Courses not previously taken or TRAN 6480 for three credit hours.

French

Select two of the following:

- TRAN 5402 Practicum in Translating I – French (3)
- TRAN 5403 Practicum in Translating II – French (3)
- TRAN 5404 Practicum in Translating III – French (3)

German

Select two of the following:

- TRAN 5412 Practicum in Translating I – German (3)
- TRAN 5413 Practicum in Translating II – German (3)
- TRAN 5414 Practicum in Translating III – German (3)

Japanese

Select two of the following:

- TRAN 5422 Practicum in Translating I – Japanese (3)
- TRAN 5423 Practicum in Translating II – Japanese (3)
- TRAN 5424 Practicum in Translating III – Japanese (3)

Russian

Select two of the following:

- TRAN 5432 Practicum in Translating I – Russian (3)
- TRAN 5433 Practicum in Translating II – Russian (3)
- TRAN 5434 Practicum in Translating III – Russian (3)

Spanish

Select two of the following:

- TRAN 6472 Workshop on Non-Literary Topics I (Business, Legal, Governmental) (3)
- TRAN 6474 Workshop on Non-Literary Topics II (Medical and Technical) (3)
- TRAN 6476 Workshop on Literary and Cultural Topics (3)

Early Entry

Exceptional undergraduate students at UNC Charlotte may be accepted into the Graduate Certificate in Languages and Culture Studies: Translating, and begin work toward a graduate certificate or degree before completion of the baccalaureate degree. An applicant may be accepted at any time after completion of 75 or more credit hours of undergraduate coursework, although it is expected that at least 90 credit hours of undergraduate coursework will have been earned by the time the first graduate course is taken. These students will have provisional acceptance status in the graduate certificate, pending the award of the baccalaureate degree. To be accepted to this certificate program, the student must apply specifically to this certificate program and follow the Graduate School procedures and requirements.

Up to 12 credit hours earned at the graduate level may be substituted for required undergraduate hours. In other words, up to 12 twelve credit hours of graduate coursework may be “double counted” toward both the baccalaureate and graduate certificate. Students use the Early Entry Program Form to detail which courses they plan to “double count” and which courses will be taken solely for graduate credit.

Transfer Credit

Generally, only graduate courses taken at UNC Charlotte count toward the Graduate Certificate.

However, 3 credit hours of coursework may be considered for possible transfer into the certificate program if approved by the Department of Languages and Culture Studies. 9 of the 12 credit hours for the Graduate Certificate must be taken in residency.

COURSES IN FRENCH (FREN)

FREN 5003. Studies in French Literature. (3)

Prerequisite: Post-baccalaureate status, B.A. in French, or permission of department. Major topics in French literature. *May be repeated for credit with change of topic.*

FREN 5005. Studies in the French Language. (3)

Prerequisites: Post-baccalaureate status, B.A. in French, or permission of department. Major topics in the French language. *May be repeated for credit with change of topic.*

FREN 5007. Studies in French Culture and Civilization. (3)

Prerequisites: Post-baccalaureate status, B.A. in French, or permission of department. Major topics in French culture and civilization. *May be repeated for credit with change of topic.*

FREN 5050. Topics in French. (1-3) Prerequisites: Post-baccalaureate status; B.A. in French; ENGL 1102 or equivalent, if taught in English. Major topics in French. May be taught in French or English. Will not count toward the major if taught in English. *May be repeated for credit with change of topic.*

FREN 5201. Survey of French Literature I. (3)

Prerequisite: Post-baccalaureate status, B.A. in French, or permission of department. The major literary movements from the Middle Ages to the Enlightenment, with sample texts. Emphasis on continuity and change.

FREN 5202. Survey of French Literature II. (3)

Prerequisite: Post-baccalaureate status, B.A. in French, or permission of department. The major literary movements from the Enlightenment to the contemporary period, with sample texts. Emphasis on continuity and change.

FREN 5410. Professional Internship in French. (1-6)

Prerequisites: Post-baccalaureate status, B.A. in French, or permission of department. Faculty-supervised field and/or research experience in a cooperating profession (e.g., business) or community organization. Contents of internship based upon a contractual agreement among the student, department, and business or community organization. *Graded on a Pass/Unsatisfactory basis.*

FREN 5800. Directed Individual Study. (1-3)

Prerequisite: Post-baccalaureate status, B.A. in French, or permission of department. Individual work on a selected area of study. To be arranged with the instructor, generally during the preceding semester, and by special permission only. *May be repeated for credit.*

COURSES IN GERMAN (GERM)

GERM 5010. Periods in the History of German Literature. (3)

(a) Medieval literature, (b) Classicism, (c) Romanticism, (d) Nineteenth Century, (e) Contemporary literature. Prerequisites: Post-baccalaureate status, B.A. in German, or permission of department. Study of the major writers and works in a given period. Readings, lectures, and reports. *May be repeated for credit with change of topic.*

GERM 5020. The Chief Genres in German Literature. (3)

(a) Novel, (b) Theater, (c) Lyric poetry, (d) short prose fiction. Prerequisites: Post-baccalaureate status, B.A. in German, or permission of department. An analysis of a major genre and its development within German literary history. Readings, lectures and reports. *May be repeated for credit with change of topic.*

GERM 5050. Special Topics in German. (1-3)

Prerequisite: Post-baccalaureate status, B.A. in German, or permission of department. Treatment of a special group or figure in German literature, specialized topic in German culture or language, or special problems in German conversation. *May be repeated for credit with change of topic.*

GERM 5120. Advanced Business German I. (3)

Prerequisites: Post-baccalaureate status, B.A. in German, or permission of department. Advanced studies in Business German, intensive practice in speaking, listening comprehension, reading, writing, and translation in functional business areas such as economics, management, and marketing.

GERM 5121. Advanced Business German II. (3)

Prerequisite: Post-baccalaureate status, B.A. in German, or permission of department. Advanced studies in Business German, intensive practice in speaking, listening comprehension, reading, writing, and translation in functional business areas such as marketing, finance, and import-export.

GERM 5203. Survey of German Literature I. (3)

Prerequisites: Post-baccalaureate status, B.A. in German, or permission of department. General introduction to German literature from the Middle Ages to the Classical Period. Book reports and class discussion on collateral readings.

GERM 5204. Survey of German Literature II. (3)

Prerequisite: Post-baccalaureate status, B.A. in German, or permission of department. German literature since Classicism. Book reports and discussions on collateral readings.

GERM 5410. Professional Internship in German. (1-6)

Prerequisites: Post-baccalaureate status, B.A. in German, or permission of department. Faculty-supervised field and/or research experience in a cooperating profession (e.g., business) or community organization. Contents of internship based upon a contractual agreement among the student, department, and business or community organization.

GERM 5800. Directed Individual Study. (1-3)

Prerequisite: Post-baccalaureate status, B.A. in German, or permission of department. Individual work on a selected area study. To be arranged with the instructor, generally during the preceding semester, and by special permission only. *May be repeated for credit.*

COURSES IN SPANISH (SPAN)

SPAN 5050. Selected Topics in Spanish. (1-3)

Prerequisites: Post-baccalaureate status, B.A. in Spanish, or permission of the department. Consideration of a predetermined topic. *May be repeated for credit with change of topic.*

SPAN 5120. Advanced Business Spanish I. (3)

Cross-listed as LTAM 5120. Prerequisites: Post-baccalaureate status, B.A. in Spanish, or permission of the department. Advanced studies in Business Spanish, intensive practice in speaking, listening comprehension, reading, writing, and translation in functional business areas such as economics, management, and marketing.

SPAN 5121. Advanced Business Spanish II. (3)

Cross-listed as LTAM 5121. Prerequisites: Post-baccalaureate status, B.A. in Spanish, or permission of the department. Advanced studies in Business Spanish, intensive practice in speaking, listening comprehension, reading, writing, and translation in functional business areas such as marketing, finance, and import-export.

SPAN 5122: Studies in Advanced Business Spanish.

(3) Cross-listed as LTAM 4322. Prerequisites: SPAN 3201, 3202, 3203, and 3220, or permission of the department. Advanced studies in special topics in Business Spanish (e.g., Tourism in Spain and Latin America, Free Trade in the Americas [NAFTA/TLCAN, Mercosur, The Andean Pact, CAFTA-DR],

Socioeconomic Issues in the Greater Caribbean, Business and Technology in Latin America and Spain). *May be repeated for credit with change of topic.*

SPAN 5201. Nineteenth Century Spanish Literature.

(3) Prerequisites: Post-baccalaureate status, B.A. in Spanish, or permission of the department. Survey of Peninsular literature from Costumbrismo through the Generation of 1898. Lectures, discussions, and reports.

SPAN 5202. Twentieth Century Spanish Literature.

(3) Prerequisites: Post-baccalaureate status, B.A. in Spanish, or permission of the department. Treatment of major literary developments from the Generation of 1898 to present day. Lectures, discussions, and reports.

SPAN 5205. Novel of the Golden Age. (3)

Prerequisites: Post-baccalaureate status, B.A. in Spanish, or permission of the department. El Lazarillo through El Criticón. Lectures, discussions, and reports.

SPAN 5206. Theater of the Golden Age. (3)

Prerequisites: Post-baccalaureate status, B.A. in Spanish, or permission of the department. Study of works of the leading dramatists of the period. Lectures, discussions, and reports.

SPAN 5210. Studies in Spanish American Poetry. (3)

Cross-listed as LTAM 5310. Prerequisites: Post-baccalaureate status, B.A. in Spanish, or permission of the department. Studies of 19th and 20th century Spanish American poetry.

SPAN 5211. Studies in Spanish American Prose Fiction. (3)

Cross-listed as LTAM 5311. Prerequisites: Post-baccalaureate status, B.A. in Spanish, or permission of the department. Studies of 19th and 20th century Spanish American prose fiction.

SPAN 5212. Studies in Spanish American Theater. (3)

Cross-listed as LTAM 5312. Prerequisites: Post-baccalaureate status, B.A. in Spanish, or permission of the department. Studies of 20th century Spanish American theater.

SPAN 5213. Don Quijote. (3) Prerequisites: Post-baccalaureate status, B.A. in Spanish, or permission of the department. Study of Cervantes' masterpiece.

SPAN 5410. Professional Internship in Spanish. (1-6)

Prerequisites: Post-baccalaureate status, B.A. in Spanish, and permission of the department. Faculty-supervised field and/or research experience in a cooperating profession (e.g., business) or community organization. Contents of internship based upon a contractual agreement among the student,

department, and business or community organization. *Graded on a Pass/Unsatisfactory basis.*

SPAN 5800. Directed Individual Study. (1-3)

Prerequisite: Post-baccalaureate status, B.A. in Spanish or permission of the department. Individual work on a selected area of study. To be arranged with the instructor, generally during the preceding semester. By special permission only. *May be repeated for credit.*

SPAN 6001. Advanced Studies in Spanish Language.

(3) Selected topics in Spanish linguistics. Topics may include a) history of the Spanish language; b) introduction to Spanish phonology and morphology; and c) Spanish dialectology. *May be repeated for credit with change of topic.*

SPAN 6003. Studies in Hispanic Culture and Civilization. (3)

Selected topics on the civilization and culture of the Spanish-speaking world. Possible emphases include 1) the press in Spanish America; 2) song texts of the Hispanic world; 3) Spanish cinema; 4) Spain since Franco; 5) Hispanics in the United States. *May be repeated for credit with change of topic.*

SPAN 6005. Advanced Studies in Spanish Literature.

(3) Study of selected works and writers from Spain. *May be repeated for credit with change of topic.*

SPAN 6007. Advanced Studies in Spanish American Literature. (3)

Cross-listed as LTAM 6307. Study of selected works, writers, literary genres, periods, and schools from Spanish America. *May be repeated for credit with change of topic.*

SPAN 6201. Hispanic Language and Culture through Media. (3)

In-depth study of contemporary Hispanic culture and language through media sources, including print, radio, film, Internet, and television. The course provides cultural exposure, and practice in written and oral communication, and training in the use of technology--assisted instruction. *May be repeated for credit with change of topic.*

SPAN 6901. Advanced Project. (1-3) Appropriate research and written exposition of that research. The proposed project, as well as the final product, will be approved by a committee of three faculty members appropriate to the topic, appointed by the Department Chair after consultation with the student and the Graduate Program Director, on the basis of a written proposal from the student. *May be repeated for credit with change of topic.*

SPAN 6902. Thesis. (1-6) Appropriate research and written exposition of that research. The proposed project, as well as the final product, will be approved

by a committee of three faculty members appropriate to the topic, appointed by the Chair of the Department after consultation with the student, on the basis of a written proposal from the student. (A statement of recommendations and requirements for form and procedure is available in the office of the Department of Languages and Culture Studies.) *May be repeated for credit up to 6 credits.*

COURSES IN TRANSLATING AND TRANSLATION STUDIES (TRAN)

TRAN 5402. Practicum in Translating I - French. (3)
Cross-listed as TRAN 4402. Provides guided practical experience in translating from French to American English, through work with a variety of source texts. Students present their translations to the class.

TRAN 5403. Practicum in Translating II - French. (3)
Cross-listed as TRAN 4403. Provides guided practical experience in translating from French to American English, through work with one genre of source texts. Students present their translations to the class.

TRAN 5404. Practicum in Translating III - French. (3)
Cross-listed as TRAN 4404. Provides individualized practical experience in translating from French to American English. Students present their translations to the class.

TRAN 5412. Practicum in Translating I - German. (3)
Cross-listed as TRAN 4412. Provides guided practical experience in translating from German to American English, through work with a variety of source texts. Students present their translations to the class.

TRAN 5413. Practicum in Translating II - German. (3)
Cross-listed as TRAN 4413. Provides guided practical experience in translating from German to American English, through work with one genre of source texts. Students present their translations to the class.

TRAN 5414. Practicum in Translating III - German. (3)
Cross-listed as TRAN 4414. Provides individualized practical experience in translating from German to American English. Students present their translations to the class.

TRAN 5422. Practicum in Translating I - Japanese. (3)
Cross-listed as TRAN 4422. Provides guided practical experience in translating from Japanese to American English, through work with a variety of source texts. Students present their translations to the class.

TRAN 5423. Practicum in Translating II - Japanese. (3)
Cross-listed as TRAN 4423. Provides guided

practical experience in translating from Japanese to American English, through work with one genre of source texts. Students present their translations to the class.

TRAN 5424. Practicum in Translating III - Japanese. (3)
Cross-listed as TRAN 4424. Provides individualized practical experience in translating from Japanese to American English. Students present their translations to the class.

TRAN 5432. Practicum in Translating I - Russian. (3)
Cross-listed as TRAN 4432. Provides guided practical experience in translating from Russian to American English, through work with a variety of source texts. Students present their translations to the class.

TRAN 5433. Practicum in Translating II - Russian. (3)
Cross-listed as TRAN 4433. Provides guided practical experience in translating from Russian to American English, through work with one genre of source texts. Students present their translations to the class.

TRAN 5434. Practicum in Translating III - Russian. (3)
Cross-listed as TRAN 4434. Provides individualized practical experience in translating from Russian to American English. Students present their translations to the class.

TRAN 6001. History, Theory, and Method of Translation. (3) Theories of translation from Horace and Cicero to the present. Provides a historical, theoretical, and sociological framework for the translation enterprise. Emphases may differ from year to year. *May be repeated for credit with change of topic.*

TRAN 6002. Linguistics for Translators. (3) The study of translation issues through the lens of linguistic theory, namely semantic, pragmatic, and psycholinguistic theories.

TRAN 6003. Computer-Assisted Translating. (3) Focus on discourse and textual typologies (representative kinds of writing and kinds of documents and texts) that the practicing translator may encounter. Development of reading, recognition, and reproduction skills. Strategies for lexical development and terminology management. *May be repeated for credit with change of topic.*

TRAN 6004. Translation Project Management. (3) Provides a hands-on introduction to traditional project management and its application to translations and localization projects (cultural adaptation), enhancing one's understanding of the language industry while providing preparation for a successful transition to the job market.

TRAN 6472. Workshop on Non-Literary Topics I (Business, Legal, Governmental). (3) Theory-based workshop practicum dealing with the English↔Spanish translation of authentic business, legal, and/or governmental documents. Emphasis may center on any one of these types of discourse or any combination thereof. *May be repeated for credit with change of topic.*

TRAN 6474. Workshop on Non-Literary Topics II (Medical and Technical). (3) Theory-based workshop practicum dealing with the English↔Spanish translation of authentic medical, technical, and/or scientific documents. Emphasis may center on any one of these types of discourse or any combination thereof. *May be repeated for credit with change of topic.*

TRAN 6476. Workshop on Literary and Cultural Topics. (3) Theory-based workshop practicum dealing with the English↔Spanish translation of literary and/or cultural texts. Emphasis may center on one or both of these types of discourse. *May be repeated for credit with change of topic.*

TRAN 6480. Translation Internship. (1-6) On-site work in translating texts or interpreting, English↔Spanish. Site and workload to be determined in consultation with employer and one faculty internship advisor. Provides practical and professional training experience under conditions that the University cannot duplicate.

TRAN 6481. Translation Cooperative Education. (1-3) On-site work in translating texts or interpreting, English↔Spanish. Site, workload and remuneration to be determined in consultation with employer and one faculty co-op advisor. Provides practical and professional training experience under conditions that the University cannot duplicate.

TRAN 6900. Special Topics in Translation Studies. (3) Selected topics in Translating and Translation Studies (e.g., continued study of theories of translation, translation of a literary genre such as prose fiction, drama or poetry, translation of historical, political or social documents, or interpretation). *May be repeated for credit with change of topic.*

TRAN 6901. Advanced Project in English↔Spanish Translating. (1-3) Selected topics in English↔Spanish Translating and Translation Studies (e.g., continued study of theories of translation, translation of a literary genre such as prose fiction, drama or poetry, translation of historical, political or social documents, or interpretation). *May be repeated for credit with change of topic.*

TRAN 6902. Thesis. (1-6) Appropriate research and written exposition of that research, or substantial English↔Spanish translation project with critical introduction and commentary. The proposed thesis work, as well as the final product, will be approved by a committee of three faculty appropriate to the topic, appointed by the Department Chair after consultation with the student and the Graduate Program Director, on the basis of a written proposal from the student. (A statement of recommendations and requirements for form and procedure is available in the Department of Languages and Culture Studies.) *May be repeated for credit up to 6 credits.*

Latin American Studies

- **M.A. in Latin American Studies**
- **M.A. in Latin American Studies/
MBA Dual Degree** (see *Belk College of Business section*)

Website

latinamericanstudies.uncc.edu

Graduate Program Director

Dr. Jurgen Buchenau

MASTER OF ARTS IN LATIN AMERICAN STUDIES

The program in Latin American Studies leading to the Master of Arts degree provides students with the skills and knowledge to understand and analyze the societies of Latin America and the Caribbean—a region of key importance in the age of globalization and mass migration. The program will provide an excellent foundation for advanced graduate study in the humanities, social sciences, and law. It is also designed to prepare the growing number of students who seek careers in the foreign service and other government agencies as well as those who will seek employment in non-governmental organizations with an international or cross-cultural orientation or in international business. Finally, it will also serve as an important qualification for individuals in education and the social services who work with the burgeoning Hispanic population of North Carolina.

The M.A. program in Latin American Studies has the following educational objectives:

- to study the culture, geography, history, politics, and society of Latin America and the Spanish-speaking Caribbean
- to provide an understanding of the socio-cultural background of the Latino population in the United States
- to understand economic development and underdevelopment from a comparative perspective
- to undertake interdisciplinary research in the humanities and social sciences using a variety of methodologies
- to instill writing and critical thinking skills by teaching rigorous scholarly inquiry and research

methods at a level appropriate for graduate education

- to develop language competencies in Spanish and/or Portuguese

Additional Admission Requirements

In addition to the general requirements for admission to the Graduate School, an undergraduate degree, preferably in Latin American Studies or in a related field such as Anthropology, Architecture, Art, Geography, History, International Business, International Studies, Political Science, Portuguese, Sociology, or Spanish, with a GPA of at least 3.0 is required. However, the admissions committee will consider applicants with an average lower than this minimum if the other elements of the application are strong.

Spanish proficiency at the advanced level as demonstrated by undergraduate coursework, an oral interview, a standardized test, and/or life experience is also required. Knowledge of Portuguese is desirable but not required.

A combined score of at least 1000 on the verbal and math portions of the GRE is required. Again, the admissions committee will consider applicants with a lower score than this minimum if the other elements of the application are strong.

The following documents must be submitted for admission:

- UNC Charlotte Graduate School online application form.
- Official academic transcripts.
- Official GRE score.
- Statement of purpose.
- Evidence of proficiency in Spanish.
- Three letters of recommendation on the UNC Charlotte recommendation form.
- International students only: evidence of proficiency in English as well as the following UNC Charlotte forms: immigration status, statement of financial responsibility, and estimated expenses.

Degree Requirements

The Master of Arts degree in Latin American Studies requires completion, with a GPA of 3.0 or above, of at least 30 credit hours in approved graduate courses. These courses must include at least 18 credit hours which are only open to graduate students. No more than 12 credit hours may be taken for credit in the degree program at the 5000 level.

At the end of the program, students will display Spanish proficiency at the advanced level in speaking, reading, and writing.

Tracks

Students select one of two tracks within the degree program: (1) a Thesis track or (2) an Examination track. The Thesis track prepares students for graduate work at the doctoral level in Latin American Studies or one of its constituent disciplines. The Examination track prepares students for employment in the private and public sectors.

Thesis Track (30 credit hours)***Interdisciplinary Core Courses (12 credit hours)***

LTAM 5600 Seminar in Latin American Studies (3)
(two sections)

LTAM 6910 Thesis Tutorial (3)

LTAM 6920 Master's Thesis (3)*

**As part of the Master's Thesis course, students prepare and defend a thesis before a committee composed of three faculty members from at least two different disciplines. A satisfactory grade (A or B) on the thesis is required for graduation.*

Multidisciplinary Elective Courses (18 credit hours)

Social Sciences Courses (6 credit hours)

Select two of the following:

LTAM 5000 Graduate Topics in Latin American Studies (3) (*science-focused topic*)

LTAM 5116 Culture and Conflict in the Amazon (3)

LTAM 5120 Advanced Business Spanish I (3)

LTAM 5121 Advanced Business Spanish II (3)

LTAM 6000 Advanced Graduate Topics in Latin American Studies (3) (*science-focused topic*)

LTAM 6100 Seminar in Latin American Politics (3)

LTAM 6800 Directed Readings (3) (*science-focused topic*)

LTAM 6801 Directed Research (3) (*science-focused topic*)

History Courses (6 credit hours)

Select two of the following:

LTAM 5000 Graduate Topics in Latin American Studies (3) (*history-focused topic*)

LTAM 6000 Advanced Graduate Topics in Latin American Studies (3) (*history-focused topic*)

LTAM 6250 Comparative Slavery and Race Relations (3)

LTAM 6251 Seminar in Colonial Latin American History (3)

LTAM 6252 Seminar in Modern Latin American History (3)

LTAM 6800 Directed Readings (3) (*history-focused topic*)

LTAM 6801 Directed Research (3) (*history-focused topic*)

Humanities Courses (6 credit hours)

LTAM 6300 Seminar in Latin American Thought (3)

Plus select one of the following:

LTAM 5000 Graduate Topics in Latin American Studies (3) (*humanities-focused topic*)

LTAM 6000 Advanced Graduate Topics in Latin American Studies (3) (*humanities-focused topic*)

LTAM 5310 Studies in Spanish American Poetry (3)

LTAM 5311 Studies in Spanish American Prose Fiction (3)

LTAM 5312 Studies in Spanish American Theater (3)

LTAM 6300 Seminar in Latin American Thought (3)

LTAM 6307 Advanced Studies in Spanish American Literature (3)

LTAM 6350 Histories of Latin American Architecture (3)

LTAM 6800 Directed Readings (3) (*humanities-focused topic*)

LTAM 6801 Directed Research (3) (*humanities-focused topic*)

Note: Listed above are acceptable elective courses; however, they are not limited to those listed. Up to two of the elective courses may be independent studies (LTAM 6800 and/or LTAM 6801).

Examination Track (30 credit hours)***Interdisciplinary Core Courses (9 credit hours)***

LTAM 5600 Seminar in Latin American Studies (3)
(two sections)

OR

LTAM 5600 Seminar in Latin American Studies (3)
and LTAM 6400 Internship (3)

LTAM 6950 Comprehensive Examination (3)*

**Based on an interdisciplinary reading list of at least 40 titles, students will take a written and oral comprehensive examination before a committee composed of three faculty members from at least two different disciplines. A satisfactory grade (A or B) on the written examination is required to proceed to the oral examination; in case of an unsatisfactory grade, the written examination may be retaken once. Similarly, a satisfactory grade of A or B on the oral examination is required for graduation, and the student may retake the oral examination once in case of an unsatisfactory grade.*

Multidisciplinary Elective Courses (18 credit hours)

Social Sciences Courses (6 credit hours)

Select two of the following:

LTAM 5000 Graduate Topics in Latin American Studies (3) (*science-focused topic*)

LTAM 5116 Culture and Conflict in the Amazon (3)

LTAM 5120 Advanced Business Spanish I (3)

LTAM 5121 Advanced Business Spanish II (3)

LTAM 6000 Advanced Graduate Topics in Latin American Studies (3) (*science-focused topic*)

LTAM 6100 Seminar in Latin American Politics (3)

LTAM 6800 Directed Readings (3) (*science-focused topic*)

LTAM 6801 Directed Research (3) (*science-focused topic*)

History Courses (6 credit hours)

Select two of the following:

LTAM 5000 Graduate Topics in Latin American Studies (3) (*history-focused topic*)

LTAM 6000 Advanced Graduate Topics in Latin American Studies (3) (*history-focused topic*)

LTAM 6250 Comparative Slavery and Race Relations (3)

LTAM 6251 Seminar in Colonial Latin American History (3)

LTAM 6252 Seminar in Modern Latin American History (3)

LTAM 6800 Directed Readings (3) (*history-focused topic*)

LTAM 6801 Directed Research (3) (*history-focused topic*)

Humanities Courses (6 credit hours)

LTAM 6300 Seminar in Latin American Thought (3)

Plus select one of the following:

LTAM 5000 Graduate Topics in Latin American Studies (3) (*humanities-focused topic*)

LTAM 6000 Advanced Graduate Topics in Latin American Studies (3) (*humanities-focused topic*)

LTAM 5310 Studies in Spanish American Poetry (3)

LTAM 5311 Studies in Spanish American Prose Fiction (3)

LTAM 5312 Studies in Spanish American Theater (3)

LTAM 6300 Seminar in Latin American Thought (3)

LTAM 6307 Advanced Studies in Spanish American Literature (3)

LTAM 6350 Histories of Latin American Architecture (3)

LTAM 6800 Directed Readings (3) (*humanities-focused topic*)

LTAM 6801 Directed Research (3) (*humanities-focused topic*)

Elective Course (3 credit hours)

Select one additional course from any of the above categories.

Note: Listed above are acceptable elective courses; however, they are not limited to those listed. Up to two of the elective courses may be independent studies (LTAM 6800 and/or LTAM 6801).

Admission to Candidacy

Students are admitted to candidacy either by defending a thesis or taking a comprehensive examination.

Grade Requirements

Students must maintain a 3.0 average in all LTAM graduate courses to remain in the program. As per the academic regulations of the UNC Charlotte Graduate School, one U or more than two grades of C in graduate coursework will lead to suspension in enrollment.

Time Limit

Most students complete the program in two to three years. University policy requires that no course listed on a master's student's candidacy form be older than six years at the time of graduation. Courses that exceed this time limit must be revalidated or retaken, whichever the graduate program decides necessary, if they are to count in a degree program.

Transfer Credit

A maximum of 6 hours of graduate transfer credit will be accepted.

MASTER OF ARTS IN LATIN AMERICAN STUDIES / MASTER OF BUSINESS ADMINISTRATION DUAL DEGREE

This dual degree program allows students to earn both a Master of Arts in Latin American Studies degree from the College of Liberal Arts & Sciences and a Master of Business Administration (MBA) degree from the Belk College of Business. Students are expected to meet the admission requirements of both programs to participate in the MBA/MA in Latin American Studies Dual Degree program. For details, see the Belk College of Business section of this *Catalog*.

COURSES IN LATIN AMERICAN STUDIES (LTAM)

LTAM 5000. Graduate Topics in Latin American Studies. (3)

Intensive treatment of a topic in Latin American Studies, depending on student needs and staff resources. *May be repeated for credit with change of topic.*

LTAM 5116. Culture and Conflict in the Amazon. (3)

Cross-listed as ANTH 4616. Examines Brazilian development strategies in the Amazon and explores how these policies have affected both the environment and the various populations living in the Amazon. Topics covered include environmental degradation, human rights abuses, culture change, migration, and globalization.

LTAM 5120. Advanced Business Spanish I. (3)

Cross-listed as SPAN 5120. Prerequisites: Post-baccalaureate status, B.A. in Spanish, or permission of the department. Advanced studies in Business Spanish, intensive practice in speaking, listening comprehension, reading, writing, and translation in functional business areas such as economics, management, and marketing.

LTAM 5121. Advanced Business Spanish II. (3)

Cross-listed as SPAN 5121. Prerequisites: Post-baccalaureate status, B.A. in Spanish, courses or permission of the department. Advanced studies in Business Spanish, intensive practice in speaking, listening comprehension, reading, writing, and translation in functional business areas such as marketing, finance, and import-export.

LTAM 5310. Studies in Spanish American Poetry. (3)

Cross-listed as SPAN 5210. Prerequisites: Post-baccalaureate status, B.A. in Spanish, or permission of the department. Studies of 19th and 20th century Spanish American poetry.

LTAM 5311. Studies in Spanish American Prose Fiction. (3)

Cross-listed as SPAN 5211. Prerequisites: Post-baccalaureate status, B.A. in Spanish, or permission of the department. Studies of 19th and 20th century Spanish American prose fiction.

LTAM 5312. Studies in Spanish American Theater. (3)

Cross-listed as SPAN 5212. Prerequisites: Permission of the department. Studies of 20th century Spanish American theater.

LTAM 5600. Seminar in Latin American Studies. (3)

Cross-listed as LTAM 4600. A seminar involving in-depth research and analysis of a topic suitable for interdisciplinary study and exploration of a variety of methodological approaches. *May be repeated for credit with change of topic.*

LTAM 6000. Advanced Graduate Topics in Latin American Studies. (3) Intensive treatment of a topic in Latin American Studies, depending on student needs and staff resources. *May be repeated for credit with change of topic.*

LTAM 6100. Seminar in Latin American Politics. (3) An analysis of contemporary Latin American politics

LTAM 6250. Comparative Slavery and Race Relations. (3) Cross-listed as HIST 6250. Prerequisite: Permission of the department. Slavery in the New World through its abolition including Indian and African slaves, the slave trade, the economics of slavery, and the impact of slavery on modern race relations in the Americas.

LTAM 6251. Seminar in Colonial Latin American History. (3)

Cross-listed as HIST 6201. Prerequisite: Permission of the department. A seminar devoted to selected themes in colonial Latin American history. Provides an introduction to research methods, documentary sources, and the critical analysis of historical literature. Topics will change. *May be repeated for credit.*

LTAM 6252. Seminar in Modern Latin American History. (3)

Cross-listed as HIST 6202. Prerequisite: Permission of the department. A seminar devoted to selected themes in modern Latin American history. This course provides an introduction to research methods, documentary sources, and the critical analysis of historical literature. Topics will change. *May be repeated for credit.*

LTAM 6300. Seminar in Latin American Thought. (3)

An examination of Latin American thought from the Spanish Conquest to the present day. Emphasis on colonialism and post-colonialism as well as ethnic, racial, class, national, and gender identity

LTAM 6307. Advanced Studies in Spanish American Literature. (3)

Cross-listed as SPAN 6007. Prerequisite: Permission of the department. Study of selected works, writers, literary genres, periods, and schools from Spanish America. *May be repeated for credit with change of topic.*

LTAM 6350. Histories of Latin American Architecture. (3)

Cross-listed as ARCH 6050. Surveys the ways by which Latin American architectures (both north and south of the US/Mexico border) have come to be seen within the western canon. In this sense, this course is not purely historical; rather, the course will explore Latin American architectures chronologically but from a post-colonial perspective rooted in the present

LTAM 6400. Internship. (1-3)

Prerequisite: Permission of the department. Supervised work experience in Latin America or related to Latino/a and Latin American Studies issues in the Charlotte area, accompanied by a written project.

LTAM 6800. Directed Readings. (3)

Prerequisite: prior written permission of instructor and Director of Latin American Studies. Coverage of topics through individually designed reading programs and scheduled conferences with a faculty member. *May be repeated for credit.*

LTAM 6801. Directed Research. (3)

Prerequisite: prior written permission of instructor and Director of Latin American Studies. Investigation of a topic in Latin American Studies culminating in a research paper.

LTAM 6910. Thesis Tutorial. (3) Independent study with a faculty advisor chosen by the student to conduct research for the M.A. thesis.

LTAM 6920. Master's Thesis. (3) Preparation of the master's thesis under the supervision of the thesis committee.

LTAM 6950. Comprehensive Examination (3)
Preparation for and completion of the comprehensive exam option of the M.A. in Latin American Studies based on a reading list compiled in consultation with three examiners from at least two different departments.

Liberal Studies

• M.A. in Liberal Studies

Liberal Studies Program

mals.uncc.edu

Graduate Program Director

Dr. Elizabeth Gargano

Graduate Faculty

Faculty are drawn from a wide array of disciplines across the University.

MASTER OF ARTS IN LIBERAL STUDIES

The Master of Arts in Liberal Studies degree program (MALS) is designed primarily for adults seeking to enhance their general education in the liberal arts at the graduate level. It provides a flexible, multidisciplinary framework to accommodate the varied undergraduate backgrounds and personal interests that students bring to the program. The curriculum draws upon the full range of the humanities, social sciences, and natural sciences. The emphasis is on liberal arts education rather than on specialized study or professional training.

For recent recipients of the baccalaureate degree, the Liberal Studies program may provide the insight needed to make an informed career choice, or it may enhance opportunities in a career already launched. For returning students, graduate liberal studies may renew ties with university life or lead to a change of career. For persons with significant work experience, the program offers a chance to integrate the life of the mind with that of the workplace. Just as students come to the Liberal Studies program from a variety of fields, so they pursue a variety of careers after graduation. The most widely represented are in business, education, government, law, and social services.

Although the Liberal Studies program is not exclusively an evening program, the majority of courses are offered at times convenient for working adults. It is possible to earn the degree in a timely fashion through evening courses only.

Additional Admission Requirements

In addition to the general requirements for admission to the Graduate School, the following are required for graduate study in Liberal Studies:

- 1) A GPA of at least 3.0 on academic work beyond high school and 3.0 for courses prerequisite to the area of proposed graduate study
- 2) Satisfactory scores on the Miller Analogies Test or the Verbal and Analytical portions of the Graduate Record Examination
- 3) A two-page essay describing the applicant's objectives in undertaking graduate work in Liberal Studies
- 4) A resume of employment history or volunteer experience (for applicants who have been out of school for at least five years or whose baccalaureate degree was delayed)

Degree Requirements

The master's program in Liberal Studies requires a minimum of 30 credit hours of graduate work, including at least 15 credit hours in courses open only to graduate students.

Students must take four core MALS courses for a total of 12 credit hours. The remaining six courses (18 credit hours) may be taken in any department(s), with approval. This flexibility allows students to customize the MALS curriculum to their individual needs and interests, working in concert with their professors and the MALS Graduate Program Director.

Core Courses (12 credit hours)

MALS 6000 Topics in Liberal Studies (3)
 MALS 6101 The Liberal Arts Tradition (3)
 MALS 6102 Ideas Across the Disciplines (3)
 MALS 6600 Liberal Studies Capstone Seminar (3)

Elective Courses (18 credit hours)

Select six additional courses from any department(s), with the instructor's permission and approval. The courses must be chosen in consultation with the MALS Graduate Program Director.

No more than 6 credit hours of directed reading/research or independent study may be applied to the degree. A form for MALS 6890 (Directed Reading/Research) is available in the Director's office and must be completed and the directed reading/research or study approved in advance of registration.

Grade Requirements

Students must have a cumulative GPA of 3.0 in courses in their degree plan of study in order to graduate. Please consult the Graduate School's grading policies under "Degree Requirements and Academic Policies."

COURSES IN LIBERAL STUDIES (MALS)

MALS 6000. Topics in Liberal Studies. (3) Selected topics approached from interdisciplinary perspectives in the liberal arts. *May be repeated for credit with change of topic.* Examples include interrelated courses forming program emphases on Language and Culture and on Religious Ideas in Physical Forms.

MALS 6101. The Liberal Arts Tradition. (3) The concept of a liberal education and its relationship to human understanding as reflected in representative historical traditions, literature, art, and intellectual works. Examination of selected classics of the Western tradition and critiques through the use of works from other traditions and perspectives.

MALS 6102. Ideas Across the Disciplines. (3) Enduring ideas and their impact on history, society and culture. Each semester a single idea is examined through a variety of writings spanning the liberal arts disciplines. Examples include the idea of nature, the idea of human nature, the idea of the democracy and the idea of citizen. *May be repeated for credit with permission of the Director of MALS.*

MALS 6600. Liberal Studies Capstone Seminar. (3) An integration of the coursework previously taken. Students complete a substantial Capstone Project, working with their Capstone Project Director. As the culmination of this course, students defend their project at an oral defense with the Director and two additional faculty committee members. This course is to be completed in the student's final semester of study.

MALS 6890. Directed Reading/Research. (1-3) Prerequisite: Prior written permission of instructor and MALS Director. Graduate students meet individually or in small groups with the instructor and will be assigned readings and/or research on an interdisciplinary theme. Attendance at the lectures is a course requirement. *May be repeated for credit with permission of the MALS director.*

Mathematics and Statistics

- **Ph.D. in Applied Mathematics**
- **Ph.D. in Curriculum and Instruction: Mathematics Education Specialization**
(see *College of Education* section)
- **M.S. in Mathematics**
- **M.S. in Mathematical Finance**
(see *Belk College of Business* section)
- **Graduate Minor in Operations Research**

Department of Mathematics and Statistics
math.uncc.edu

Graduate Program Director
Dr. Shaozhong Deng, Mathematics

Graduate Faculty

Dr. Joel Avrin, Professor
Dr. Jaya Bishwal, Associate Professor
Dr. Wei Cai, Professor
Dr. Duan Chen, Assistant Professor
Dr. Victor V. Cifarelli, Professor
Dr. Xingde Dai, Professor
Dr. Shaozhong Deng, Associate Professor
Dr. Yuanan Diao, Professor
Dr. Alan Dow, Professor
Dr. Anthony Fernandes, Associate Professor
Dr. Yuri Godin, Associate Professor
Dr. Alexander Gordon, Associate Professor
Dr. Michael Grabchak, Assistant Professor
Dr. Mary Kim Harris, Associate Professor
Dr. Gabor Heteyi, Professor
Dr. Evan G. Houston, Professor
Dr. Jiancheng Jiang, Associate Professor
Dr. Mohammad A. Kazemi, Professor
Dr. Michael V. Klibanov, Professor
Dr. Shaoyu Li, Assistant Professor
Dr. Xingjie Li, Assistant Professor
Dr. Yang Li, Assistant Professor
Dr. Thomas G. Lucas, Professor
Dr. Kevin McGoff, Assistant Professor
Dr. Stanislav Molchanov, Professor
Dr. Adriana Ocejo Monge, Assistant Professor
Dr. Hae-Soo Oh, Professor
Dr. Franz Rothe, Associate Professor
Dr. Adalira Sáenz-Ludlow, Professor
Dr. Oleg Safronov, Associate Professor
Dr. Douglas S. Shafer, Professor

Dr. Isaac M. Sonin, Professor
Dr. Yanqing Sun, Professor
Dr. Boris R. Vainberg, Professor
Dr. Mingxin Xu, Associate Professor
Dr. Zhi Yi Zhang, Professor
Dr. Weihua Zhou, Associate Professor

PH.D. IN APPLIED MATHEMATICS

The Ph.D. degree program in Applied Mathematics is designed to enable its students to master a significant body of mathematics, including a specialty in applied mathematics; to relate this knowledge to a coherent area of science or engineering; and to carry on fundamental research in applied mathematics at a nationally competitive level. Recipients of this degree will, according to their abilities and choice of sub-specialty, be able to work effectively in a research and development environment involving mathematical or statistical analysis and modeling in business, government or industry; to teach mathematics at the college or university level; or to carry on fundamental research in their area of specialty.

Additional Admission Requirements

In addition to the requirements of the Graduate School for admission to doctoral study, applicants must have completed at least 27 credit hours of courses in the mathematical sciences at the undergraduate level, as approved by the department Graduate Committee, with grades of a C or above. Admission requires that the candidate be able to take MATH 8143 or be able to take MATH 5143 and have other factors in their record that indicate strong potential to complete the program. For prospective students who have completed work in mathematics beyond the bachelor's degree, performance on that work will be considered in admission decisions. Candidates for admission must make satisfactory scores on the general portion of the Graduate Record Examination (GRE).

Students are admitted to the program by the Graduate School, based on the recommendation of the department Graduate Committee or its designate, the Graduate Program Director. Recommendations are based on the Committee's judgment of the candidate's ability to complete the program, as supported by the application materials. The department may waive certain requirements if it judges the candidate to be nonetheless capable of completing the program. If there are more candidates than can be accommodated, candidates are admitted in order of perceived mathematical ability, promise of success, and suitability to the program.

Degree Requirements

Students must complete an approved program of study of at least 54 credit hours, including the following:

Required Courses

MATH 8143

MATH 8144

MATH 8120 (if the student has a statistics focus)

MATH 8994 (at least 18 research credit hours)

Minor Courses

The minor is interdisciplinary and may be satisfied by 9 hours of graduate coursework outside the Department of Mathematics and Statistics, by 6 credit hours of MATH 8691 and MATH 8692 for a directed project in an area of application, or by a combination of external coursework and directed project in an area of application totaling 9 credit hours. It is expected that interdisciplinary minor courses shall in general be in STEM disciplines, but if there are applications in the student's dissertation work towards the social sciences, courses in those fields are allowed too. Examples of interdisciplinary minor courses allowed for several fields include:

Physics

PHYS 5222 Classical Mechanics II (3)

PHYS 5232 Electromagnetic Theory II (3)

PHYS 5242 Modern Physics II (3)

PHYS 5271 Waves and Optics (3)

PHYS 6101 Biophysics (3)

PHYS 6121 Classical Dynamics (3)

PHYS 6131 Classical Electromagnetism I (3)

PHYS 6132 Classical Electromagnetism II (3)

PHYS 6141 Quantum Theory I (3)

PHYS 6142 Quantum Theory II (3)

PHYS 6201 Fourier Optics (3)

PHYS 6203 Methods of Molecular Modeling and Simulation in Physics (3)

PHYS 6210 Theoretical Physics (3)

PHYS 6211 Introduction to Modern Optics (3)

PHYS 6221 Optical Communications I (3)

PHYS 6241 Light Sources and Detectors (3)

PHYS 6251 Statistical Physics (3)

PHYS 6261 Nuclear Physics (3)

PHYS 6271 Advanced Solid State Physics (3)

Optics

OPTI 8101 Mathematical Methods of Optical Science and Engineering (3)

OPTI 8102 Principles of Geometrical Optics (3)

OPTI 8104 Electromagnetic Waves (3)

OPTI 8105 Optical Properties of Materials (3)

OPTI 8211 Introduction to Modern Optics (3)

Mechanical Engineering

MEGR 8102 Introduction to Continua (3)

MEGR 8113 Dynamics and Thermodynamics of Compressible Flow (3)

MEGR 8116 Fundamentals of Heat Transfer and Fluid Flow (3)

MEGR 8125 Vibrations of Continuous Systems (3)

MEGR 8141 Theory of Elasticity I (3)

MEGR 8142 Theory of Elasticity II (3)

MEGR 8143 Inelastic Behavior of Materials (3)

MEGR 8164 Diffraction/Spectroscopic Studies of Matter (3)

Computer Science

ITCS 8111 Evolutionary Computation (3)

ITCS 8114 Algorithms and Data Structures (3)

ITCS 8115 Advanced Topics in Algorithms and Data Structures (3)

ITCS 8150 Intelligent Systems (3)

ITCS 8153 Neural Networks (3)

ITCS 8155 Knowledge-Based Systems (3)

ITCS 8156 Machine Learning (3)

ITCS 8165 Coding and Information Theory (3)

ITCS 8170 Logic for Artificial Intelligence (3)

ITCS 8171 Logic Programming (3)

ITCS 8220 Pattern Recognition (3)

ITCS 8226 Bioinformatics (3)

Finance and Economics

Any FINN or ECON courses listed under the M.S. in Mathematical Finance program. Examples include:

FINN 6203 Financial Economic Theory (3)

FINN 6210 Financial Elements of Derivatives (3)

FINN 6211 Fixed Income Securities and Credit Risk (3)

ECON 6112 Graduate Econometrics (3)

ECON 6113 Cross-Section and Time-Series Econometrics (3)

ECON 6206 Game Theory and Experiments (3)

ECON 6218 Advanced Business and Economic Forecasting (3)

ECON 6219 Financial Econometrics (3)

Elective Courses

Select elective courses from the following approved list:

MATH 5128 Applied Probability I (3)

MATH 5129 Applied Probability II (3)

MATH 5143 Analysis I (3)

MATH 5144 Analysis II (3)

MATH 5161 Number Theory (3)

MATH 5163 Modern Algebra (3)

MATH 5164 Abstract Linear Algebra (3)

MATH 5165 Numerical Linear Algebra (3)

MATH 5171 Numerical Solution of Ordinary Differential Equations (3)

MATH 5172 The Finite Element Method (3)

MATH 5173 Ordinary Differential Equations (3)

MATH 5174 Partial Differential Equations (3)

MATH 5176 Numerical Methods for Partial Differential Equations (3)
 MATH 5181 Introduction to Topology (3)
 MATH 6201 Statistical Techniques in Finance (3)
 MATH 6202 Derivatives II: Partial Differential Equations for Finance (3)
 MATH 6203 Stochastic Calculus for Finance I (3)
 MATH 6204 Numerical Methods for Financial Derivatives (3)
 MATH 6205 Financial Computing (3)
 MATH 6206 Stochastic Calculus for Finance II (3)
 Any MATH 8000 course
 STAT 5123 Applied Statistics I (3)
 STAT 5124 Applied Statistics II (3)
 STAT 5126 Theory of Statistics I (3)
 STAT 5127 Theory of Statistics II (3)
 STAT 6113 Cross-Section and Time-Series Econometrics (3)
 STAT 6115 Statistical Learning with Big Data (3)
 STAT 8027 Topics in Statistics (3)
 STAT 8122 Advanced Statistics I (3)
 STAT 8123 Advanced Statistics II (3)
 STAT 8124 Sampling Theory (3)
 STAT 8127 Linear Statistical Models (3)
 STAT 8133 Multivariate Analysis (3)
 STAT 8890 Industrial Internship (6)

Dissertation Committee

Each student has a dissertation committee appointed by the department Graduate Committee in consultation with the student and approved by the Dean of the Graduate School. It includes the prospective dissertation advisor, as well as a department co-advisor, if the dissertation advisor is not a member of the Department of Mathematics and Statistics. The dissertation committee should be appointed as soon as is feasible, usually within a year after passing the Qualifying Examination. Once formed, it has the responsibility of constructing and approving the program of study which includes the minor. Prior to the appointment of the dissertation committee the student is advised by a graduate faculty member appointed by the department Graduate Committee.

Grade Requirements

Students are expected to achieve As or Bs in all courses included in the program of study and must have at least a 3.0 GPA to graduate. The dissertation is graded on a pass/unsatisfactory basis and, therefore, is not included in the cumulative average. An accumulation of more than two marginal (C) grades will result in suspension of the student's enrollment in the program. If students make a grade of U on any course, enrollment will be suspended and students cannot take further graduate work without being readmitted to the program. Readmission to the program requires approval of the Dean of the

Graduate School upon the recommendation of the department Graduate Committee.

Transfer Credit

Only courses with grades of A or B may be accepted for transfer credit. Transfer credit must be recommended by the department Graduate Committee and approved by the Dean of the Graduate School. The amount of transfer credit cannot exceed the limit set by the Graduate School.

Qualifying Examination

After being admitted to the Ph.D. program, students are expected to take the qualifying examination within three semesters. This time limit may be extended for up to two additional semesters in certain cases, depending on the background of the student and with program approval. The qualifying examination consists of two parts. The first part is a written examination based on Real Analysis I and II (MATH 8143 and MATH 8144) or Probability Theory I and Real Analysis I (MATH 8120 and MATH 8143), the latter intended for a student with a statistics focus. The second part is a written examination based on two other courses chosen by the student to be specifically related to the student's intended specialty and approved by the department Graduate Committee. Students may be allowed to retake a portion of the qualifying examination a second time if they do not pass that portion on the first attempt within the guidelines of the Graduate School regulations pertaining to the qualifying examination and as overseen by the department Graduate Committee. Students who do not complete the qualifying examination as per the regulations of the Graduate School are terminated from the Ph.D. program.

Topic Approval Defense and Admission to Candidacy

After a student completes the qualifying examination and advanced coursework deemed necessary for the student's research as approved by the student's doctoral dissertation committee, the student, in consultation with the student's dissertation advisor, may propose a dissertation topic. The dissertation topic proposal must be articulated and defended at a meeting of the student's dissertation committee. A written dissertation proposal must be submitted to the dissertation committee at least two weeks prior to the scheduled defense. The student is expected during the course of the topic defense to outline and demonstrate sufficient proficiency with the advanced knowledge and techniques to be used in the conduct of the research. The topic approval defense and the committee's deliberations in this regard are to be conducted according to the pertinent regulations of the Graduate School. A doctoral student advances to

candidacy after the student's dissertation committee and the Dean of the Graduate School have approved the dissertation topic proposal.

Dissertation

The student must complete and defend a dissertation based on a research program approved by the student's dissertation advisor which results in a high quality, original and substantial piece of research. The student must orally present and successfully defend the dissertation before the student's doctoral dissertation committee in a defense that is open to the public. A copy of the dissertation must be made available to the graduate faculty of the department at least two weeks prior to the public defense. The dissertation is graded on a pass/unsatisfactory basis by the dissertation committee and must be approved by the Department Graduate Program Director and the Dean of the Graduate School.

Residency Requirement

Full-time Ph.D. students must enroll for one continuous full-time year (i.e., two consecutive semesters of at least nine graduate credit hours in each semester) following admission to the program.

Time Limit for Degree Completion

Students must achieve admission to candidacy within six years after admission to the program and complete all requirements within six years after admission to candidacy for the Ph.D. degree. All requirements for the degree must be completed within eight years after first registration as a doctoral student.

Assistantships

A number of graduate assistantships are available each year (with nationally-competitive stipends) for qualified applicants. A limited number of fellowship awards can be applied to supplement these stipends or provide stand-alone stipends for up to \$25,000 for especially qualified students.

PH.D. IN CURRICULUM AND INSTRUCTION: MATHEMATICS EDUCATION SPECIALIZATION

The department also offers a Mathematics Education specialization to students enrolled in the Ph.D. program in Curriculum and Instruction in the College of Education. For details, please see the Curriculum and Instruction degree information located in the College of Education section of this *Catalog*.

MASTER OF SCIENCE IN MATHEMATICS

The Master of Science in Mathematics degree is organized into four concentrations:

- 1) Concentration in General Mathematics
- 2) Concentration in Applied Mathematics
- 3) Concentration in Applied Statistics
- 4) Concentration in Mathematics Education

The **Concentration in General Mathematics** is a robust but flexible program that allows a student to develop a broad background in Mathematics ranging over a variety of courses chosen from both pure and applied areas, or to tailor a program toward a particular focus that may not be as closely covered by the department's other degree concentrations (e.g., one that is interdisciplinary in nature).

The **Concentration in Applied Mathematics** develops analytical and computational skills focused toward applications of mathematics in the physical sciences as encountered in industry, government, and academia.

The **Concentration in Applied Statistics** provides theoretical understanding of, and training in, statistical analysis and methods applicable to particular areas of business, industry, government, and academia.

The **Concentration in Mathematics Education** is designed primarily for secondary school mathematics teachers interested in professional growth in mathematics teaching. Emphasis in this program is given to developing depth and breadth in mathematics teaching and learning, appropriate to the role of the secondary school teacher.

Degree Requirements

All candidates, regardless of which concentration is chosen, are required to take two courses in mathematical or statistical analysis and a comprehensive exam. Students in all concentrations except for the Mathematics Education concentration may also choose a thesis option for 3-6 credit hours towards the required credit hour total.

Concentration in General Mathematics

The Master of Science in Mathematics with Concentration in General Mathematics program is designed both to provide advanced skills and knowledge for persons seeking positions in industry, government, or teaching at the community college level, and to provide professional development to persons currently in such positions. Qualified

graduates are also prepared to enter directly into at least the second year of a Ph.D. program in mathematics, applied mathematics, or statistics, depending on the particular course of study.

Additional Admission Requirements

In addition to the general requirements for admission to the Graduate School, the following are required for the concentration in General Mathematics:

- 1) Applicants must present evidence of the satisfactory completion of at least 27 credit hours of mathematics approved by the department Graduate Committee.
- 2) A satisfactory score is required on at least the Quantitative portion of the general Graduate Record Examination (GRE).
- 3) It is recommended that the student have a basic knowledge of at least two of the areas of algebra, real analysis, and topology.

Concentration Requirements

The M.S. in Mathematics with Concentration in General Mathematics degree requires successful completion of at least 30 credit hours of graduate work approved by the department Graduate Committee, including: MATH 5143 and MATH 5144 or their equivalents; at least one course each from two of the groups I, II, III, V, and VI below; and at least 15 credit hours in 7000-level courses. No credit shall be given for 6000-level math courses other than mathematical finance courses in group V. With the approval of the department Graduate Committee, a 3 credit hour 6000-level course in another department of a theoretical nature or a 3 credit hour 6000-level mathematical finance course may be applied toward the 15 credit hours in the 7000-level courses.

Candidates for the degree concentration must demonstrate, to the satisfaction of the department Graduate Committee, competence on general knowledge in at least three of six groups of courses listed below. This may be accomplished by (a) successful performance on a written or oral comprehensive examination or (b) successful completion of courses in these areas.

Group I - Applied Mathematics

MATH 5165 Numerical Linear Algebra (3)
 MATH 5171 Numerical Solution of Ordinary Differential Equations (3)
 MATH 5172 The Finite Element Method (3)
 MATH 5173 Ordinary Differential Equations (3)
 MATH 5174 Partial Differential Equations (3)
 MATH 5176 Numerical Methods for Partial Differential Equations (3)
 MATH 7172 Partial Differential Equations (3)
 MATH 7176 Advanced Numerical Analysis (3)
 MATH 7177 Applied Optimal Control (3)

MATH 7178 Computational Methods for Fluid Dynamics (3)

MATH 7180 Advanced Numerical Methods in Scientific Computing (3)

MATH 7273 Advanced Finite Element Analysis (3)

Group II - Probability-Statistics

STAT 5123 Applied Statistics I (3)
 STAT 5124 Applied Statistics II (3)
 STAT 5126 Theory of Statistics I (3)
 STAT 5127 Theory of Statistics II (3)
 STAT 7027 Topics in Statistics (3)
 STAT 7122 Advanced Statistics I (3)
 STAT 7123 Advanced Statistics II (3)
 STAT 7127 Linear Statistical Models (3)
 STAT 7133 Multivariate Analysis (3)
 MATH 5128 Applied Probability I (3)
 MATH 5129 Applied Probability II (3)
 MATH 7120 Probability Theory I (3)
 MATH 7121 Probability Theory II (3)
 MATH 7125 Stochastic Processes I (3)

Group III - Algebra-Topology

MATH 5163 Modern Algebra (3)
 MATH 5164 Abstract Linear Algebra (3)
 MATH 5181 Introduction to Topology (3)
 MATH 7163 Modern Algebra I (3)
 MATH 7164 Modern Algebra II (3)

Group IV - Analysis

MATH 5143 Analysis I (3)
 MATH 5144 Analysis II (3)
 MATH 7141 Complex Analysis I (3)
 MATH 7143 Real Analysis I (3)
 MATH 7144 Real Analysis II (3)

Group V - Mathematical Finance

MATH 6202 Derivatives II: Partial Differential Equations for Finance (3)
 MATH 6203 Stochastic Calculus for Finance I (3)
 MATH 6204 Numerical Methods for Financial Derivatives (3)
 MATH 6205 Financial Computing (3)
 MATH 6206 Stochastic Calculus for Finance II (3)

Group VI - Computer Science

All 5000- and 6000-level ITCS courses

Assistantships

A number of graduate assistantships are available each year (with nationally-competitive stipends) for qualified applicants. A limited number of fellowship awards can be applied to supplement these stipends for especially qualified students.

Thesis

Completion of a thesis is optional. With the approval of the department Graduate Committee, a candidate

may receive up to six of the 15 hours required at the 7000 level for the writing of a master's thesis on an approved topic. This thesis may be original work, work of an expository nature, or the mathematical formulation and solution of a particular industrial or business problem suggested by the career interests of the student. A candidate may receive no more than six of the hours required at the 7000 level for course and thesis work in another department. If the thesis option is selected, the candidate will be required to defend his/her thesis in an oral examination.

Comprehensive Examination

A candidate must perform satisfactorily on a written or oral comprehensive examination over his/her program of study.

Concentration in Applied Mathematics

The Master of Science in Mathematics with Concentration in Applied Mathematics program is designed to develop critical thinking, intuition, and advanced experience in the techniques of mathematical analysis and their application to the problems of industry and technology. Skills are developed to deal with technical problems encountered in industry, business, and government and to hold leadership positions therein; to teach Applied Mathematics at the undergraduate or community college level; and to potentially study Applied Mathematics leading to the Ph.D. degree.

Concentration Requirements

A candidate for the M.S. in Mathematics with Concentration in Applied Mathematics degree must complete at least 30 credit hours of graduate work approved by the department Graduate Committee to include:

Core Courses (21 credit hours)

MATH 5143 Analysis I (3)
MATH 5144 Analysis II (3)
MATH 5165 Numerical Linear Algebra (3)

Numerical Analysis Courses

Select one of the following:

MATH 5171 Numerical Solution of Ordinary Differential Equations (3)
MATH 5172 The Finite Element Method (3)
MATH 5176 Numerical Methods for Partial Differential Equations (3)

Advanced Analysis Courses

Select one of the following:

MATH 7141 Complex Analysis I (3)
MATH 7143 Real Analysis I (3)
MATH 7144 Real Analysis II (3)

Advanced Applied Mathematics Courses

Select two of the following:

MATH 7172 Partial Differential Equations (3)
MATH 7176 Advanced Numerical Analysis (3)
MATH 7177 Applied Optimal Control (3)
MATH 7178 Computational Methods for Fluid Dynamics (3)
MATH 7179 Advanced Finite Difference Methods (3)
MATH 7180 Advanced Numerical Methods in Scientific Computing (3)
MATH 7273 Advanced Finite Element Analysis (3)

Elective Courses (6 credit hours)

Advanced Elective Courses

Select one of the following:

MATH 7141 Complex Analysis I (3)
MATH 7143 Real Analysis I (3)
MATH 7144 Real Analysis II (3)
MATH 7172 Partial Differential Equations (3)
MATH 7176 Advanced Numerical Analysis (3)
MATH 7177 Applied Optimal Control (3)
MATH 7178 Computational Methods for Fluid Dynamics (3)
MATH 7179 Advanced Finite Difference Methods (3)
MATH 7180 Advanced Numerical Methods in Scientific Computing (3)
MATH 7273 Advanced Finite Element Analysis (3)
MATH 7893 Thesis (0-3)

Mathematics or Application Elective Courses

Select one Mathematics or suitable area of application course with the approval of the student's advisor.

Suggested electives include:

STAT 5123 Applied Statistics I (3)
MEGR 6116 Fundamentals of Heat Transfer and Fluid Flow (3)
MEGR 6141 Theory of Elasticity I (3)
MEGR 7112 Radiative Heat Transfer (3)
MEGR 7114 Advanced Fluid Mechanics (3)

Research Seminar (3 credit hours)

All candidates for the degree concentration must complete three hours of a Research Seminar course in which they carry out an independent project under the supervision of a member of the graduate faculty. The project could involve a specific application to a concrete problem of techniques identified in the literature or studied in other courses. All projects are subject to prior approval of the department Graduate Committee and must be successfully defended before a committee of three graduate faculty members appointed by the department Graduate Committee.

MATH 7691 Research Seminar (1-3)

Assistantships

A number of graduate assistantships are available each year (with nationally-competitive stipends) for qualified applicants. A limited number of fellowship

awards can be applied to supplement these stipends for especially qualified students.

Thesis

A student may choose to expand the work begun in MATH 7691 into a master's thesis by registering for 3 credit hours of MATH 7893 to fulfill the advanced elective course requirement described above. This thesis option affords the student the opportunity to do professional/scholarly work demonstrating proficiency in the area of Applied Mathematics.

Comprehensive Examination

Each candidate for the degree concentration in Applied Mathematics must perform satisfactorily on a final comprehensive examination. This examination will be set and administered by a committee appointed by the department Graduate Committee. It may be in either written or oral form, and it will cover those areas of study and/or research deemed appropriate by the committee.

Concentration in Applied Statistics

The Master of Science in Mathematics with Concentration in Applied Statistics program is designed to provide advanced skills and knowledge in the planning, design, testing, and implementation of statistical methods. Skills are developed to deal with problems encountered in statistical applications in business, industry, and government; to hold administrative positions requiring planning and implementation of statistical analysis; to teach statistics at the undergraduate or community college level; and to potentially study statistics leading to the Ph.D. degree.

Additional Admission Requirements

In addition to the general requirements for admission to the Graduate School, the following are required for the concentration in Applied Statistics:

- 1) An overall GPA of at least 3.0 on all previous college work including a GPA of at least 3.0 in courses prerequisite to the area of applied statistics.
- 2) Evidence of undergraduate preparation in mathematics and computer science including: 12 credit hours of calculus at the level of MATH 1241, MATH 1242, MATH 2241, and MATH 2242; 3 credit hours of linear algebra at the level of MATH 2164; 3 credit hours of differential equations at the level of MATH 2171; 6 credit hours of probability and statistics at the level of MATH 3122 and MATH 3123; and 3 credit hours of computer programming at the level of ITCS 1214.

Concentration Requirements

A candidate for the M.S. in Mathematics with Concentration in Applied Statistics degree must complete a minimum of 33 credit hours of graduate work approved by the department Graduate Committee, including:

Core Courses (21 credit hours)

STAT 5123 Applied Statistics I (3)
 STAT 5124 Applied Statistics II (3)
 STAT 5126 Theory of Statistics I (3)
 STAT 5127 Theory of Statistics II (3)
 STAT 7027 Topics in Statistics (3)
 STAT 7127 Linear Statistical Models (3)
 STAT 7133 Multivariate Analysis (3)

Note: Students who, because of their undergraduate work or other experience, can demonstrate sufficient knowledge of the material in one or more of the core courses may be exempted from taking a course or courses. Exemption from a course carries no credit towards the degree concentration.

Elective Courses (9 credit hours)

MATH/STAT or Applied Elective Courses

Select two courses from an approved list. Examples include:

STAT 6115 Statistical Learning from Big Data (3)
 STAT 7027 Topics in Statistics (3)
 MATH 5128 Applied Probability I (3)
 MATH 5129 Applied Probability II (3)
 MATH 5143 Analysis I (3)
 MATH 5165 Numerical Linear Algebra (3)
 MATH 7120 Probability Theory I (3)
 MATH 7121 Probability Theory II (3)
 MATH 7143 Real Analysis I (3)
 MATH 7692 Research Seminar (3)

MATH or STAT Elective Course

Select any MATH or STAT course at the 7000-level.

Research Seminar (3 credit hours)

All candidates for the M.S. in Mathematics with Concentration in Applied Statistics degree are required to complete 3 credit hours of a Research Seminar in which they carry out an independent project under the supervision of a member of the graduate faculty. The project could involve a specific application of techniques identified in the literature or studied in other courses. All projects are subject to the prior approval of the department Graduate Committee and must be successfully defended before a committee of three graduate faculty members appointed by the department Graduate Committee.

MATH 7691 Research Seminar (3)

Assistantships

A number of graduate assistantships are available each year (with nationally-competitive stipends) for qualified applicants. A limited number of fellowship awards can be applied to supplement these stipends for especially qualified students.

Thesis

A student may choose to expand the work begun in MATH 7691 (Research Seminar) into a master's thesis by registering for 3 credit hours of MATH 7893 (Thesis) to fulfill the MATH/STAT 7000-level elective course requirement above. This thesis option affords the student the opportunity to do professional and scholarly work demonstrating proficiency in the area of applied statistics.

Comprehensive Examination

Each candidate for the M.S. in Mathematics with Concentration in Applied Statistics degree must perform satisfactorily on an oral comprehensive examination over the candidate's program of study.

Concentration in Mathematics Education

The Master of Science in Mathematics with Concentration in Mathematics Education degree program is designed primarily for secondary school mathematics teachers interested in professional growth in mathematics teaching. Emphasis in this program is given to developing depth and breadth in mathematics teaching and learning, appropriate to the role of the secondary school teacher.

By the end of his/her first semester in the program, each student will select a member of the Mathematics Education faculty to serve as his/her Graduate Advisor throughout the program. Approval of the program of each student and provision of advice regarding progress toward the degree are the responsibility of the Graduate Advisor.

Additional Admission Requirements

In addition to the general requirements for admission to the Graduate School, the following are required for graduate study in Mathematics Education:

- 1) Twenty-seven hours of undergraduate coursework in Mathematics beyond the freshman level, or evidence of equivalent academic preparation.
- 2) Possession of a North Carolina "A" teacher's license or the equivalent from another state. An applicant may be admitted on the condition that he/she satisfies the Class "A" requirements early in his/her course of study. Work applied to the Class "A" deficiency may not be applied toward the degree.
- 3) Two years of full-time experience teaching mathematics in a secondary school or other acceptable teaching experience.
- 4) A satisfactory score is required on the general Graduate Record Examination.

Concentration Requirements

Candidates for the M.S. in Mathematics with Concentration in Mathematics Education degree must complete a minimum of 33 credit hours of graduate coursework or the equivalent. Of these, 18 credit hours must be in courses numbered 6000 or above. Programs of study beyond these 33 credit hours may be required to remove deficiencies in undergraduate programs or to develop areas of need, interest, or desired experience.

Core Courses (15 credit hours)

MATH 5109 History of Mathematical Thought (3)
 MATH 6101 Real Analysis for Secondary Mathematics Teachers I (3)
 MATH 6102 Real Analysis for Secondary Mathematics Teachers II (3)
 MATH 6108 Probability and Statistics for Secondary Mathematics Teachers (3)
 or STAT 6108 Probability and Statistics for Secondary Mathematics Teachers (3)
 MATH 6118 Non-Euclidean Geometry (3)

Mathematical Foundations and Algebra Courses (6 credit hours)

Select two of the following:

MATH 5161 Number Theory (3)
 MATH 6106 Modern Algebra for Secondary Mathematics Teachers (3)
 MATH 6107 Linear Algebra for Secondary Mathematics Teachers (3)

Mathematics Education Courses (9 credit hours)

Students take graduate-level courses covering mathematics education learning theory, research, and contemporary topics in secondary mathematics teaching.

MAED 6122 Theoretical Foundations of Learning Mathematics (3)
 MAED 6123 Research in Mathematics Education (3)
 MAED 6124 Issues in the Teaching of Secondary School Mathematics (3)

Professional Education Course (3 credit hours)

MDSK 6260 Teacher Leadership (3)

Basic Portfolio

Each student must complete a Basic Portfolio consisting of documents and artifacts that provides evidence of the student's professional growth during the program.

Substitutions to satisfy any of the Concentration Requirements must be approved by the Graduate Advisor and the Mathematics Education Coordinator.

Comprehensive Examination

Upon successful completion of all coursework, each candidate for the M.S. in Mathematics with Concentration in Mathematics Education degree must pass a comprehensive final exam consisting of two parts. The student must pass an oral exam on the mathematics content courses. The second part of the exam involves the student presenting documentation that demonstrates his/her professional growth as teachers and educational researchers. The student has the option of presenting either a research-based project or a comprehensive portfolio. The Graduate Advisor will advise and assist the student in planning his/her Comprehensive Portfolio or Final Research Report.

GRADUATE MINOR IN OPERATIONS RESEARCH

The interdisciplinary Graduate Minor in Operations Research is designed to provide advanced problem solving skills and knowledge in the general areas of operations research and optimization to enable their application to effectively address the present day problems of business, computer science, management science, and engineering. This program can serve as an effective and focused supplement to existing graduate programs in the participating departments. The required courses are offered by the participating Departments of Business Information Systems and Operations Management, Civil and Environmental Engineering, Computer Science, Economics, Electrical and Computer Engineering, and Mechanical Engineering and Engineering Science.

Admission Requirements

Students admitted to graduate degree programs in the participating departments and the M.B.A. program who are in good standing, are eligible for the Minor in Operations Research.

Minor Requirements

- Declaration of the minor, preferably by the end of the first semester of graduate study.
- Formation of a Program Committee: Students who elect to minor in Operations Research will select a participating faculty member as a member of their regular graduate committee. A list of participating faculty will be available from the Graduate Program Director of the Minor in Operations Research.

- Fulfill the requirements of a participative degree program and the following courses.

Core Course (3 credit hours)

Select one of the following:

- OPRS 6101 Introduction to Operations Research (3)
- OPRS 8101 Introduction to Operations Research (3)

Elective Courses (6 credit hours)

Select one course from two of the following areas, selected with the advice and knowledge of the student's program committee:

Business Information Systems and Operations Management

- MBAD 5121 Business Information Systems (3)
- MBAD 6122 Decision Modeling and Analysis via Spreadsheets (3)
- MBAD 6141 Operations Management (3)

Civil and Environmental Engineering

- CEGR 5090 Special Topics in Civil Engineering (3)
- CEGR 6181 Traffic Flow Theory (3)

Computer Science

- ITCS 6160 Database Systems (3)
- ITCS 6166 Computer Communications and Networks (3)

Economics

- ECON 6100 Graduate Mathematical Economics (3)
- ECON 6112 Graduate Econometrics (3)

Electrical Engineering

- ECGR 6111 Systems Theory (3)
- ECGR 6112 Digital Control Systems (3)
- ECGR 6115 Optimal Control Theory I (3)
- ECGR 6116 Optimal Control Theory II (3)

Mathematics

- OPRS 5111 Linear Programming (3)
 - OPRS 5112 Nonlinear Programming (3)
 - OPRS 5113 Game Theory (3)
 - OPRS 5114 Dynamic Programming (3)
 - MATH 5165 Numerical Linear Algebra (3)
 - MATH 7125 Stochastic Processes I (3)
 - MATH 7177 Applied Optimal Control (3)
- Additional topics available include: reliability theory, queuing models, variational methods

Course waivers and transfer credit will be considered on an individual basis.

Grade Requirements

Students must have a cumulative 3.0 GPA in courses applied to the minor.

COURSES IN MATHEMATICS, MATHEMATICS EDUCATION, OPERATIONS RESEARCH, AND STATISTICS

Mathematics (MATH)

MATH 5000. Topics in Foundations or History of Mathematics. (2-3) Prerequisite: Permission of department. Topics in the foundations or the history of mathematics selected to supplement regular course offerings in this area of mathematics. *May be repeated for credit with permission of department.* Credit for the M.A. degree in mathematics requires approval of the department.

MATH 5040. Topics in Analysis. (2-3) Prerequisite: Permission of department. Topics in the foundations or the history of mathematics selected to supplement regular course offerings in this area of mathematics. *May be repeated for credit with permission of department.* Credit for the M.A. degree in mathematics requires approval of the department.

MATH 5060. Topics in Algebra. (2-3) Prerequisite: Permission of department. Topics in algebra selected to supplement regular course offerings in this area of mathematics. *May be repeated for credit with permission of department.* Credit for the M.A. degree in mathematics requires approval of the department.

MATH 5080. Topics in Geometry and Topology. (3) Prerequisite: Permission of department. Topics in geometry or topology selected to supplement regular course offerings in this area of mathematics. *May be repeated for credit with permission of department.* Credit for M.A. degree in mathematics requires approval of the department.

MATH 5109. History of Mathematical Thought. (3) Prerequisite: MATH 1241 or permission of department. A study of the development of mathematics in its historical setting from the earliest beginnings to modern times. Not approved for the M.A. in mathematics degree.

MATH 5128. Applied Probability I. (3) Prerequisite: MATH/STAT 3122 and MATH 2171 or permission of department. Finite and countable Markov chains, Markov Decision Processes, and optimal stopping. Other topics selected from: queuing theory, inventory models, reliability theory, game theory, recurrent events, information theory, stochastic control, stochastic control with incomplete information and Kalman filtering.

MATH 5129. Applied Probability II. (3) Prerequisite: MATH 5128 or permission of department. Continuation of MATH 5128.

MATH 5143. Analysis I. (3) Prerequisite: MATH 3141 with grade of B or above, or permission of department. First course of a two-semester sequence providing a rigorous treatment of continuity, differentiability, and integration of functions of one and several real variables.

MATH 5144. Analysis II. (3) Prerequisite: MATH 5143 with a grade of B or above or permission of department. Continuation of MATH 5143.

MATH 5161. Number Theory. (3) Prerequisite: MATH 3163 with a grade of C or above or permission of department. A study of the elements of classical number theory including divisibility, congruences, diophantine equations, prime numbers and their distribution, quadratic reciprocity, number-theoretic functions, and famous unsolved problems. Not approved for the M.A. in mathematics degree.

MATH 5163. Modern Algebra. (3) Prerequisite: MATH 3163 or permission of department. Groups, rings, integral domains, fields.

MATH 5164. Abstract Linear Algebra. (3) Prerequisite: MATH 3163 and 2164 or permission of department. Vector spaces over arbitrary fields, linear transformations, canonical forms, multilinear algebra.

MATH 5165. Numerical Linear Algebra. (3) Prerequisites: ITCS 1214, MATH 2164 and MATH 2171, all with a grade of C or above, or permission of department. Gaussian elimination and LU decomposition methods for linear systems. Vector and matrix norms, condition numbers, and accuracy of solutions. Solutions of large sparse matrix systems using skyline solvers, and Jacobi, Gauss-Seidel, and SOR iterative methods. Solution of nonlinear systems. Least squares methods using the QR factorization. Selected problems are programmed for computer solution.

MATH 5171. Numerical Solution of Ordinary Differential Equations. (3) Prerequisites: ITCS 1214, MATH 2241, 2164, and 2171, all with a grade of C or above, or permission of department. Numerical solution techniques for ordinary differential equations such as Runge-Kutta, multistep, and extrapolation methods. Stiff solvers and stability criteria. Comparative work with modern robust codes and visualization methods.

MATH 5172. The Finite Element Method. (3) Prerequisites: ITCS 1214, MATH 2241, MATH 2164, and MATH 2171 with grades of C or above, or

permission of department. Boundary value problems and their variational form. Finite element basis functions, computational techniques, isoparametric elements and curved boundaries, alternate methods, singular problems, eigenvalue problems. Some practical experience with an F.E.M. program and graphical output.

MATH 5173. Ordinary Differential Equations. (3)

Prerequisites: MATH 2171 and MATH 3142, or permission of department. Existence and uniqueness theorems for initial value problems; continuous dependence of solutions on initial values and right hand sides; linear differential equations in $\mathbb{R}^2$ and $\mathbb{R}^n$; nonlinear differential equations in $\mathbb{R}^2$ and $\mathbb{R}^n$: phase portraits, singularities, cycles; invariant manifolds; linearization; singularities of planar systems; Lyapunov stability; examples: van der Pol oscillator, Liénard systems, Volterra-Lotka equations.

MATH 5174. Partial Differential Equations. (3)

Prerequisites: MATH 2164, MATH 2171, and MATH 3141, or permission of department. Classification of types of partial differential equations. Separation of variables, Sturm-Liouville problems, boundary and eigenvalue problems, fundamental solutions and Green's theorem, Fourier series and integrals, Laplace transforms.

MATH 5176. Numerical Methods for Partial Differential Equations. (3)

Prerequisites: ITCS 1214, MATH 2241, MATH 2164, and MATH 2171, all with grade S of C or above, or permission of department. Basic finite difference schemes for the solutions of elliptic, parabolic and hyperbolic equations. Von Neumann analysis, characteristics, boundary conditions.

MATH 5181. Introduction to Topology. (3)

Prerequisite: MATH 2164 with a grade of C or above. Topics from set theory and point set topology such as cardinality, order, topological spaces, metric spaces, separation axioms, compactness and connectedness.

MATH 5691. Seminar. (1-6) Prerequisite: Permission of department. Individual or group investigation and exposition of selected topics in mathematics.

MATH 5692. Seminar. (1-6) Prerequisite: Permission of department. A continuation of MATH 5691.

MATH 6004. Topics in Analysis. (3) Cross-listed as EDCI 8004. Prerequisite: MATH 6101 or permission of department. Topics in analysis selected so as to complement regular course offerings in this area of mathematics. *May be repeated for credit with permission of department.*

MATH 6008. Topics in Geometry and Topology. (3)

Cross-listed as EDCI 8008. Prerequisite: Permission of department. Topics selected from Euclidean geometry, non-Euclidean geometry, projective geometry, differential geometry, point-set topology, algebraic topology. *May be repeated for credit with permission of department.*

MATH 6050. Topics in Mathematics. (3)

Prerequisite: Permission of department. Topics chosen from applied mathematics applicable to other disciplines.

MATH 6101. Real Analysis for Secondary

Mathematics Teachers I. (3) Cross-listed as EDCI 8101. Prerequisites: Admission into M.S. in Mathematics with Concentration in Mathematics Education program, successful completion of undergraduate calculus sequence, and experience in writing formal mathematics proofs. Study of the axiomatic methods and characteristics of axiomatic systems. Axiomatic and historical development of the real and complex numbers. Introduction to transfinite numbers. Rigorous development of limits and continuity of functions.

MATH 6102. Real Analysis for Secondary

Mathematics Teachers II. (3) Cross-listed as EDCI 8102. Prerequisite: MATH 6101. A rigorous approach to differentiation and integration of functions of one real variable.

MATH 6103. Computer Techniques and Numerical

Methods. (3) Cross-listed as EDCI 8103. Prerequisite: MATH 6101 or permission of department. Computer systems, programming, and the computer solution of numerical problems.

MATH 6105. Problem Solving in Discrete

Mathematics. (3) Cross-listed as EDCI 8105. Prerequisite: Permission of department. Propositional and predicate calculus, counting techniques, partially ordered sets, lattices, graphs and trees.

MATH 6106. Modern Algebra for Secondary

Mathematics Teachers. (3) Cross-listed as EDCI 8106. Prerequisite: MATH 3163 or its equivalent or permission of department. Topics chosen from group theory, rings and ideals, integral domains, fields and elementary Galois theory.

MATH 6107. Linear Algebra for Secondary

Mathematics Teachers. (3) Cross-listed as EDCI 8107. Prerequisite: MATH 2164 or its equivalent or permission of department. Systems of linear equations, matrices, vector spaces, linear transformations, determinants, canonical forms of matrices, inner products.

MATH 6108. Probability and Statistics for Secondary Mathematics Teachers. (3) Cross-listed as STAT 6108. Prerequisite: Admission into the M.S. in Mathematics with Concentration in Mathematics Education program. Topics from probability and statistics appropriate for high school mathematics teachers. Topics in probability include: discrete and continuous random variables, probability distributions, sums and functions of random variables, the law of large numbers, and the central limit theorem. Topics in statistics include: sample mean and variance, estimating distributions, correlation, regression, and hypothesis testing.

MATH 6118. Non-Euclidean Geometry. (3) Cross-listed as EDCI 8118. Prerequisite: Permission of department. History of Euclid's Fifth Postulate and attempts to prove it; work of Gauss, Bolyai, Lobachevsky and others; systematic development of hyperbolic geometry; relative consistency of hyperbolic geometry; relative consistency of hyperbolic and Euclidean geometries.

MATH 6171. Advanced Applied Mathematics I. (3) Prerequisites: MATH 2241 and MATH 2171 with grades of C or above, or permission of department. Power series solutions of ordinary differential equations, vector calculus, line and surface integrals, partial differential equations and Fourier integrals.

MATH 6172. Advanced Applied Mathematics II. (3) Prerequisites: MATH 2241 and MATH 2171 with grades of C or above, or permission of department. Complex analysis; probability and statistics.

MATH 6201. Statistical Techniques in Finance. (3) This course reviews basic concepts and introduces more advanced techniques from Probability and Statistics which are commonly utilized in mathematical finance. Topics covered include random variables, distributions, conditional expectations, confidence intervals and hypothesis testing, simple and multiple regression, multivariate analysis including factor and canonical correlation analysis, and time series models including ARMA, ARIMA, ARCH, and GARCH.

MATH 6202. Derivatives II: Partial Differential Equations for Finance. (3) This course deals with those partial differential equations which are associated with financial derivatives based on factors such as equities and spot interest rates.

MATH 6203. Stochastic Calculus for Finance I. (3) Prerequisite: Admission to the graduate program and permission of Program Director. This course starts with the probability theory in discrete probability space, discrete-time stochastic processes, and derivatives pricing in the Binomial model. The

second part covers probability theory in general probability space and continuous-time martingale and Markov processes. Topics include: the Itô integral, Black-Scholes model, Itô-Doeblin formula, Girsanov's theorem, and Martingale Representation theorem. Applications to pricing of exotic derivatives and American options are discussed.

MATH 6204. Numerical Methods for Financial Derivatives. (3) This course will introduce students to numerical and computational techniques for solving both European- and American-style financial derivatives. The approach will be the finite difference method and the basic theoretical concepts will be introduced. Final projects will involve implementing the techniques on computers. Some spectral and Monte Carlo methods will also be discussed.

MATH 6205. Financial Computing. (3) This lab-oriented course introduces the numerical methods needed for quantitative work in finance, focusing on derivative pricing and fixed income applications. Topics include: binomial and trinomial methods, Crank-Nicholson methods for various exotic options, treatment of discrete dividends, numerical methods for stochastic differential equations, random number generators, Monte-Carlo methods for European and American options. The computing course teaches theory and practice of numerical finance as well as the programming skills needed to build software systems in C/C++, Java, Javascript, and Mathematica/Matlab.

MATH 6206. Stochastic Calculus for Finance II. (3) Cross-listed as MATH 8206. Prerequisite: MATH 6203 or permission of department. The applications of stochastic calculus techniques to advanced financial modeling. Topics include: pricing of European, American, and fixed-income derivatives in the Black-Scholes and stochastic volatility models. The Jump-diffusion model is also introduced.

MATH 6609. Seminar in Mathematics. (1-3) Cross-listed as EDCI 8609. Prerequisite: Permission of department. A series of regularly scheduled meetings in which each student presents one or more topics selected by the instructor. *May be repeated for credit with permission of department.*

MATH 7028. Topics in Probability. (3) Prerequisites: MATH 7120 and MATH 7121, or permission of department. Topics of current interest in probability and advanced topics in probability. *May be repeated for credit with permission of department.*

MATH 7050. Topics in Mathematics. (2-3) Prerequisite: Permission of department. Topics chosen from such fields as algebra, topology, analysis, applied mathematics, differential geometry,

mathematical physics, graph theory, probability, statistics. *May be repeated for credit with change of topic and with the approval of the department.*

MATH 7065. Topics in Applied Algebra and Algebraic Structures. (3) Prerequisite: Permission of department. Current topics in Applied Algebra and Algebraic Structure.

MATH 7070. Topics in Numerical Analysis. (3) Prerequisite: Permission of department. Topics of current interest in numerical analysis. *May be repeated for credit with permission of department.*

MATH 7071. Topics in Differential Equations. (3) Prerequisite: Permission of department. Topics of current interest in ODE, PDE, dynamical systems, inverse problems and related subjects. *May be repeated for credit with permission of department.*

MATH 7120. Probability Theory I. (3) Prerequisites: MATH 7143 and MATH/STAT 3122, or permission of department. Topics include: probability spaces, probability measures, sigma-algebras, characteristic functions, sequences of random variables, law of large numbers, general forms of the Central Limit Theorem.

MATH 7121. Probability Theory II. (3) Prerequisite: MATH 7120 or permission of department. A continuation of MATH 7120.

MATH 7125. Stochastic Processes I. (3) Prerequisites: MATH 3122, MATH 7120, and MATH 7143, or permission of department. Basic ideas in the study of stochastic processes, selected from: discrete and continuous time Markov processes, stationary and renewal processes, applications to queuing theory, reliability theory, stochastic differential equations, time-series analysis, filtering and stochastic control theory.

MATH 7126. Stochastic Processes II. (3) Prerequisite: MATH 7125. A continuation of MATH 7125.

MATH 7141. Complex Analysis I. (3) Prerequisite: MATH 5143 or permission of department. Holomorphic functions, complex integration, residues, entire and meromorphic functions, conformal mapping, harmonic functions.

MATH 7142. Complex Analysis II. (3) Prerequisite: MATH 7141. A continuation of MATH 7141.

MATH 7143. Real Analysis I. (3) Prerequisite: MATH 5144 or permission of department. Lebesgue integration on the real line, L_p spaces, introduction to general measure and integration theory.

MATH 7144. Real Analysis II. (3) Prerequisite: MATH 7143 or permission of department. A continuation of MATH 7143.

MATH 7147. Applied Functional Analysis. (3) Prerequisite: MATH 5144. Introduction to functional analysis and its applications to such areas as linear and nonlinear differential equations, integral equations, and control theory. Topics chosen from Banach spaces, operators, the Hahn-Banach, open mapping and closed graph theorems, Sobolev spaces, spectral theory, operators in Hilbert space.

MATH 7148. Functional Analysis. (3) Prerequisite: MATH 7144 or permission of department. Material selected from: spectral theory, spectral theory of differential operators, groups and semigroups of operators, nonlinear functional analysis, asymptotic analysis, integral equations, Fourier analysis, distributions, and Sobolev spaces.

MATH 7163. Modern Algebra I. (3) Prerequisite: MATH 4163 and MATH 4164, or permission of department. Topics include: Galois theory, commutative algebra, modules, ring theory, homological algebra.

MATH 7164. Modern Algebra II. (3) Prerequisite: MATH 7163. A continuation of MATH 7163.

MATH 7172. Partial Differential Equations. (3) Prerequisites: MATH 5174 and MATH 7144, or permission of department. Harmonic functions, mean-value theorem, maximum principle, Green's representation for the solution of the Dirichlet problem for Laplace's equation; Poisson's equations and the Poisson formula; statement and proof of the existence theorem for general second-order elliptic operators, generalized maximum principles; Sobolev spaces. Evolution equations involving elliptic operators, such as the heat or wave equations, may also be introduced.

MATH 7173. Evolution Equations. (3) Prerequisites: MATH 7144 and MATH 7172 or permission of department. Semigroups of operators and their generators, examples of semigroups. The heat equation, examples of elliptic operators that generate semigroups, Hille-Yosida theory, analytic semigroups; examples, fractional powers of operators.

MATH 7174. Linear and Nonlinear Waves. (3) Prerequisites: MATH 5124 and MATH 7144 or permission of department. Hyperbolic waves, characteristics, Riemann invariants, conservation laws, weak solutions, shock structure. Burger's equation, gas dynamics, dispersive waves, group velocity, water waves, nonlinear optics.

MATH 7175. Inverse Problems. (3) Prerequisites: MATH 5174 and MATH 7144, or permission of department. Ill-posed problems and numerical methods for them. Applications of inverse problems to real processes. One dimensional inverse problems. Multi-dimensional inverse problems: uniqueness and numerical methods. Inverse scattering problems.

MATH 7176. Advanced Numerical Analysis. (3) Prerequisites: MATH 2164, MATH 2171, and MATH 5176, or permission of department. A selection of topics from such areas as iterative methods of solving linear and nonlinear systems of equations, approximation theory, splines, and finite element methods for partial differential equations.

MATH 7177. Applied Optimal Control. (3) Prerequisite: MATH 5143 or permission of department. Examples of control systems and optimization problems, optimal control of discrete-time systems, solutions of the general discrete-time optimization problem, optimal control of continuous-time systems, the calculus of variations, solution of the general continuous optimization problem, applications of the Pontryagin Maximum Principle, Dynamic programming, and Bang-bang control. Controllability and differential games may also be introduced.

MATH 7178. Computational Methods for Fluid Dynamics. (3) Prerequisites: MATH 2242, MATH 2171, MATH 5174, and MATH 5176, or permission of department. Topics on various numerical techniques for the solution of incompressible and compressible flows. Finite difference, finite element and spectral methods, and shock capturing and fitting methods. Multi-grid method and acceleration techniques.

MATH 7179. Advanced Finite Difference Methods. (3) Prerequisite: Permission of department. Accuracy analysis and design of high order schemes, stability theory of schemes with variable coefficients, stability theory of schemes for initial-boundary value problems, convergence theory for nonlinear cases.

MATH 7180. Advanced Numerical Methods in Scientific Computing. (3) Prerequisites: MATH 5172 and MATH 5176, or permission of the department. Introduces advanced numerical methods in scientific computing. Topics include: Particle-Mesh Ewald and the Fast multipole methods, boundary element methods, absorbing and perfectly matched layered boundary conditions, Yee's finite difference and discontinuous Galerkin methods, surface integral equation methods, Nedelec edge elements for Maxwell equations, Bloch theory and periodic structures and photonics, Boltzmann and Wigner kinetic methods, high resolution Godunov methods

and WENO methods for hydrodynamic equations, particle-in-cell and constrained transport methods for magnetohydrodynamics.

MATH 7181. Topology I. (3) Prerequisite: Permission of department. Topological spaces, continuous functions, connectedness, compactness, and metrizability, and further topics from point-set, geometric or algebraic topology.

MATH 7182. Topology II. (3) Prerequisite: MATH 7181. A continuation of MATH 7181.

MATH 7184. Differential Geometry I. (3) Prerequisite: Permission of department. Manifolds, differential structures, tangent bundles, embeddings, immersions, inverse function theorem, Morse-Sard theorem, transversality, Borsuk-Ulam theorem, vector bundles, Euler characteristics, Morse theory, Stokes theorem, Gauss-Bonnet theorem, Whitney embedding theorem.

MATH 7185. Differential Geometry II. (3) Prerequisite: Permission of department. Differentiable manifolds, differential forms, critical points, local and global theory of curves, local and global theory of surfaces, connections, geodesics, curvature, spaces of constant curvature, Lie groups and Lie algebras.

MATH 7273. Advanced Finite Element Analysis. (3) Prerequisite: MATH 5172 and MATH 5174, or permission of department. Selection of topics from such areas of finite element analysis as convergence theorems (Ciarlet), hierarchical basis functions, the h-p method, adaptive grid techniques and solution methods for nonlinear equations.

MATH 7275. Dynamical Systems I. (3) Prerequisites: MATH 5143 and MATH 5173, or permission of department. Cycles and separatrix cycles, Poincaré first-return map: diffeomorphisms, Poincaré-Bendixson Theory, flows on the two-torus; structural stability, genericity, Peixoto's theorem; singularities of planar systems. Degenerate singularities, Hopf bifurcation, saddle-node bifurcation, center bifurcation.

MATH 7276. Dynamical Systems II. (3) Prerequisite: MATH 7275 or permission of department. Method of averaging, Melnikov functions, hyperbolic structure, symbolic dynamics, homoclinic and heteroclinic orbits, global bifurcations, infinite dimensional dynamical systems, inertial manifolds, Lyapunov exponents and dimension of attractors, codimension-two bifurcations, Duffing's equation, Lorenz equations, finite dimensional systems of dimension at least three.

MATH 7277. Bifurcation Theory. (3) Prerequisite: MATH 7275 or permission of department. Implicit function theorem, manifolds and transversality, Newton polygons, Lyapunov center theorem, variational methods, Ljusternik-Schnirelman theory, mountain-pass theorem, bifurcations with one-dimensional null-spaces, Morse theory and global bifurcations, geometric theory of partial differential equations.

MATH 7691. Research Seminar. (1-3) Prerequisite: Permission of department. A seminar in which independent study may be pursued by the student or a group of students under the direction of a professor. *May be repeated for credit.*

MATH 7692. Research Seminar. (1-3) Prerequisite: Permission of department. A continuation of MATH 7691. *May be repeated for credit.*

MATH 7890. Industrial Internship. (0-6)
Prerequisites: completion of six hours of coursework in MATH/STAT/OPRS graduate courses and permission of department. Full- or part-time academic year or summer internship in mathematics and/or statistics complementary to the student's major course of study and designed to allow theoretical and course-based practical learning to be applied in a supervised industrial experience. Each student's program must be approved by the department's Graduate Program Director. Requires a mid-term report and final report to be graded by the supervising faculty. *Grading on a Pass/Unsatisfactory basis. Credit hours gained from the internship are not be counted toward the courses leading to advancement to candidacy.*

MATH 7893. Thesis. (0-3) Prerequisite: Permission of department. Subject to the approval of the department Graduate Committee, the thesis may be original work, work of an expository nature, or the mathematical formulation and solution of a particular industrial or business problem suggested by the career interests of the student. The thesis must be defended in an oral presentation. *May be repeated for credit with permission of department.*

MATH 8028. Topics in Probability. (3) Prerequisites: MATH 8120 and MATH 8121, or permission of department. Topics of current interest in probability and advanced topics in probability. *May be repeated for credit with permission of department.*

MATH 8050. Topics in Mathematics. (2-3)
Prerequisite: Permission of department. Topics chosen from such fields as algebra, topology, analysis, applied mathematics, differential geometry, mathematical physics, graph theory, probability,

statistics. *May be repeated for credit with change of topic and with the approval of the department.*

MATH 8065. Topics in Applied Algebra and Algebraic Structures. (3) Prerequisite: Permission of department. Current topics in Applied Algebra and Algebraic Structure.

MATH 8070. Topics in Numerical Analysis. (3)
Prerequisite: Permission of department. Topics of current interest in numerical analysis. *May be repeated for credit with permission of department.*

MATH 8071. Topics in Differential Equations. (3)
Prerequisite: Permission of department. Topics of current interest in ODE, PDE, dynamical systems, inverse problems and related subjects. *May be repeated for credit with permission of department.*

MATH 8120. Probability Theory I. (3) Prerequisites: MATH 8143 and MATH/STAT 3122, or permission of department. Topics include: probability spaces, probability measures, sigma-algebras, characteristic functions, sequences of random variables, law of large numbers, general forms of the Central Limit Theorem.

MATH 8121. Probability Theory II. (3) Prerequisite: MATH 8120 or permission of department. A continuation of MATH 8120.

MATH 8125. Stochastic Processes I. (3)
Prerequisites: MATH 3122, MATH 8120, and MATH 8143, or permission of department. Basic ideas in the study of stochastic processes, selected from: discrete and continuous time Markov processes, stationary and renewal processes, applications to queuing theory, reliability theory, stochastic differential equations, time-series analysis, filtering and stochastic control theory.

MATH 8126. Stochastic Processes II. (3)
Prerequisite: MATH 8125. A continuation of MATH 8125.

MATH 8141. Complex Analysis I. (3) Prerequisite: MATH 5143 or permission of department. Holomorphic functions, complex integration, residues, entire and meromorphic functions, conformal mapping, harmonic functions.

MATH 8142. Complex Analysis II. (3) Prerequisite: MATH 8141. A continuation of MATH 8141.

MATH 8143. Real Analysis I. (3) Prerequisite: MATH 5144 or permission of department. Lebesgue integration on the real line, L_p spaces, introduction to general measure and integration theory.

MATH 8144. Real Analysis II. (3) Prerequisite: MATH 8143 or permission of department. A continuation of MATH 8143.

MATH 8147. Applied Functional Analysis. (3) Prerequisite: MATH 5144. Introduction to functional analysis and its applications to such areas as linear and nonlinear differential equations, integral equations, and control theory. Topics chosen from Banach spaces, operators, the Hahn-Banach, open mapping and closed graph theorems, Sobolev spaces, spectral theory, operators in Hilbert space.

MATH 8148. Functional Analysis. (3) Prerequisite: MATH 8144 or permission of department. Material selected from: spectral theory, spectral theory of differential operators, groups and semigroups of operators, nonlinear functional analysis, asymptotic analysis, integral equations, Fourier analysis, distributions, and Sobolev spaces.

MATH 8163. Modern Algebra I. (3) Prerequisite: MATH 4163 and MATH 4164 or permission of department. Topics selected from Galois theory, commutative algebra, modules, ring theory, homological algebra.

MATH 8164. Modern Algebra II. (3) Prerequisite: MATH 8163. A continuation of MATH 8163.

MATH 8172. Partial Differential Equations. (3) Prerequisites: MATH 5174 and MATH 8144, or permission of department. Harmonic functions, mean-value theorem, maximum principle, Green's representation for the solution of the Dirichlet problem for Laplace's equation; Poisson's equations and the Poisson formula; statement and proof of the existence theorem for general second-order elliptic operators, generalized maximum principles; Sobolev spaces. Evolution equations involving elliptic operators, such as the heat or wave equations, may also be introduced.

MATH 8173. Evolution Equations. (3) Prerequisites: MATH 8144 and MATH 8172, or permission of department. Semigroups of operators and their generators, examples of semigroups. The heat equation, examples of elliptic operators that generate semigroups, Hille-Yosida theory, analytic semigroups; examples, fractional powers of operators.

MATH 8174. Linear and Nonlinear Waves. (3) Prerequisites: MATH 5144 and MATH 8144, or permission of department. Hyperbolic waves, characteristics, Riemann invariants, conservation laws, weak solutions, shock structure. Burger's equation, gas dynamics, dispersive waves, group velocity, water waves, nonlinear optics.

MATH 8175. Inverse Problems. (3) Prerequisites: MATH 5174 and MATH 8144, or permission of department. Ill-posed problems and numerical methods for them. Applications of inverse problems to real processes. One dimensional inverse problems. Multi-dimensional inverse problems: uniqueness and numerical methods. Inverse scattering problems.

MATH 8176. Advanced Numerical Analysis. (3) Prerequisites: MATH 2164, MATH 2171, and MATH 5176, or permission of department. A selection of topics from such areas as iterative methods of solving linear and nonlinear systems of equations, approximation theory, splines, and finite element methods for partial differential equations.

MATH 8177. Applied Optimal Control. (3) Prerequisite: MATH 5143 or permission of department. Examples of control systems and optimization problems, optimal control of discrete-time systems, solutions of the general discrete-time optimization problem, optimal control of continuous-time systems, the calculus of variations, solution of the general continuous optimization problem, applications of the Pontryagin Maximum Principle, Dynamic programming, and Bang-bang control. Controllability and differential games may also be introduced.

MATH 8178. Computational Methods for Fluid Dynamics. (3) Prerequisites: MATH 2242, MATH 2171, MATH 5174, and MATH 5176, or permission of department. Topics on various numerical techniques for the solution of incompressible and compressible flows. Finite difference, finite element and spectral methods, and shock capturing and fitting methods. Multi-grid method and acceleration techniques.

MATH 8180. Advanced Numerical Methods in Scientific Computing. (3) Prerequisites: MATH 5172 and MATH 5176, or permission of the department. Introduces advanced numerical methods in scientific computing. Topics include: Particle-Mesh Ewald and the Fast multipole methods, boundary element methods, absorbing and perfectly matched layered boundary conditions, Yee's finite difference and discontinuous Galerkin methods, surface integral equation methods, Nedelec edge elements for Maxwell equations, Bloch theory and periodic structures and photonics, Boltzmann and Wigner kinetic methods, high resolution Godunov methods and WENO methods for hydrodynamic equations, particle-in-cell and constrained transport methods for magnetohydrodynamics.

MATH 8181. Topology I. (3) Prerequisite: Permission of department. Topological spaces, continuous functions, connectedness, compactness,

and metrizable, and further topics from point-set, geometric or algebraic topology.

MATH 8182. Topology II. (3) Prerequisite: MATH 8181. A continuation of MATH 8181.

MATH 8184. Differential Geometry I. (3)

Prerequisite: Permission of department. Manifolds, differential structures, tangent bundles, embeddings, immersions, inverse function theorem, Morse-Sard theorem, transversality, Borsuk-Ulam theorem, vector bundles, Euler characteristics, Morse theory, Stokes theorem, Gauss-Bonnet theorem, Whitney embedding theorem.

MATH 8185. Differential Geometry II. (3)

Prerequisite: Permission of department. Differentiable manifolds, differential forms, critical points, local and global theory of curves, local and global theory of surfaces, connections, geodesics, curvature, spaces of constant curvature, Lie groups and Lie algebras.

MATH 8202. Partial Differential Equations for Finance. (3) Cross-listed as MATH 6202. This course deals with those partial differential equations which are associated with financial derivatives based on factors such as equities and spot interest rates.

MATH 8203. Stochastic Calculus for Finance. (3)

Cross-listed as MATH 6203. An introduction to those aspects of partial differential equations and diffusion processes most relevant to finance, Random walk and first-step analysis, Markov property, martingales and semi-martingales, Brownian motion. Stochastic differential equations: Ito's lemma, backward and forward Kolmogorov equations, the Feynman-Kac formula, stopping times, Hull and White Models, Cox-Ingersoll-Ross Model. Applications to finance including portfolio optimization and option pricing.

MATH 8204. Numerical Methods for Financial Derivatives. (3)

Cross-listed as MATH 6204. Introduction to numerical and computational techniques for solving both European- and American-style financial derivatives. The approach is the finite difference method and the basic theoretical concepts are introduced. Final projects involve implementing the techniques on computers. Some spectral and Monte Carlo methods are also be discussed.

MATH 8206. Stochastic Calculus for Finance II. (3)

Cross-listed as MATH 6206. Prerequisite: MATH 8203 or permission of department. The applications of stochastic calculus techniques to advanced financial modeling. Topics include: pricing of European, American, and fixed-income derivatives in the Black-Scholes and stochastic volatility models. The Jump-diffusion model is also introduced.

MATH 8273. Advanced Finite Element Analysis. (3)

Prerequisites: MATH 5172 and MATH 5174, or permission of department. Selection of topics from such areas of finite element analysis as convergence theorems (Ciarlet), hierarchical basis functions, the h-p method, adaptive grid techniques and solution methods for nonlinear equations.

MATH 8275. Dynamical Systems I. (3)

Prerequisites: MATH 5143 and MATH 5173, or permission of department. Cycles and separatrix cycles, Poincaré first-return map: diffeomorphisms, Poincaré-Bendixson Theory, flows on the two-torus; structural stability, genericity, Peixoto's theorem; singularities of planar systems. Degenerate singularities, Hopf bifurcation, saddle-node bifurcation, center bifurcation.

MATH 8276. Dynamical Systems II. (3)

Prerequisite: MATH 8275 or permission of department. Method of averaging, Melnikov functions, hyperbolic structure, symbolic dynamics, homoclinic and heteroclinic orbits, global bifurcations, infinite dimensional dynamical systems, inertial manifolds, Lyapunov exponents and dimension of attractors, codimension-two bifurcations, Duffing's equation, Lorenz equations, finite dimensional systems of dimension at least three.

MATH 8277. Bifurcation Theory. (3)

Prerequisite: MATH 8275 or permission of department. Implicit function theorem, manifolds and transversality, Newton polygons, Lyapunov center theorem, variational methods, Ljusternik-Schnirelman theory, mountain-pass theorem, bifurcations with one-dimensional null-spaces, Morse theory and global bifurcations, geometric theory of partial differential equations.

MATH 8691. Research Seminar. (1-3)

Prerequisite: Permission of department. A seminar in which independent study may be pursued by the student or a group of students under the direction of a professor. *May be repeated for credit.*

MATH 8692. Research Seminar. (1-3)

Prerequisite: Permission of department. A continuation of MATH 8691. *May be repeated for credit.*

MATH 8890. Industrial Internship. (0-6)

Prerequisites: completion of six hours of coursework in MATH/STAT/OPRS graduate courses and permission of department. Full- or part-time academic year or summer internship in mathematics and/or statistics complementary to the student's major course of study and designed to allow theoretical and course-based practical learning to be applied in a supervised industrial experience. Each student's

program must be approved by the department's Graduate Program Director. Requires a mid-term report and final report to be graded by the supervising faculty. *Grading on a Pass/Unsatisfactory basis. Credit hours gained from the internship are not be counted toward the courses leading to advancement to candidacy.*

MATH 8994. Doctoral Research and Reading. (0-9)

Prerequisite: Permission of department. Investigation of a topic in mathematics culminating in a research paper. *May be repeated for credit.*

MATH 8999. Doctoral Dissertation Research. (1)

Prerequisite: Advancement to Candidacy. Individual investigation and research leading to the preparation of a doctoral dissertation. *May be repeated for credit.*

Mathematics Education (MAED)

MAED 5000. Topics in Mathematics Education, Early Childhood. (1-6) Prerequisite: Permission of department. Major topics in early childhood mathematics education. *May be repeated for credit with change of topic.*

MAED 5040. Topics in Mathematics Education, Intermediate. (1-6) Prerequisite: Permission of department. Major topics in mathematics education involving intermediate grades. *May be repeated for credit with change of topic.*

MAED 5070. Topics in Mathematics Education, Secondary. (1-6) Prerequisite: Permission of department. Major topics in mathematics education involving secondary education. *May be repeated for credit with change of topic.*

MAED 5101. Arithmetic in the School. (3)

Prerequisite: MATH 1100 or equivalent. A study of the number systems with emphasis placed upon the basic concepts and meanings, properties of addition, multiplication, inverses, systems of numeration and number line appropriate for each grade. (Does not count toward a major in mathematics. Open only to transfer students who have completed six credit hours of mathematics at another university.)

MAED 5104. Microcomputing for Teachers. (3)

Prerequisites: working knowledge of college algebra and trigonometry, and permission of department. Introduction to basic computer concepts, to microcomputer systems, to the design and development of programs to assist instruction in mathematics and computer sciences. A programming language such as BASIC or LOGO will be used. Students integrate skills learned by selecting,

designing and developing a specific project. (No prior experience with computer programming required.)

MAED 5105. Geometry for Teachers. (3)

Prerequisite: MATH 2102, MAED 5101, or permission of department. A study of the foundations of Euclidean geometry and a brief treatment of non-Euclidean geometry. Emphasis on learning activities and teaching techniques for teachers of mathematics K-12.

MAED 5141. Mathematics for the Intermediate School Teacher. (3)

Prerequisite: MATH 2102 or permission of department. A study of the algebraic properties of the real numbers; functions, equations, inequalities and their graphs, activities and applications related to upper elementary and intermediate grades.

MAED 5252. Teaching Mathematics to Secondary School Learners. (3)

Prerequisites: Admission to the MAT Program (Secondary Grades mathematics emphasis) or permission of department. Initial teaching methods course for secondary school mathematics teachers. Focuses on secondary school mathematics and its relation to the K-12 curriculum. Topics include: the development of teaching strategies and activities in secondary school mathematics with an emphasis on problem solving, mathematical connections, communication and assessment, including school-based field experiences.

MAED 5232. Teaching Mathematics to Middle School Learners. (3)

Prerequisite: Admission to the MAT Program (Middle Grades mathematics emphasis) or permission of department. Initial teaching methods course for middle school mathematics teachers. Focuses on secondary school mathematics and its relation to the K-12 curriculum. Topics include: the development of teaching strategies and activities in middle school mathematics with an emphasis on problem solving, mathematical connections, communication and assessment, including school-based field experiences.

MAED 6122. Theoretical Foundations of Learning Mathematics. (3)

Prerequisite: Admission into the M.S. in Mathematics with Concentration in Mathematics Education program. Introduction to theories of learning that have influenced the teaching of mathematics in K-12. An overview of theories that have guided reforms in mathematics teaching; contemporary constructivist theories of mathematics learning.

MAED 6123. Research in Mathematics Education. (3)

Prerequisite: Admission into the M.S. in Mathematics with Concentration in Mathematics Education program. An introduction and overview of research

in the teaching and learning of mathematics in K-12. Overview of contemporary research perspectives and paradigms; interpreting and synthesizing the research literature; survey of contemporary research problems in mathematics teaching and learning; development of classroom-based research studies.

MAED 6124. Issues in the Teaching of Secondary School Mathematics. (3) Prerequisite: Admission into the M.S. in Mathematics with Concentration in Mathematics Education program. Study of major issues affecting secondary mathematics education: analysis of the impact of learning theories on methods of teaching; assessment methods for improving mathematics learning; analysis of the historical and programmatic development of the secondary school mathematics curriculum leading to current trends, issues, and problems; and analysis of the role of technology in the secondary mathematics classroom.

MAED 6252. Advanced Methods in Middle and Secondary Mathematics Education. (3) Prerequisite: Enrollment in the MAT or M.Ed. program. Examination of current research and scholarship on the teaching of mathematics in middle and secondary schools. Particular emphasis on the development of advanced instructional expertise and leadership.

MAED 8124. Advanced Topics in Mathematics Education. (3) Prerequisite: Enrollment in the Mathematics Education specialization of the Ph.D. in Curriculum and Instruction program. Advanced research topics in the teaching and learning of mathematics. Includes a survey, interpretation, and synthesis of contemporary research problems in mathematics teaching and learning. *May be repeated for credit with change of topic.*

MAED 8160. Readings in Mathematics Education. (3) Prerequisite: Enrollment in the Mathematics Education specialization of the Ph.D. in Curriculum and Instruction program. Readings in the teaching and learning of mathematics K-16; analysis of the historical development of the K-16 mathematics curriculum leading to current trends, issues, and problems; theory, methods, and techniques for assessment; and analysis of contemporary issues impacting the teaching of mathematics.

Operations Research (OPRS)

OPRS 5010. Topics in Decision Mathematics. (2-3) Prerequisite: Permission of department. Topics in decision mathematics selected to supplement regular course offerings in this area of mathematics. *May be repeated for credit with permission of department.* Credit for the M.A. degree in mathematics requires approval of the department.

OPRS 5111. Linear Programming. (3) Prerequisites: OPRS 3111 and ITCS 1214. Mathematical formulation and solution of linear programming problems. Topics include: the simplex method and its variations, sensitivity and parametric analysis, duality, and applications. A project will be required for all graduate students.

OPRS 5112. Nonlinear Programming. (3) Prerequisites: ITCS 1214, MATH 2241, and OPRS 3111. Basic unconstrained optimization problems, search techniques, some discussion of rates of convergence and an introduction to constrained optimization. Computer implementation and testing of optimization algorithms will be required. A project will be required of all graduate students.

OPRS 5113. Game Theory. (3) Prerequisites: OPRS 3111; and STAT 2122, MATH/STAT 3122, or OPRS 3113. The theory of zero-sum matrix games, minimax theorem, optimal strategies, symmetric games, economic models, infinite, separable, polynomial, multi-stage, general-sum and n-person games. A project is required of all graduate students.

OPRS 5114. Dynamic Programming. (3) Prerequisites: ITCS 1214, OPRS 3111, and one of STAT 2122, MATH/STAT 3122 or OPRS 3113. The identification of dynamic programming problems and their solution in terms of recurrence relations. Elementary path problems, resource allocation, shortest path, traveling salesmen problem, discrete-time optimal control, replacement models and inventory systems. A project will be required of all graduate students.

OPRS 6101. Introduction to Operations Research. (3) Prerequisite: STAT 3122. Operations Research approach: modeling, constraints, objective and criterion. The problem of multiple criteria, optimization, model validation. The team approach. Systems design. Examples, or methodology: mathematical programming, optimum seeking, simulation, gaming, heuristic programming. Examples, or applications: theory of inventory, economic ordering under deterministic and stochastic demand. The production smoothing problem, linear and quadratic cost functions. Waiting line problems: single and multiple servers with Poisson input and output. The theory of games for two-person competitive situations. Project management through probabilistic activity networks and deterministic activity network (CPM-PERT).

OPRS 7125. Stochastic Processes. (3) Basic ideas in the study of stochastic processes, selected from: discrete and continuous time Markov processes, stationary and renewal processes, applications to

queuing theory, reliability theory, stochastic differential equations, time-series analysis, filtering and stochastic control theory.

OPRS 8101. Introduction to Operations Research. (3)

Operations Research approach: modeling, constraints, objective and criterion. The problem of multiple criteria, optimization, model validation. The team approach. Systems design. Examples, or methodology: mathematical programming, optimum seeking, simulation, gaming, heuristic programming. Examples, or applications: theory of inventory, economic ordering under deterministic and stochastic demand. The production smoothing problem, linear and quadratic cost functions. Waiting line problems: single and multiple servers with Poisson input and output. The theory of games for two-person competitive situations. Project management through probabilistic activity networks and deterministic activity network (CPM-PERT).

OPRS 8125. Stochastic Processes I. (3) Basic ideas in the study of stochastic processes, selected from: discrete and continuous time Markov processes, stationary and renewal processes, applications to queuing theory, reliability theory, stochastic differential equations, time-series analysis, filtering and stochastic control theory.

Statistics (STAT)

STAT 5110. Applied Regression Analysis. (3) Cross-listed as DSBA 5110. Prerequisites: MATH 2164; and STAT 2122, STAT 3128, or equivalent; or permission of department. Theoretical and practical training in statistical modeling with particular emphasis on the application of linear regression and multivariate statistical analysis. The basic fundamentals and statistical inference techniques associated with regression models are introduced. Students also learn how to apply the statistical techniques to extract information from data generated in various application areas using statistical software. Topics include: linear regression, model adequacy checking and diagnostics, generalized linear regression, and multivariate statistical analysis.

STAT 5123. Applied Statistics I. (3) Cross-listed as HCIP 5123. Prerequisite: MATH 2164 with a grade of C or above or permission of department. Review of stochastic variables and probability distributions, methods of estimating a parameter, hypothesis testing, confidence intervals, contingency tables. Linear and multiple regression, time series analysis.

STAT 5124. Applied Statistics II. (3) Prerequisite: STAT 5123 or permission of department. Single factor analysis of variance. Multi-factor analysis of variance.

Randomized complete-block designs, nested or hierarchical designs, Latin squares, factorial experiments. Design of experiments.

STAT 5126. Theory of Statistics I. (3) Prerequisite: STAT 3123 or permission of department. Survey of the mathematical structure supporting applied statistics. Discrete and continuous distributions, moment-generating functions, sampling, point estimation, the multivariate normal distribution, sampling distributions.

STAT 5127. Theory of Statistics II. (3) Prerequisite: STAT 5126 or permission of department. Point and interval estimations, hypothesis testing, regression and linear hypotheses, experimental designs and analysis, distribution-free methods.

STAT 6027. Topics in Statistics. (3) Prerequisite: Permission of department. Topics chosen from applied statistics applicable to other disciplines.

STAT 6108. Probability and Statistics for Secondary Mathematics Teachers. (3) Cross-listed as MATH 6108. Prerequisite: Admission into the M.S. in Mathematics with Concentration in Mathematics Education program. Topics from probability and statistics appropriate for high school mathematics teachers. Topics in probability include: discrete and continuous random variables, probability distributions, sums and functions of random variables, the law of large numbers, and the central limit theorem. Topics in statistics include: sample mean and variance, estimating distributions, correlation, regression, and hypothesis testing.

STAT 6113. Cross-Section and Time-Series Econometrics. (3) Cross-listed as ECON 6113. Prerequisite: permission of department. Introduces the advanced study of the theory and application of statistics to economic problems. Topics include: derivation of the least-squares estimator; methods with which to detect and correct for potential problems with the classical regression model; maximum likelihood estimation; instrumental variables regression; the problems with multicollinearity, heteroscedasticity, and autocorrelation; introduction to the time-series estimation, including ARIMA models and basic forecasting tools.

STAT 6115. Statistical Learning with Big Data. (3) Cross-listed as DSBA 6115. Prerequisite: DSBA 5110, STAT 5110, STAT 5123, or permission of department. A survey of major statistical learning concepts and methods for big data analysis, including both supervised and unsupervised learning such as resampling methods, support vector machines, model selection and regularization, tree-based methods and

ensembles, and statistical graphics. Students learn how and when to apply statistical learning techniques, their comparative strengths and weaknesses, and how to critically evaluate the performance of learning algorithms in case studies in financial investment, gene identification, and feature selection in high-dimensional spaces.

STAT 6127. Introduction to Biostatistics. (3)

Prerequisites: MATH 1100 and STAT 1221 or permission of department. Descriptive statistics and exploratory data analysis; basic probability models and the concept of random variables; point and interval estimation; hypothesis testing (one- and two-sample problems); simple linear regression and ANOVA; selection of appropriate methods for analysis; development of skills to conduct analysis of data; development of the capability to present the results of a study in scientific language.

STAT 7027. Topics in Statistics. (3) Prerequisite: Permission of department. Topics of current interest in statistics and/or applied statistics. *May be repeated for credit with permission of department.*

STAT 7122. Advanced Statistics I. (3) Prerequisites: MATH 7143 and STAT 5127 or permission of department. A survey of frequently used statistical techniques selected from: estimation theory and hypothesis testing, parametric goodness-of-fit criterion and tests for independence, measures of association, regression techniques, multi-sample inferential techniques, Bayes and minimax estimation, admissibility, minimax property.

STAT 7123. Advanced Statistics II. (3) Prerequisite: STAT 7122 or permission of department. Hypothesis testing, Neyman-Pearson Lemma, UMP tests, UMP unbiased tests, monotone likelihood ratio families of distributions, UMP invariant tests. Confidence bounds and regions, uniformly most accurate bounds, regression models, least squares estimates, normal equations, Gauss-Markov theorem. Large sample behavior of methods of moments estimates, maximum likelihood estimates, likelihood ratio tests, Chi-square tests, approximate confidence regions for large samples.

STAT 7124. Sampling Theory. (3) Prerequisite: STAT 5126 or permission of department. Methods and theory of survey sampling: simple, systematic, stratified, cluster multistage and specialized sampling schemes and the problems of their implementation and analysis.

STAT 7127. Linear Statistical Models. (3)

Prerequisites: MATH 2164 and MATH 3123, or permission of department. A selection of topics from the following list: distribution and quadratic forms,

regression, dummy variables, models not of full rank, the two-way crossed classification, time series.

STAT 7133. Multivariate Analysis. (3) Prerequisites: STAT 5126 and STAT 5127, or permission of department. Multivariate distributions. Inference for the multivariate normal model. Further topics from the following: principal components, factor analysis, multidimensional scaling, canonical correlation, discriminant analysis, cluster analysis, multivariate linear models, special topics.

STAT 7890. Industrial Internship. (0-6)

Prerequisites: completion of six hours of coursework in MATH/STAT/OPRS graduate courses and permission of department. Full- or part-time academic year or summer internship in mathematics and/or statistics complementary to the student's major course of study and designed to allow theoretical and course-based practical learning to be applied in a supervised industrial experience. Each student's program must be approved by the department's Graduate Program Director. Requires a mid-term report and final report to be graded by the supervising faculty. *Graded on a Pass/Unsatisfactory basis.* Credit hours gained from the internship shall not be counted toward the courses leading to advancement to candidacy.

STAT 8027. Topics in Statistics. (3) Prerequisite: Permission of department. Topics of current interest in statistics and/or applied statistics. *May be repeated for credit with permission of department.*

STAT 8110. Applied Biostatistics: Regression. (3)

Cross-listed as HLTH 8270 and HSRD 8110. Pre or corequisites: Graduate level Introduction to Biostatistics or approved Statistics course; basic knowledge of statistical software; or permission of instructor. To understand and apply concepts and principles of regression based statistical methods (regression, linear models, logistic regression, Poisson regression) to health related studies. Selection of appropriate methods for analysis, development of skills to conduct the analysis of the data and capability to write in scientific language the results of the study are studied.

STAT 8111. Applied Biostatistics: Multivariate Methods. (3)

Cross-listed as HLTH 8271 and HSRD 8111. Pre- or corequisite: HLTH 8270, HSRD 8110, STAT 8110, or permission of instructor. Includes study of the concepts, principles and statistical methods of analysis of discrete and continuous multivariate data. Students learn to use the most popular methods of multivariate data reduction, classification and clustering such as principal components, factor analysis and canonical correlation analysis. Design issues, verification of the

assumptions and interpretation of the results are discussed. Skills for concise presentation of the results of statistical analysis will be developed.

STAT 8122. Advanced Statistics I. (3) Prerequisites: MATH 8143 and STAT 5127, or permission of department. A survey of frequently used statistical techniques selected from: estimation theory and hypothesis testing, parametric goodness-of-fit criterion and tests for independence, measures of association, regression techniques, multi-sample inferential techniques, Bayes and minimax estimation, admissibility, and minimax property.

STAT 8123. Advanced Statistics II. (3) Prerequisite: STAT 8122 or permission of department. Hypothesis testing, Neyman-Pearson Lemma, UMP tests, UMP unbiased tests, monotone likelihood ratio families of distributions, UMP invariant tests. Confidence bounds and regions, uniformly most accurate bounds, regression models, least squares estimates, normal equations, Gauss-Markov theorem. Large sample behavior of methods of moments estimates, maximum likelihood estimates, likelihood ratio tests, Chi-square tests, approximate confidence regions for large samples.

STAT 8124. Sampling Theory. (3) Prerequisite: STAT 5126 or permission of department. Methods and theory of survey sampling: simple, systematic, stratified, cluster multistage and specialized sampling schemes and the problems of their implementation and analysis.

STAT 8127. Linear Statistical Models. (3) Prerequisites: MATH 2164 and MATH 3123, or permission of department. A selection of topics from the following list: distribution and quadratic forms, regression, dummy variables, models not of full rank, the two-way crossed classification, and time series.

STAT 8133. Multivariate Analysis. (3) Prerequisites: STAT 5126 and STAT 5127, or permission of department. Multivariate distributions. Inference for the multivariate normal model. Further topics from the following: principal components, factor analysis, multidimensional scaling, canonical correlation, discriminant analysis, cluster analysis, multivariate linear models, and other special topics.

STAT 8890. Industrial Internship. (0-6) Full- or part-time academic year or summer internship in mathematics and/or statistics complementary to the student's major course of study and designed to allow theoretical and course-based practical learning to be applied in a supervised industrial experience. Each student's program must be approved by the department's Graduate Program Director. Requires a mid-term report and final report to be graded by the

supervising faculty. *Graded on a Pass/Unsatisfactory basis.* Credit hours gained from the internship shall not be counted toward the courses leading to advancement to candidacy.

Nanoscale Science

• Ph.D. in Nanoscale Science

Program Website

nanoscalescience.uncc.edu

Graduate Program Director/Coordinator

Dr. Bernadette T. Donovan-Merkert, Director
Ms. Nancy Queen, Assistant Coordinator

Graduate Faculty

Dr. Kirill Afonin, Assistant Professor
Dr. Christopher Bejger, Assistant Professor
Dr. Glenn Boreman, Professor
Dr. Hansang Cho, Assistant Professor
Dr. Bernadette Donovan-Merkert, Professor
Dr. Ahmed El-Ghannam, Associate Professor
Dr. Gloria Elliott, Professor
Dr. Markus Etzkorn, Associate Professor
Dr. Faramarz Farahi, Professor
Dr. Michael Fiddy, Professor
Dr. Greg Gbur, Professor
Dr. Tsing-Hua Her, Associate Professor
Dr. Marcus Jones, Associate Professor
Dr. Joanna Krueger, Associate Professor
Dr. Yuri Nesmelov, Associate Professor
Dr. Irina Nesmelova, Associate Professor
Dr. Craig Ogle, Professor
Dr. Jordan Poler, Associate Professor
Dr. Daniel Rabinovich, Professor
Dr. Amy Ringwood, Associate Professor
Dr. Thomas Schmedake, Associate Professor
Dr. Stuart Smith, Professor
Dr. Edward Stokes, Professor
Dr. Jerry Troutman, Associate Professor
Dr. Juan Vivero-Escoto, Assistant Professor
Dr. Michael Walter, Assistant Professor
Dr. Qiuming Wei, Associate Professor
Dr. Jennifer Weller, Associate Professor
Dr. Terry Xu, Associate Professor
Dr. Haitao Zhang, Assistant Professor
Dr. Yong Zhang, Distinguished Professor

PH.D. IN NANOSCALE SCIENCE

The Ph.D. in Nanoscale Science at UNC Charlotte is an interdisciplinary program that addresses the development, manipulation, and use of materials and devices on the scale of roughly 1-100 nanometers in length, and the study of phenomena that occur on this size scale. The program prepares students to become scholarly, practicing scientists who possess the critical thinking, methodological, and communication skills required to advance and disseminate knowledge of fundamental and applied nanoscale science.

The many challenges and opportunities that nanoscale science presents to society require collaborative, interdisciplinary approaches to research. Students enrolled in UNC Charlotte's Ph.D. program in Nanoscale Science learn about the exciting field of nanoscale science from the perspectives of faculty members of a variety of disciplines and develop an advanced knowledge base of a selected science or engineering discipline. NANO courses are team taught and/or co-developed by teams of faculty members from multiple disciplines. This approach provides students trained in a specific science or engineering field at the undergraduate or master's level with the tools needed to work effectively with scientists and engineers from other disciplines on cutting-edge research projects.

Students in the program acquire the knowledge and skills needed to compete effectively for positions in academic, industrial, or government settings by completing interdisciplinary nanoscale science courses and elective courses, participating in program colloquia and seminars, working as a member of a team on projects and research proposals, and making research contributions independently and as part of a team.

Admission Requirements

The following are general guidelines for successful admission into the Ph.D. program in Nanoscale Science:

- 1.) A bachelor's or master's degree in a science or engineering field relevant to nanoscale science is required for admission to full standing in the Ph.D. in Nanoscale Science.
- 2.) A minimum undergraduate grade point average of 3.0 or, if the applicant is currently enrolled in a graduate program or has earned a master's degree, a minimum grade point average of 3.0 in a relevant science or engineering master's program.
- 3.) Admission to the program will require strong scores on the verbal, quantitative, and analytical sections of the Graduate Record Examination. The Graduate Record Examination is a required part of the application package.
- 4.) Three strong, positive letters of recommendation, at least two of which must come from faculty in the applicant's current or previous academic program. All letters should be written by individuals in a position to judge the applicant's likely success in a Ph.D. level program. Letters should address the applicant's suitability for a

Ph.D. program and ability to complete the program in a timely manner.

- 5.) Admission of students who are not native English speakers will require strong scores on the TOEFL exam. The TOEFL exam is a required part of the application for non-native English speakers.

Documents To Be Submitted For Application For Admission

- 1.) Official transcripts from all colleges and universities attended (indicating completion of a bachelor's degree in a relevant science or engineering discipline)
- 2.) Official GRE scores (verbal, quantitative, and analytical)
- 3.) The UNC Charlotte application for graduate admission form
- 4.) Three letters of reference from academics who have taught or worked directly with the applicant
- 5.) An essay that addresses professional goals and motivation for pursuing the degree, suitability for the program, and career goals following the program
- 6.) TOEFL scores (if the applicant is not a native English speaker)

Admissions Assessment

An admissions committee will review applications and recommend to the Program Director whether each applicant should be admitted and, if so, under what conditions.

Admission to Candidacy Requirements

After completing the appropriate core courses and at least three elective courses, each student delivers and defends an oral presentation that addresses research completed or in progress, plus proposed research for completion of the dissertation. The presentation/defense is delivered to the student's dissertation committee. The student is questioned by the committee about his/her research, plus material from any relevant graduate level courses the student has completed. Students who fail the exam on the first attempt will be provided a second opportunity to pass it, and will be advised by the committee on how to better prepare for the second attempt. Students who do not pass on the second attempt will be offered the option of obtaining a Master's degree in an appropriate discipline (depending on which electives the student has completed) but will not be allowed to continue on to the Ph.D. degree. Under normal circumstances, students are expected to pass the qualifying exam prior to the sixth semester in residence.

Degree Requirements

The Ph.D. in Nanoscale Science requires 72 credit hours. Core courses account for at least 22 credit hours, and elective courses account for at least 9 credit hours. The remaining credit hours are fulfilled by enrolling in NANO 8900, NANO 8681, and NANO 8682. Students may count additional elective courses towards meeting the 72 credit hour requirement with approval of the Graduate Program Director.

Core Courses

NANO 8001 Perspectives at the Nanoscale (2)
 NANO 8101 Introduction to Instrumentation and Processing at the Nanoscale (3)
 NANO 8102 Nanoscale Phenomena (3)
 NANO 8103 Synthesis and Characterization of Nanomaterials (3)
 NANO 8104 Fabrication of Nanomaterials (3)
 NANO 8201 Research Group Rotations (1)
 NANO 8202 Interdisciplinary Team Project (2)
 NANO 8203 Collaborative Research Proposal (3)
 NANO 8681 Nanoscale Science Seminar (1) *
 NANO 8682 Nanoscale Science Colloquium (1) **

**Students enroll in NANO 8681 during every semester in residence.*

***Students enroll in NANO 8682 during every semester in residence, except during the semester in which they enroll in NANO 8001.*

Elective Courses

Students complete a minimum of 9 credit hours of elective coursework in a chosen science or engineering discipline, in addition to completing the core courses. Any of the following elective course options are acceptable, or a course approved by the Graduate Program Director. Elective courses are selected in consultation with the student's advisor or dissertation advisor and dissertation committee to best meet the student's needs and interests.

BIOL 7000-8999
 CHEM 7000-8999
 ECGR 7000-8999
 MEGR 7000-8999
 PHYS 7000-8999
 OPTI 7000-8999
 NANO 8060 Special Topics in Nanoscale Science (1-3)

Cumulative Exams

Students must pass 6 exams (4 if done during the first year) covering announced topics in nanoscale science. The exams require knowledge of basic principles of nanoscale science and current literature and will be administered monthly. Each student is expected to take the cumulative exam each time it is offered until he/she passes the required number of

exams. Student progress in complete the cumulative exams is tracked by the Program Director.

General Science Proficiency Exam (GSPE)

The purpose of the GSPE is to ensure that students possess a *working knowledge* of material needed to master concepts in nanoscale science. The exam will cover introductory material in chemistry, physics and mathematics (including calculus). The website for the Ph.D. in Nanoscale Science (nanoscalescience.uncc.edu) contains detailed information about the exam, including a list of topics to be covered and sample questions, to assist students in preparing for the exam. The exam will be administered three times per year, in August, January, and May. Students are expected to take the GSPE each time it is offered until they pass it. Each student will discuss his/her performance on the GSPE with the Program Director regardless of whether (s)he passes the exam. The Program Director will indicate to the student any material he/she should study in greater detail and which faculty member the student should consult if he/she requires assistance in learning specific material. Students who do not pass the GSPE by the end of their first year enrolled in the program will be terminated from the program. The Program Director monitors student progress in completing the GSPE.

Advising/Committees

Students are assigned an academic advisor upon enrolling in the program and will work closely with that advisor on suggested schedules of classes, research options, and other issues important to student success until a research advisor is chosen. Upon selecting a research advisor, students will form a dissertation committee, and will then consult with the research advisor/dissertation committee on program matters.

Grade Requirements

Graduate students must have a GPA of 3.2 or higher to graduate from the program. Two grades of C or one grade of U will result in termination from the program.

Transfer Credit

Students who have taken graduate coursework but have not earned a graduate degree may transfer up to six credit hours of coursework. Students who have earned a Master's degree may transfer up to 30 credit hours.

Language Requirement

There is no foreign language requirement.

Application for Degree

Each student should make application for his/her degree by completing the online Application for Degree through Banner Self Service no later than the filing date specified in the University Academic Calendar. After successful defense of the dissertation, a student will be conferred with the doctoral degree.

Residency Requirement

Students must satisfy the residency requirement for the program by completing 21 credit hours of continuous enrollment, such as coursework or dissertation credits. Residence is considered continuous if the student is enrolled in one or more courses in successive semesters until 21 credit hours are earned.

Time Limits for Completion

The student must achieve admission to candidacy within six years after admission to the program. All requirements for the degree must be completed within eight years after first registration as a doctoral student. These time limits are maximums; full-time students will typically be expected to complete the degree requirements within 4-5 years.

COURSES IN NANOSCALE SCIENCE (NANO)

NANO 8001. Perspectives at the Nanoscale. (2)

NANO program faculty members present and discuss their research in nanoscale science to: (1) demonstrate how scientists from different disciplines approach problem-solving at the nanoscale, and (2) expose students to research opportunities for dissertation work. Students write summaries of the presentations.

NANO 8060. Special Topics in Nanoscale Science.

(1-3) Prerequisite: Permission of instructor. Selected topics in nanoscale science. *May be repeated for credit.*

NANO 8101. Introduction to Instrumentation and Processing at the Nanoscale. (3) Cross-listed as OPTI 6301 and OPTI 8301. Methods of manipulating, engineering, and characterizing nanoscale materials are introduced; applications and principles of their operation are discussed. Students acquire hands-on experience with selected laboratory methods in preparation for dissertation research. Topics include, but are not limited to, scanning probe and electron microscopy methods, cleanroom technology, nanoscale optical and e-beam lithography, nuclear magnetic resonance, mass spectrometry, luminescence methods, interferometry, gel permeation chromatography, surface area analysis, and small-angle x-ray and neutron scattering.

NANO 8102. Nanoscale Phenomena. (3) Cross-listed as CHEM 6102, OPTI 6302, and OPTI 8302. Topics include: scaling phenomena; nano-optics (near-field optics, limits of lithography masks, nano-dots and nanoscale optical interactions); nanoscale mechanics; nanotribology; biological and biologically-inspired machines.

NANO 8103. Synthesis and Characterization of Nanomaterials. (3) Cross-listed as CHEM 6103. Prerequisites: NANO 8101 and NANO 8102, or permission of instructor. Topics include: quantum dots, metallic nanoparticles, carbon nanostructured materials and nanotubes, zeolites, organic-inorganic polymers, composite materials, solution-phase colloids, sol-gel process, silica spheres, porous silicon, photonic crystals.

NANO 8104. Fabrication of Nanomaterials. (3) Prerequisite: NANO 8101. Lithographic methods (CVD, PVD, e-beam, ion beam, magnetron, evaporation, spin coating, mask fabrication, developing resists); microelectromechanical systems and nanoelectromechanical systems; limits of conventional mechanical processing, electroforming, growth mechanisms (organic, inorganic, thermal); powders.

NANO 8201. Research Group Rotations. (1) Students interact on a regular basis with selected research groups in nanoscale science from at least three different departments at UNC Charlotte. Specific activities range from meeting with the group's professor and/or other group members, attending group meetings, and observing laboratory experiments and procedures. Research groups are chosen so that each student is exposed to an array of research activities of the Nanoscale Science faculty. At the end of each rotation, the visiting student delivers a presentation to the visited research group, describing what the student learned about the visited group's research activities.

NANO 8202. Interdisciplinary Team Project. (2) Corequisite: NANO 8682. An encapsulated, semester-long research experience designed to introduce students to laboratory work in nanoscale science. Students work, in interdisciplinary teams of 2-4 students, on a short research project and present their results during a meeting of the Nanoscale Science Colloquium.

NANO 8203. Collaborative Research Proposal. (3) Cross-listed as OPTI 6303 and OPTI 8303. Effective strategies for designing and writing research proposals are presented by program faculty members, and staff from proposal development offices on campus. Students work in teams of 2-3 to prepare an original, interdisciplinary research proposal on a topic in

nanoscale science. The proposal conforms to regulations of a selected funding agency and must address a topic that is supported by that agency. Each team consults regularly with a panel of 2-3 faculty members who collectively approve the proposal topic, provide feedback during the development of the proposal, and ultimately evaluate the proposal. The course is designed to increase the ability of students to relate research ideas to fundamental concepts in science and engineering, to help students learn to develop effective methods of presenting ideas and defending them, to help students develop self confidence in their abilities to present and defend ideas, and to improve oral and written communication skills.

NANO 8681. Nanoscale Science Seminar. (1) Students attend weekly seminars of visiting speakers of the Nanoscale Science program or other approved programs on campus. Seminars are selected to best meet the educational needs of the individual student. Students submit for grading summaries of the seminars attended. *May be repeated for credit.*

NANO 8682. Nanoscale Science Colloquium. (1) Students present seminars on current topics in nanoscale science to the faculty and student participants of the program. Presentations address dissertation research, the current literature, group projects, and special topics. The colloquium provides an opportunity for students to discuss topics in Nanoscale Science with faculty from all of the participating disciplines. *May be repeated for credit.*

NANO 8900. Dissertation Research. (1-4) Research for the dissertation. *May be repeated for credit.*

Optical Science and Engineering

- **Ph.D. in Optical Science and Engineering**
- **M.S. in Optical Science and Engineering**

Optical Science and Engineering Programs

optics.uncc.edu

Graduate Program Director

Dr. Angela Davies

Graduate Faculty

Physics and Optical Science

Dr. Ishwar D. Aggarwal, Research Professor
 Dr. Vasily N. Astratov, Professor
 Dr. Glenn D. Boreman, Professor
 Dr. Angela D. Davies, Professor
 Dr. Shunji Egusa, Assistant Professor
 Dr. Faramarz Farahi, Professor
 Dr. Michael A. Fiddy, Professor
 Dr. Nathaniel Fried, Professor
 Dr. Greg J. Gbur, Professor
 Dr. Tsing-Hua Her, Associate Professor
 Dr. Yuri Nesmelov, Associate Professor
 Dr. Irina Nesmelova, Associate Professor
 Dr. Menelaos Poutous, Assistant Professor
 Dr. M. Yasin Akhtar Raja, Professor
 Dr. Tom Suleski, Professor
 Dr. Susan Trammell, Associate Professor

Electrical and Computer Engineering

Dr. Abasifreke Ebong, Professor
 Dr. Mohamed Ali Hasan, Associate Professor
 Dr. Edward B. Stokes, Professor
 Dr. Raphael Tsu, Professor
 Dr. Yong Zhang, Distinguished Professor

Chemistry

Dr. Bernadette T. Donovan-Merkert, Professor
 Dr. Marcus Jones, Associate Professor
 Dr. Jordan C. Poler, Associate Professor
 Dr. Thomas A. Schmedake, Associate Professor
 Dr. Michael G. Walter, Assistant Professor

Mathematics

Dr. Wei Cai, Professor

Mechanical Engineering

Dr. Matthew A. Davies, Professor
 Dr. Christopher J. Evans, Professor
 Dr. Brigid A. Mullany, Associate Professor

Dr. Steven R. Patterson, Distinguished Professor
 Dr. Tony L. Schmitz, Professor
 Dr. Stuart T. Smith, Professor
 Dr. Haitao Zhang, Assistant Professor

Programs of Study

The M.S. and Ph.D. programs in Optical Science and Engineering are interdisciplinary, involving primarily five science and engineering departments (Departments of Physics & Optical Science, Chemistry, Mathematics & Statistics, Electrical & Computer Engineering, and Mechanical Engineering & Engineering Science) and four centers (Center for Optoelectronics & Optical Communications, Center for Metamaterials, Center for Freeform Optics, and Center for Precision Metrology). The program is administered through the Department of Physics and Optical Science. The purpose of the program is to educate scientists and engineers who will develop the next generation of optical technology. The program emphasizes basic and applied interdisciplinary education and research in the following specialties of optics:

- Micro-optics and nanophotonics
- Fiber and integrated optics
- Optoelectronic materials and devices
- Biomedical optics
- Optical interferometry and metrology
- Optical fabrication
- Nanoscale imaging and spectroscopy
- Adaptive optics
- Optical communication
- Novel light-matter interactions
- Quantum optics
- Optical sensors and measurements

A complete description of the research activity within the Optical Science and Engineering program can be accessed online at optics.uncc.edu.

PH.D. IN OPTICAL SCIENCE AND ENGINEERING

Documents to be Submitted for Admission

- UNC Charlotte online application for graduate admission
- Official GRE scores
- Official TOEFL or IELTS score from international applicants whose native language is not English, unless the previous degree was from a country where English is the official language
- Unofficial transcripts from all colleges and universities attended should be uploaded to the application (Applicants offered admission will be required to submit official transcripts)
- A minimum of three letters of reference

- A Statement of Purpose essay detailing the applicant's motivation and career goals

Additional Admission Requirements

All applicants seeking admission into the Optical Science and Engineering Ph.D. program must fulfill the university's general requirements for graduate admission at the Ph.D. level. Additional requirements for admission into the program are:

- A baccalaureate or master's degree in Physics, Chemistry, Mathematics, Engineering, Optics, or a related field with a minimum undergraduate GPA of 3.0 overall and 3.2 (A = 4.0) in the major. In the case a candidate presents a master's degree at application, a minimum graduate GPA of 3.2 (A = 4.0) on all graduate work is required.
- A minimum combined score of 1100 on the verbal and quantitative portions of the GRE General Test (tests taken prior to August 1, 2011). A minimum combined score of 301 on the verbal and quantitative portions of the GRE revised General Test (tests taken on or after August 1, 2011).
- Positive letters of recommendation.
- Students may be required to take undergraduate courses determined by the Interdisciplinary Optics Program Committee on an individual basis. Such courses will be specified at the time of admission into the program.

Degree Requirements

The Ph.D. in Optical Science and Engineering is awarded for completion of scholarly research that advances the knowledge base in the field and is demonstrated by a successful dissertation defense. Additionally, recipients of this degree should demonstrate mastery of relevant subject matter and a potential for success in future research and teaching.

The minimum requirement for the Ph.D. degree in Optical Science and Engineering is 72 credit hours beyond the baccalaureate degree.

Each candidate for the Ph.D. degree in Optical Science and Engineering must complete the following:

- Present evidence of competency in the core curriculum by successfully completing 18 of 21 credit hours of core courses with a grade of B or above in each course
- A minimum of 6 credit hours of elective OPTI courses in addition to the core curriculum
- 1 credit hour of OPTI 8610 (Seminar) during the Fall semester of the first academic year in the program
- 1 credit hour of OPTI 8611 (Graduate Colloquium) during the Spring semester for the

first academic year in the program and 1 credit hour of OPTI 8611 each subsequent academic year in the program

- A minimum of 24 credit hours of OPTI 8991 (Dissertation Research)
- The remaining credit hours may be dissertation research credits, elective courses, or a combination
- Successfully complete the written and oral qualifying exam
- Select a dissertation advisor and form an advisory committee
- Prepare a plan of study detailing how you intend to satisfy the 72 credit hour requirement
- Successfully submit a Ph.D. research proposal
- Successfully defend the Ph.D. dissertation

Elective courses must be approved by the academic advisor and may include courses having a prefix of OPTI, PHYS, ECGR, MEGR, and NANO. Other courses may be considered as well. Ph.D. students should enroll in 8000-level courses when possible.

A student in the Ph.D. program must maintain a minimum cumulative GPA of 3.0 in all coursework attempted for the degree. An accumulation of two C grades will result in suspension from the program. A grade of U earned in any course will result in suspension from the program. An accumulation of three C grades or two U grades will result in termination from the program.

Core Curriculum

All graduates of the program must demonstrate competency in the core curriculum. Students may do so by completing 18 credit hours of the core courses with a grade of B or above in each course. The course makeup of the 18 credit hours must be approved by the academic advisor or program director. Competency is typically demonstrated by the end of the 3rd semester in the program. With program director approval, students may demonstrate competency by passing a core competency exam. Credit hours that would have been earned if the student had taken the course may be replaced by dissertation research or an approved elective.

Core Courses

Fall

- OPTI 8101 Mathematical Methods of Optical Science and Engineering (3)
- OPTI 8102 Principles of Geometrical Optics (3)
- OPTI 8102L Geometrical Optics Lab (1)
- OPTI 8105 Optical Properties of Materials (3)

Spring

- OPTI 8103 Light Sources and Detectors (3)
- OPTI 8104 Electromagnetic Waves (3)

OPTI 8106 Principles of Physical Optics (3)

OPTI 8106L Physical Optics Lab (2)

Responsible Conduct of Research

UNC Charlotte is committed to ensuring that doctoral students understand their obligations as researchers. All first year doctoral students in science, math, engineering, or technology are required to enroll in GRAD 8002 (Responsible Conduct of Research). This two credit hour course prepares students for a range of research related issues.

Qualifying Exam

Students participate in a written and oral qualifying examination administered by the optics faculty no later than the semester following the successful demonstration of competency in the core curriculum. If a student fails the qualifying examination, it may be retaken once. If a student fails the exam a second time, the student's enrollment in the Ph.D. program will be terminated.

Dissertation Advisor and Advisory Committee

Each student in the program must have a dissertation advisor and an advisory committee. The student should select the advisor before the end of the second year of residency. The student and advisor determine the committee by agreement. The advisor serves as chair of the committee and must be a member of the Optics Faculty and a regular member of the Graduate Faculty at UNC Charlotte. The Dean of the Graduate School will appoint a committee member to serve as the Graduate Faculty Representative. The committee must have at least 4 members, one of whom is the chair and one of whom is the Graduate Faculty Representative. All members of the committee must be members of the Graduate Faculty and a majority must be members of the Optics Faculty. Composition of the advisory committee must be approved by the Optics Program Director and the Dean of the Graduate School.

Plan of Study

All students should prepare a plan of study before the end of their fourth semester following admission to the program. The plan of study shows in detail how the student intends to meet the degree requirements. The plan of study must be approved by the advisory committee and the optics program director.

Research Proposal

After successful demonstration of competency in the core curriculum and approval of the plan of study, the student will prepare a written research proposal and present an oral defense of the proposal to their advisory committee. This should be completed within

three years following admission to the program. The research proposal, also called the dissertation topic proposal, must be approved by the advisory committee. The research proposal demonstrates the student's knowledge of the relevant literature and the specific research problems and methods of study that, if successfully completed, will lead to an acceptable dissertation.

Dissertation

Each student will complete a minimum of 24 credit hours of dissertation research. The student must submit a written dissertation for final review to the advisory committee three weeks before the defense date. The student must defend the dissertation before the advisory committee at a presentation which is open to the University community. Upon approval of the written dissertation and oral presentation by the advisory committee, the student has successfully completed the dissertation requirement. The dissertation must be written using a format acceptable to the Graduate School.

Residency Requirement

The student must satisfy the residence requirement for the program by completing 20 credit hours of continuous enrollment in coursework/dissertation credit. Residence is considered continuous if the student is enrolled in one or more courses in successive semesters until 20 credit hours are earned.

Transfer Credit Accepted

Up to 30 credit hours of approved coursework may be transferred from other accredited master's and/or doctoral programs. Only courses in which the student earned a grade of B or above (or its equivalent) can be transferred. No more than 6 credit hours of approved coursework taken as a post-baccalaureate student may be applied toward the degree. Credit for dissertation research cannot be transferred.

Assistantships

Support for beginning graduate students is usually a teaching assistantship. Continuing students are usually supported by research assistantships.

Application for Degree

Students should submit an Application for Degree at the beginning of the term in which they anticipate defending their dissertation. Adherence to Graduate School deadlines is expected. Degree requirements are completed when students successfully defend their dissertation and file the final copy of the dissertation in the Graduate School.

MASTER OF SCIENCE IN OPTICAL SCIENCE AND ENGINEERING

Documents to be Submitted for Admission

- UNC Charlotte online application for graduate admission
- Official GRE scores
- Official TOEFL or IELTS score from international applicants whose native language is not English, unless the previous degree was from a country where English is the official language
- Unofficial transcripts from all colleges and universities attended should be uploaded to the application (Applicants offered admission will be required to submit official transcripts)
- A minimum of three letters of reference
- A Statement of Purpose essay detailing the applicant's motivation and career goals

Additional Admission Requirements

All applicants seeking admission into the M.S. in Optical Science and Engineering program must fulfill the University's general requirements for graduate admission at the Master's level. Additional requirements for admission into the program are:

- A baccalaureate or master's degree in Physics, Chemistry, Mathematics, Engineering, Optics, Computer Science, or a related field with a minimum undergraduate GPA of 3.0 overall and 3.0 (A = 4.0) in the major.
- A minimum combined score of 1000 on the verbal and quantitative portions of the GRE General Test (tests taken prior to August 1, 2011). A minimum combined score of 293 on the verbal and quantitative portions of the GRE revised General Test (tests taken on or after August 1, 2011).
- Positive letters of recommendation.
- Students may be required to take undergraduate courses determined by the Optics Program Committee on an individual basis. Such courses will be specified at the time of admission into the program.

Degree Requirements for M.S. with Non-Thesis Option

The Master of Science degree with non-thesis option in Optical Science and Engineering is awarded for completion of formal coursework and demonstration of competency in the core curriculum.

The minimum requirement for the M.S. degree with non-thesis option is 32 credit hours beyond the baccalaureate degree. Each candidate for the M.S.

degree with non-thesis option must complete the following:

- Present evidence of competency in the core curriculum by successfully completing 15 of 21 credit hours of core courses with a grade of B or above in each course
- A minimum of 15 credit hours of elective courses in addition to the core curriculum
- 1 credit hour of OPTI 6610 (Seminar) during the Fall semester of the first academic year in the program
- 1 credit hour of OPTI 6611 (Graduate Colloquium) during the Spring semester of the first academic year in the program
- Prepare a plan of study detailing how you intend to satisfy the 32 credit hour requirement

Elective courses must be approved by the academic advisor and may include courses having a prefix of OPTI, PHYS, ECGR, MEGR, and NANO. Other courses may be considered as well. M.S. students should enroll in 6000-level courses when possible.

A student in the M.S. program must maintain a minimum cumulative GPA of 3.0 in all coursework attempted for the degree. An accumulation of two C grades will result in suspension from the program. A grade of U earned in any course will result in suspension from the program. An accumulation of three C grades or two U grades will result in termination from the program.

Degree Requirements for M.S. with Thesis Option

The Master of Science degree in Optical Science and Engineering with thesis option is awarded for completion of scholarly research that advances the knowledge base in the field and is demonstrated by a successful thesis defense.

The minimum requirement for the M.S. degree with thesis option is 32 credit hours beyond the baccalaureate degree. Each candidate for the M.S. degree with thesis option must complete the following:

- Present evidence of competency in the core curriculum by successfully completing 15 of 21 credit hours of core courses with a grade of B or above in each course
- A minimum of 6 credit hours of elective courses in addition to the core curriculum
- 1 credit hour of OPTI 6610 (Seminar) during the Fall semester of the first academic year in the program

- 1 credit hour of OPTI 6611 (Graduate Colloquium) during the Spring semester of the first academic year in the program
- A minimum of 9 credit hours of OPTI 6991 (Thesis Research)
- Select a thesis advisor and form an advisory committee
- Prepare a plan of study detailing how you intend to satisfy the 32 credit hour requirement
- Successfully submit an M.S. research proposal
- Successfully defend the M.S. thesis

Elective courses must be approved by the academic advisor and may include courses having a prefix of OPTI, PHYS, ECGR, MEGR, and NANO. Other courses may be considered as well. M.S. students should enroll in 6000-level courses when possible.

A student in the M.S. program must maintain a minimum cumulative GPA of 3.0 in all coursework attempted for the degree. An accumulation of two C grades will result in suspension from the program. A grade of U earned in any course will result in suspension from the program. An accumulation of three C grades or two U grades will result in termination from the program.

Core Curriculum

All graduates of the program must demonstrate competency in the core curriculum. Students may do so by completing 15 of the 21 available credit hours of core courses with a grade of B or above in each course. The course makeup of the 15 credit hours must be approved by the academic advisor or program director. Competency is typically demonstrated by the end of the 3rd semester in the program. With program director approval, students may demonstrate competency by passing a core competency exam. Credit hours that would have been earned if the student had taken the course may be replaced by approved credit hours.

Core Courses

Fall

- OPTI 6101 Mathematical Methods of Optical Science and Engineering (3)
- OPTI 6102 Principles of Geometrical Optics (3)
- OPTI 6102L Geometrical Optics Lab (1)
- OPTI 6105 Optical Properties of Materials (3)

Spring

- OPTI 6103 Light Sources and Detectors (3)
- OPTI 6104 Electromagnetic Waves (3)
- OPTI 6106 Principles of Physical Optics (3)
- OPTI 6106L Physical Optics Lab (2)

Thesis Advisor and Advisory Committee

Each student in a program of study with the thesis option must have a thesis advisor and an advisory committee. The student should select the advisor before the end of the first year of residency. The student and advisor determine the advisory committee by agreement. The advisor serves as chair of the advisory committee and must be a member of the Optics Faculty and a regular member of the Graduate Faculty at UNC Charlotte. The advisory committee must have at least 3 members, one of whom is the chair. All members of the committee must be members of the Graduate Faculty, and a majority must be members of the Optics Faculty. Composition of the advisory committee must be approved by the optics program director.

Plan of Study

After successful demonstration of competency in the core curriculum, students should prepare a plan of study which shows in detail how the student will meet the degree requirements. The plan of study must be approved by the optics program director.

Research Proposal

After successful demonstration of competency in the core curriculum, a student in a program of study that includes the thesis option will prepare a written research proposal. This should be completed within two years following admission to the program. The research proposal, also called the thesis topic proposal, must be approved by the advisory committee. The research proposal demonstrates the student's knowledge of the relevant literature and the specific research problems and methods of study that, if successfully completed, will lead to an acceptable thesis.

Thesis

Each student in a program of study that includes a thesis option will complete a minimum of 9 credit hours of thesis research. The student must submit a written thesis for final review to the advisory committee three weeks before the defense date. The student must defend the thesis before the advisory committee at a presentation which is open to the University community. Upon approval of the written thesis and oral presentation by the advisory committee, the student has successfully completed the thesis requirement. The thesis must be written using a format acceptable to the Graduate School.

Residency Requirement

The student must satisfy the residence requirement for the program by completing 12 credit hours of continuous enrollment in coursework/thesis credit. Residence is considered continuous if the student is

enrolled in one or more courses in successive semesters until 12 credit hours are earned.

Transfer Credit Accepted

Up to 6 credit hours of approved coursework may be transferred from other accredited master's and/or doctoral programs. Only courses in which the student earned a grade of B or above (or its equivalent) can be transferred. Credit for thesis research cannot be transferred.

Assistantships

Support for beginning graduate students is usually a teaching assistantship. Continuing students are often supported by research assistantships.

Application for Degree

Students should submit an Application for Degree at the beginning of the term in which they anticipate graduating. Adherence to Graduate School deadlines is expected.

COURSES IN OPTICAL SCIENCE AND ENGINEERING (OPTI)

OPTI 5000. Selected Topics in Optics. (3)

Prerequisite: Permission of Optics Program Director. Selected topics in optics from areas such as medical optics, adaptive optics, all optical networks, etc. *May be repeated for credit with change of topic.*

OPTI 5371. Waves and Optics. (3) Cross-listed as PHYS 5271. The mathematics of wave motion, light as an example of an electromagnetic wave, the superposition of periodic and non-periodic waves, and selected topics from geometrical and physical optics.

OPTI 5392. Solid State Microelectronic Devices. (3)

Cross-listed as ECGR 5192. PN-junctions and Schottky junctions. Bipolar and field effect transistors. Optoelectronic and heterojunction devices. Lithography and integrated circuits. Microwave devices. Light emitting devices and detectors. Quantum devices using superlattices. Quantum wells and quantum dots. Material preparation and characterization. Measurement techniques.

OPTI 6000. Selected Topics in Optics. (3) Cross-listed as OPTI 8000. Prerequisite: Permission of Optics Program Director. Selected topics in optics from areas such as medical optics, adaptive optics, all optical networks, etc. *May be repeated for credit with change of topic.*

OPTI 6101. Mathematical Methods of Optical Science and Engineering. (3) Cross-listed as OPTI

8101. A comprehensive look at those mathematical techniques important to the understanding of optical phenomena. Includes vector algebra and calculus, matrix theory, Fourier series and transforms, complex analysis, solution of boundary value problems in partial differential equations, and special functions. Topical coverage emphasizes applications specific to the field of optics.

OPTI 6102. Principles of Geometrical Optics. (3)

Cross-listed as OPTI 8102. Law of reflection and refraction, reflection and refraction at plane surfaces, paraxial imagery, mirrors, thick lenses, thin lenses, lens systems, stops, principle planes, the optical variant, vignetting, paraxial radiometry, analysis of common optical systems, real ray tracing, and introduction to aberrations and image resolution in the context of the modulation transfer function.

OPTI 6102L. Geometrical Optics Lab. (1)

Cross-listed as OPTI 8102L. Selected experiments in areas of geometrical optics such as index of refraction measurement, dispersing and reflecting prisms, spherical mirrors and thin lenses, imaging, optical instruments, aberration, fiber optics, and fringe projection profilometry.

OPTI 6103. Light Sources and Detectors. (3) Cross-listed as OPTI 8103. Photon statistics and thermal light. Interactions of photons with atoms. Population inversion, lasing threshold, and resonator modes. Mode-locked and Q-switched lasers. Semiconductor photon sources including light-emitting diodes (LEDs) and laser diodes. Quantum-confined structures, materials, and devices. Thermal sources. Light extraction. Light detectors including photoconductive, photovoltaic and avalanche photodiodes. Noise in light sources and detectors.

OPTI 6104. Electromagnetic Waves. (3) Cross-listed as OPTI 8104. Optical phenomena that are explicitly associated with the electromagnetic nature of light. Includes an introduction to Maxwell's equations and electromagnetic waves. Polarization and the Jones calculus. Energy and momentum conservation, boundary conditions and Fresnel equations. Waves in anisotropic (birefringent) and complex media. Modulation and deflection of optical beams (principles of acousto-optics and electro-optic devices). Propagation at interfaces, waveguides, and plasmons. Electromagnetic potentials and multipole radiation, scattering of light, and interaction with metallic nanoparticles.

OPTI 6105. Optical Properties of Materials. (3)

Cross-listed as OPTI 8105. Electromagnetic wave propagation in dielectrics, semiconductors and metals. Dipole oscillator model, complex dielectric constants, and Kramers-Kronig relationship. Crystal

structures and optical anisotropy. Reciprocal space and density of states. Electronic band structure. Quantum theory of radiative absorption and emission, selection rules. Direct and indirect interband absorption. Free-carrier absorption in metals and doped semiconductors. Free excitons and Frenkel excitons. Photo- and electroluminescence in semiconductors. Optical absorption and emission in quantum wells and quantum dots, and quantum Stark effect. Second and third-order optical nonlinearities.

OPTI 6106. Principles of Physical Optics. (3) Cross-listed as OPTI 8106. The Fourier transform and its role in wave optics. Wave properties of light, superposition of waves, angular spectrum of plane waves, relation to ray optics, Gaussian beams, periodic structures and surfaces, Fresnel diffraction, spatial filtering diffraction, interference and interferometers (two, multibeam, Fabry-Perot), polarization, temporal and spatial coherence, holography, imaging and resolution.

OPTI 6106L. Physical Optics Lab. (2) Cross-listed as OPTI 8106L. Selected experiments in areas of physical optics such as interference in thin films, Fabry-Perot, Michelson & Twyman-Green interferometers, polarization and diffraction of light. By the end of this course, students are asked to design and implement a mini project that includes geometrical and physical optics concepts.

OPTI 6201. Fourier Optics and Holography. (3) Cross-listed as OPTI 8201. Prerequisites: OPTI 6102 and OPTI 6104. Principles of scalar, Fresnel, and Fraunhofer diffraction theory. Coherent optical data processing. Optical filtering and data processing. Holography. Three lecture hours per week.

OPTI 6202. Fundamentals of Biomedical Optics. (3) Cross-listed as OPTI 8202 and PHYS 6202. Basic principles underlying tissue optics, laser-tissue interactions, and optical imaging, microscopy, and spectroscopy for medical applications.

OPTI 6203. Metamaterials. (3) Cross-listed as OPTI 8203. Metamaterials describes a new field of engineered materials having subwavelength structures, and which have electromagnetic properties not found in nature. Examples include zero and negative index materials which lead to some new applications. Metamaterials are made from "meta-atoms" which are much smaller than the wavelength of the radiation. Meta-atoms are LCR circuits having strong resonant behavior over some chosen bandwidth. The distribution of many such atoms and their mutual interaction determine the bulk metamaterial's properties. Describing these properties draws from electromagnetics, antenna design, atomic and molecular physics and condensed matter physics.

At increasingly small scales (i.e., at the nanoscale), both quantum and plasmonic phenomena can play a role.

OPTI 6205. Advanced Optical Materials. (3) Cross-listed as OPTI 8205. Prerequisites: OPTI 6104 and OPTI 6105; or ECGR 6133 or ECGR 8133. Molecular optical materials including fabrication methods. Luminescence centers; quenching. Nonlinear optics, including higher order terms of the susceptibility tensor. Photonic crystals. Three lecture hours per week.

OPTI 6206. Physical Optics Design and Simulation. (3) Cross-listed as OPTI 8206. Prerequisite: OPTI 6106 or permission of instructor. Design and simulation of optical components and systems using scalar and vector wave propagation, diffraction, and interference. The course is intended to complement OPTI 6241, which focuses on optical lens and system design using geometrical ray-tracing.

OPTI 6211. Introduction to Modern Optics. (3) Cross-listed as OPTI 8211. Prerequisite: OPTI 6102 or permission of instructor. Fourier analysis and holography, Coherence. Introduction to light production and detection. Optical modulation, including EO effect, Kerr effect, amplitude modulation, magneto-optic effect, photoelastic effect, and acousto-optic effect. Introduction to nonlinear optics. Photonic switching. Three lecture hours per week.

OPTI 6212. Integrated Photonics. (3) Cross-listed as OPTI 8212. Prerequisites: OPTI 6102 and OPTI 6104. Theory and application of optical waveguides, free-space micro-optics, and integrated photonic devices. Fabrication and integration techniques, including motivations for choice of approach (hybrid vs. monolithic, materials, size, performance, etc). Modeling and simulation. Students will be required to work with mathematical packages such as Matlab and/or Mathematica to illustrate key concepts and to implement beam propagation/optical modeling simulations. Three lecture hours per week.

OPTI 6221. Optical Communications. (3) Cross-listed as OPTI 8221. Prerequisites: OPTI 6102 and OPTI 6103. Introduction to optical communications and basic communication block such as lasers, optical modulators, and optical transceivers. Review of fibers (attenuation, dispersions, etc.). Optical amplifiers. Passive and active photonic components such as tunable lasers and filters. Coherent and incoherent detection. Signal processing, photonic switching, and point-to-point links / connections. Three lecture hours per week.

OPTI 6222. Optical Communication Networks. (3)

Cross-listed as OPTI 8222. Prerequisite: OPTI 6221 or graduate standing in ECE, CS, or IT. Optical signal coding, multiplexing and de-multiplexing. Time-domain medium access (TDM (SONET) and TDMA), wavelength-division multiplexing (WDM and WDMA). Optical networks, add-drop multiplexing (OADM), switching and routing technologies, Dispersion management. Optical clock and timing recovery. Optical amplification, wavelength conversion, transport, and networking protocols. Broadband ISDN concepts. Access, metro, and long-haul network topologies. Three lecture hours per week.

OPTI 6241. Optical System Function and Design. (3)

Cross-listed as OPTI 8241. Prerequisite: OPTI 6102. Advanced study of telescopes, microscopes, cameras, off-axis imaging systems, stops, apertures, multiple lenses, use and selection of ray trace computer codes. Three lecture hours per week.

OPTI 6242. Optical Propagation in Inhomogeneous Media. (3)

Cross-listed as OPTI 8242. Prerequisites: OPTI 6102 and OPTI 6104. Advanced study of free space propagation, scattering, and scintillation of Gaussian and uniform beam waves. Random processes, weak fluctuation theory, propagation through complex paraxial optical systems.

OPTI 6244. High Speed Photonics and Optical Instrumentation. (3)

Cross-listed as OPTI 8244. Prerequisites: OPTI 6103 and OPTI 6104. Study of instrumentation used for generation, detection, and manipulation of light in optical circuits. Topics include: ultrashort pulse generation, photon-phonon interactions, 2nd & 3rd harmonic generation, squeezed light, optical tweezers, OPO, electro-optic modulators, selective polarizers, optical switches, amplifiers, multiplexing and mixing schemes, and application of CCD and CMOS cameras and detectors. Three lecture hours per week.

OPTI 6261. Modern Coherence Theory. (3)

Cross-listed as OPTI 8261. Prerequisites: OPTI 6102 and OPTI 6104. Stochastic processes. Second order coherence of scalar and vector wavefields, radiation and states of coherence. Quantum wavefields.

OPTI 6271. Advanced Physical Optics. (3)

Cross-listed as OPTI 8271. Prerequisites: OPTI 6101, OPTI 6102, and OPTI 6104. Advanced study of electromagnetic wave propagation, stratified media, physics of geometrical optics, polarization and crystal optics, absorption and dispersion, interference, propagation and diffraction. Three lecture hours per week.

OPTI 6281. Modern Optics Laboratory. (3)

Cross-listed as OPTI 8281. Prerequisite: OPTI 6102. Selected experiments in areas of modern optics such as fiber optics, interferometry, spectroscopy, polarization, optical metrology, and holography. Six laboratory hours per week.

OPTI 6301. Introduction to Instrumentation and Processing at the Nanoscale. (3)

Cross-listed as OPTI 8301 and NANO 8101. Methods of manipulating, engineering, and characterizing nanoscale materials are introduced; applications and principles of their operation are discussed. Students acquire hands-on experience with selected laboratory methods in preparation for dissertation research. Topics include, but are not limited to, scanning probe and electron microscopy methods, cleanroom technology, nanoscale optical and e-beam lithography, nuclear magnetic resonance, mass spectrometry, luminescence methods, interferometry, gel permeation chromatography, surface area analysis, and small-angle x-ray and neutron scattering.

OPTI 6302. Nanoscale Phenomena. (3)

Cross-listed as OPTI 8302, CHEM 6102, and NANO 8102. Nanooptics (near-field optics, limits of lithography masks, nano-dots and nanoscale optical interactions). Nanoscale mechanics. Nanotribology. Biological and biologically-inspired machines.

OPTI 6303. Collaborative Research Proposal. (3)

Cross-listed as OPTI 8303 and NANO 8203. Effective strategies for designing and writing research proposals are presented by program faculty members, and staff from proposal development offices on campus. Students work in teams of 2-3 to prepare an original, interdisciplinary research proposal on a topic in nanoscale science. The proposal conforms to regulations of a selected funding agency and must address a topic that is supported by that agency. Each team consults regularly with a panel of 2-3 faculty members who collectively approve the proposal topic, provide feedback during the development of the proposal, and ultimately evaluate the proposal. The course is designed to increase the ability of students to relate research ideas to fundamental concepts in science and engineering, to help students learn to develop effective methods of presenting ideas and defending them, to help students develop self confidence in their abilities to present and defend ideas, and to improve oral and written communication skills.

OPTI 6341. Applied Quantum Mechanics. (3)

Cross-listed as OPTI 8341 and PHYS 6141. Principles of non-relativistic wave mechanics. The Schrodinger equation, linear harmonic oscillator and WKB approximation. Central forces and angular

momentum. The hydrogen atom. Applications of quantum mechanics in materials and optics.

OPTI 6371. Solid State Materials. (3) Cross-listed as OPTI 8371 and PHYS 6271. Crystal structure. Electromagnetic, electron, mechanical, and elastic wave interactions with crystals. Theory of X-ray diffraction. Energy band theory of metals and semiconductors. Optical properties of solids, phase transitions, and amorphous solids. Quantum mechanics of covalent bonding, phonon excitation, and thermal energy.

OPTI 6381. Engineering Metrology. (3) Cross-listed as MEGR 6181, MEGR 8181, and OPTI 8381. Introduction to metrology and standards. Uncertainty, precision and accuracy in metrology. Measurement of size and form, computational methods in measurement of form. Measurement of surface texture and out of roundness. Machine tool and robot accuracy and calibration. Evaluation of screw threads and gears. Introduction to design of precision instruments.

OPTI 6384. Advanced Surface Metrology. (3) Cross-listed as MEGR 7284, MEGR 8284, and OPTI 8384. Prerequisite: OPTI 6381, OPTI 8381, or permission of instructor. Constituents of surface texture, stylus, optical, atomic force microscope and other advanced methods of measuring surface texture. Two and three dimensional measurement of surfaces. Separation of form, waviness and roughness. Random process analysis techniques, use of transforms for filtering. Numerical evaluation of surface texture. Use of surface texture as fingerprint of the process. Relationship between function and surface texture.

OPTI 6400. Industrial Internship. (1-3) Cross-listed as OPTI 8400. Prerequisites: Completion of nine hours of graduate coursework and permission of program director. Full- or part-time academic year internship in optical science/optical engineering complementary to the major course of studies and designed to allow theoretical and course-based practical learning to be applied in a supervised industrial experience. Requires a mid-term report and final report to be graded by the supervising faculty. *May be repeated for credit.*

OPTI 6610. Seminar. (1) Cross-listed as OPTI 8610. Utilizing library resources, materials, and research tools. Using presentation software and developing presentation skills for effective technical presentations. Patents and technology transfer. Ethical issues in science and engineering. Current topics in optics.

OPTI 6611. Graduate Colloquium. (1) Cross-listed as OPTI 8611. Students present seminars on current

topics in optical science and engineering. *May be repeated for credit.*

OPTI 6800. Independent Study. (1-3) Cross-listed as OPTI 8800. Prerequisite: Permission of the Optics Program Director. Independent study pursued by the student, or a group of students, under the direction of a professor. *May be repeated for credit up to 6 credits.*

OPTI 6991. Thesis Research. (1-3) Prerequisite: Admission to candidacy. Research for the thesis. *May be repeated for credit up to 18 credits. Graded on a Pass/Unsatisfactory basis.*

OPTI 8000. Selected Topics in Optics. (3) Cross-listed as OPTI 6000. Prerequisite: Permission of Optics Program Director. Selected topics in optics from areas such as medical optics, adaptive optics, all optical networks, etc. *May be repeated for credit with change of topic.*

OPTI 8101. Mathematical Methods of Optical Science and Engineering. (3) Cross-listed as OPTI 6101. A comprehensive look at those mathematical techniques important to the understanding of optical phenomena. Includes vector algebra and calculus, matrix theory, Fourier series and transforms, complex analysis, solution of boundary value problems in partial differential equations, and special functions. Topical coverage emphasizes applications specific to the field of optics.

OPTI 8102. Principles of Geometrical Optics. (3) Cross-listed as OPTI 6102. Law of reflection and refraction, reflection and refraction at plane surfaces, paraxial imagery, mirrors, thick lenses, thin lenses, lens systems, stops, principle planes, the optical variant, vignetting, paraxial radiometry, analysis of common optical systems, real ray tracing, and introduction to aberrations and image resolution in the context of the modulation transfer function.

OPTI 8102L. Geometrical Optics Lab. (1) Cross-listed as OPTI 6102L. Selected experiments in areas of geometrical optics such as index of refraction measurement, dispersing and reflecting prisms, spherical mirrors and thin lenses, imaging, optical instruments, aberration, fiber optics, and fringe projection profilometry.

OPTI 8103. Light Sources and Detectors. (3) Cross-listed as OPTI 6103. Photon statistics and thermal light. Interactions of photons with atoms. Population inversion, lasing threshold, and resonator modes. Mode-locked and Q-switched lasers. Semiconductor photon sources including light-emitting diodes (LEDs) and laser diodes. Quantum-confined structures, materials, and devices. Thermal sources. Light

extraction. Light detectors including photoconductive, photovoltaic and avalanche photodiodes. Noise in light sources and detectors.

OPTI 8104. Electromagnetic Waves. (3) Cross-listed as OPTI 6104. Optical phenomena that are explicitly associated with the electromagnetic nature of light. Includes an introduction to Maxwell's equations, and electromagnetic waves. Polarization and the Jones calculus. Energy and momentum conservation, boundary conditions and Fresnel equations. Waves in anisotropic (birefringent) and complex media. Modulation and deflection of optical beams (principles of acousto-optics and electro-optic devices). Propagation at interfaces, waveguides, and plasmons. Electromagnetic potentials and multipole radiation, scattering of light, and interaction with metallic nanoparticles.

OPTI 8105. Optical Properties of Materials. (3) Cross-listed as OPTI 6105. Electromagnetic wave propagation in dielectrics, semiconductors and metals. Dipole oscillator model, complex dielectric constants, and Kramers-Kronig relationship. Crystal structures and optical anisotropy. Reciprocal space and density of states. Electronic band structure. Quantum theory of radiative absorption and emission, selection rules. Direct and indirect interband absorption. Free-carrier absorption in metals and doped semiconductors. Free excitons and Frenkel excitons. Photo- and electroluminescence in semiconductors. Optical absorption and emission in quantum wells and quantum dots, and quantum Stark effect. Second and third-order optical nonlinearities.

OPTI 8106. Principles of Physical Optics. (3) Cross-listed as OPTI 6106. The Fourier transform and its role in wave optics. Wave properties of light, superposition of waves, angular spectrum of plane waves, relation to ray optics, Gaussian beams, periodic structures and surfaces, Fresnel diffraction, spatial filtering diffraction, interference and interferometers (two, multibeam, Fabry-Perot), polarization, temporal and spatial coherence, holography, imaging and resolution.

OPTI 8106L. Physical Optics Lab. (2) Cross-listed as OPTI 6106L. Selected experiments in areas of physical optics such as interference in thin films, Fabry-Perot, Michelson & Twyman-Green interferometers, polarization and diffraction of light. By the end of this course, students are asked to design and implement a mini project that includes geometrical and physical optics concepts.

OPTI 8201. Fourier Optics and Holography. (3) Cross-listed as OPTI 6201. Prerequisites: OPTI 8102 and OPTI 8104. Principles of scalar, Fresnel, and Fraunhofer diffraction theory. Coherent optical data

processing. Optical filtering and data processing. Holography. Three lecture hours per week.

OPTI 8202. Fundamentals of Biomedical Optics. (3) Cross-listed as OPTI 6202 and PHYS 6202. Basic principles underlying tissue optics, laser-tissue interactions, and optical imaging, microscopy, and spectroscopy for medical applications.

OPTI 8203. Metamaterials. (3) Cross-listed as OPTI 6203. Metamaterials describes a new field of engineered materials having subwavelength structures, and which have electromagnetic properties not found in nature. Examples include zero and negative index materials which lead to some new applications. Metamaterials are made from "meta-atoms" which are much smaller than the wavelength of the radiation. Meta-atoms are LCR circuits having strong resonant behavior over some chosen bandwidth. The distribution of many such atoms and their mutual interaction determine the bulk metamaterial's properties. Describing these properties draws from electromagnetics, antenna design, atomic and molecular physics and condensed matter physics. At increasingly small scales (i.e., at the nanoscale), both quantum and plasmonic phenomena can play a role.

OPTI 8205. Advanced Optical Materials. (3) Cross-listed as OPTI 6205. Prerequisites: OPTI 8104 and OPTI 8105; or ECGR 6133 or ECGR 8133. Molecular optical materials including fabrication methods. Luminescence centers; quenching. Nonlinear optics, including higher order terms of the susceptibility tensor. Photonic crystals. Three lecture hours per week.

OPTI 8206. Physical Optics Design and Simulation. (3) Cross-listed as OPTI 6206. Prerequisite: OPTI 8106 or permission of instructor. Design and simulation of optical components and systems using scalar and vector wave propagation, diffraction, and interference. The course is intended to complement OPTI 8241, which focuses on optical lens and system design using geometrical ray-tracing.

OPTI 8211. Introduction to Modern Optics. (3) Cross-listed as OPTI 8211. Prerequisite: OPTI 6102 or permission of instructor. Fourier analysis and holography, Coherence. Introduction to light production and detection. Optical modulation, including EO effect, Kerr effect, amplitude modulation, magneto-optic effect, photoelastic effect, and acousto-optic effect. Introduction to nonlinear optics. Photonic switching. Three lecture hours per week.

OPTI 8212. Integrated Photonics. (3) Cross-listed as OPTI 6212. Prerequisites: OPTI 8102 and OPTI

8104. Theory and application of optical waveguides, free-space micro-optics, and integrated photonic devices. Fabrication and integration techniques, including motivations for choice of approach (hybrid vs. monolithic, materials, size, performance, etc). Modeling and simulation. Students will be required to work with mathematical packages such as Matlab and/or Mathematica to illustrate key concepts and to implement beam propagation/optical modeling simulations. Three lecture hours per week.

OPTI 8221. Optical Communications. (3) Cross-listed as OPTI 6221. Prerequisites: OPTI 8102 and OPTI 8103. Introduction to optical communications and basic communication block such as lasers, optical modulators, and optical transceivers. Review of fibers (attenuation, dispersions, etc.). Optical amplifiers. Passive and active photonic components such as tunable lasers and filters. Coherent and incoherent detection. Signal processing, photonic switching, and point-to-point links / connections. Three lecture hours per week.

OPTI 8222. Optical Communication Networks. (3) Cross-listed as OPTI 6222. Prerequisite: OPTI 8221. Optical signal coding, multiplexing and de-multiplexing. Time-domain medium access (TDM (SONET) and TDMA), wavelength-division multiplexing (WDM and WDMA). Optical networks, add-drop multiplexing (OADM), switching and routing technologies, Dispersion management. Optical clock and timing recovery. Optical amplification, wavelength conversion, transport, and networking protocols. Broadband ISDN concepts. Access, metro, and long-haul network topologies. Three lecture hours per week.

OPTI 8241. Optical System Function and Design. (3) Cross-listed as OPTI 6241. Prerequisite: OPTI 8102. Advanced study of telescopes, microscopes, cameras, off-axis imaging systems, stops, apertures, multiple lenses, use and selection of ray trace computer codes. Three lecture hours per week.

OPTI 8242. Optical Propagation in Inhomogeneous Media. (3) Cross-listed as OPTI 6242. Prerequisites: OPTI 8102 and OPTI 8104. Advanced study of free space propagation, scattering, and scintillation of Gaussian and uniform beam waves. Random processes, weak fluctuation theory, propagation through complex paraxial optical systems.

OPTI 8244. High Speed Photonics and Optical Instrumentation. (3) Cross-listed as OPTI 6244. Prerequisites: OPTI 8103 and OPTI 8104. Study of instrumentation used for generation, detection, and manipulation of light in optical circuits. Topics include: ultrashort pulse generation, photon-phonon interactions, 2nd & 3rd harmonic generation, squeezed

light, optical tweezers, OPO, electro-optic modulators, selective polarizers, optical switches, amplifiers, multiplexing and mixing schemes, and application of CCD and CMOS cameras and detectors. Three lecture hours per week.

OPTI 8261. Modern Coherence Theory. (3) Cross-listed as OPTI 6261. Prerequisites: OPTI 8102 and OPTI 8104. Stochastic processes. Second order coherence of scalar and vector wavefields, radiation and states of coherence. Quantum wavefields.

OPTI 8271. Advanced Physical Optics (3) Cross-listed as OPTI 6271. Prerequisites: OPTI 8101, OPTI 8102, and OPTI 8104. Advanced study of electromagnetic wave propagation, stratified media, physics of geometrical optics, polarization and crystal optics, absorption and dispersion, interference, propagation and diffraction. Three lecture hours per week.

OPTI 8281. Modern Optics Laboratory. (3) Cross-listed as OPTI 6281. Prerequisite: OPTI 8102. Selected experiments in areas of modern optics such as fiber optics, interferometry, spectroscopy, polarization, optical metrology, and holography. Six laboratory hours per week.

OPTI 8301. Introduction to Instrumentation and Processing at the Nanoscale. (3) Cross-listed as OPTI 6301 and NANO 8101. Methods of manipulating, engineering, and characterizing nanoscale materials are introduced; applications and principles of their operation are discussed. Students acquire hands-on experience with selected laboratory methods in preparation for dissertation research. Topics include, but are not limited to, scanning probe and electron microscopy methods, cleanroom technology, nanoscale optical and e-beam lithography, nuclear magnetic resonance, mass spectrometry, luminescence methods, interferometry, gel permeation chromatography, surface area analysis, and small-angle x-ray and neutron scattering.

OPTI 8302. Nanoscale Phenomena. (3) Cross-listed as OPTI 6302, CHEM 6102, and NANO 8102. Nano-optics (near-field optics, limits of lithography masks, nano-dots and nanoscale optical interactions). Nanoscale mechanics. Nanotribology. Biological and biologically-inspired machines.

OPTI 8303. Collaborative Research Proposal. (3) Cross-listed as OPTI 6303 and NANO 8203. Effective strategies for designing and writing research proposals are presented by program faculty members, and staff from proposal development offices on campus. Students work in teams of 2-3 to prepare an original, interdisciplinary research proposal on a topic in nanoscale science. The proposal conforms to

regulations of a selected funding agency and must address a topic that is supported by that agency. Each team consults regularly with a panel of 2-3 faculty members who collectively approve the proposal topic, provide feedback during the development of the proposal, and ultimately evaluate the proposal. The course is designed to increase the ability of students to relate research ideas to fundamental concepts in science and engineering, to help students learn to develop effective methods of presenting ideas and defending them, to help students develop self confidence in their abilities to present and defend ideas, and to improve oral and written communication skills.

OPTI 8341. Applied Quantum Mechanics. (3) Cross-listed as OPTI 6341 and PHYS 6141. Principles of non-relativistic wave mechanics. The Schrodinger equation, linear harmonic oscillator and WKB approximation. Central forces and angular momentum. The hydrogen atom. Applications of quantum mechanics in materials and optics.

OPTI 8371. Solid State Materials. (3) Cross-listed as OPTI 6371 and PHYS 6271. Crystal structure. Electromagnetic, electron, mechanical, and elastic wave interactions with crystals. Theory of X-ray diffraction. Energy band theory of metals and semiconductors. Optical properties of solids, phase transitions, and amorphous solids. Quantum mechanics of covalent bonding, phonon excitation, and thermal energy.

OPTI 8381. Engineering Metrology. (3) Cross-listed as MEGR 6181, MEGR 8181, and OPTI 6381. Introduction to metrology and standards. Uncertainty, precision and accuracy in metrology. Measurement of size and form, computational methods in measurement of form. Measurement of surface texture and out of roundness. Machine tool and robot accuracy and calibration. Evaluation of screw threads and gears. Introduction to design of precision instruments.

OPTI 8384. Advanced Surface Metrology. (3) Cross-listed as MEGR 7284, MEGR 8284, and OPTI 6384. Prerequisite: OPTI 6381, OPTI 8381, or permission of instructor. Constituents of surface texture, stylus, optical, atomic force microscope and other advanced methods of measuring surface texture. Two and three dimensional measurement of surfaces. Separation of form, waviness and roughness. Random process analysis techniques, use of transforms for filtering. Numerical evaluation of surface texture. Use of surface texture as fingerprint of the process. Relationship between function and surface texture.

OPTI 8400. Industrial Internship. (1-3) Cross-listed as OPTI 6400. Prerequisites: Completion of nine

hours of graduate coursework and permission of program director. Full- or part-time academic year internship in optical science/optical engineering complementary to the major course of studies and designed to allow theoretical and course-based practical learning to be applied in a supervised industrial experience. Requires a mid-term report and final report to be graded by the supervising faculty. *May be repeated for credit.*

OPTI 8610. Seminar. (1) Cross-listed as OPTI 6610. Utilizing library resources, materials, and research tools. Using presentation software and developing presentation skills for effective technical presentations. Patents and technology transfer. Ethical issues in science and engineering. Current topics in optics.

OPTI 8611. Graduate Colloquium. (1) Cross-listed as OPTI 6611. Students present seminars on current topics in optical science and engineering. *May be repeated for credit.*

OPTI 8800. Independent Study. (1-3) Cross-listed as OPTI 6800. Prerequisite: Permission of the Optics Program Director. Independent study pursued by the student, or a group of students, under the direction of a professor. *May be repeated for credit up to 6 credits.*

OPTI 8991. Dissertation Research. (1-3) Prerequisite: Admission to candidacy. Research for the dissertation. *May be repeated for credit up to 45 credits. Graded on a Pass/Unsatisfactory basis.*

Organizational Science

• Ph.D. in Organizational Science

Organizational Science Program

orgscience.uncc.edu

Graduate Program Directors

Dr. Steven Rogelberg, Director

Dr. Wei Zhao, Associate Director

Graduate Faculty

Dr. George Banks, Assistant Professor

Dr. Anita Blanchard, Associate Professor

Dr. Jaime Bochantin, Assistant Professor

Dr. Amy Canevello, Assistant Professor

Dr. Yang Cao, Associate Professor

Dr. Janaki Gooty, Assistant Professor

Dr. Loril Gossett, Associate Professor

Dr. Eric Heggstad, Associate Professor

Dr. Franz Kellermanns, Professor

Dr. Shawn Long, Professor

Dr. Alyssa McGonagle, Assistant Professor

Dr. Steven Rogelberg, Professor

Dr. Beth Rubin, Professor

Dr. Enrica Ruggs, Assistant Professor

Dr. Clifton Scott, Associate Professor

Dr. Linda Shanock, Professor

Dr. Lisa Walker, Professor

Dr. Justin Webb, Associate Professor

Dr. Dave Woehr, Professor

Dr. Wei Zhao, Associate Professor

PH.D. IN ORGANIZATIONAL SCIENCE

Organizational Science is an emerging interdisciplinary field of inquiry focusing on employee and organizational health, well-being, and effectiveness. Organizational Science is both a science and a practice. Enhanced understanding leads to applications and interventions that benefit the individual, work groups, the organization, the customer, the community, and the larger society in which the organization operates. Specific topics of study in Organizational Science include, but are not limited to: *Team Processes and Performance; Organizational Structure and Effectiveness; Selection, Testing, and Promotion; Leadership; Organizational Culture and Climate; Training and Development; Performance Evaluation; Workplace Health and Safety; Workplace Diversity; Employee Attitudes; Job Satisfaction and Turnover; Rewards and Recognition;*

Communication Effectiveness; Technology and Work; Employee Motivation and Participation; Employee Citizenship and Deviance; Work-Life Programs; Organizations and External Environment; Customer Service and Satisfaction; Organizational Behavior; Employee Recruitment and Socialization; Interorganizational Relations; and Organizational Change. The discipline stems from (in alphabetical order): Human Resources Management, Industrial/Organizational Psychology, Organizational Behavior, Organizational Communication, Organizational Sociology, and Social Psychology.

Upon graduation, students will have achieved the following educational objectives:

- Acquire a comprehensive and integrated body of organizational science knowledge ranging from micro issues concerning employee selection and socialization to more macro issues concerning organizational structure and effectiveness
- Demonstrate competence in synthesizing and transcending disciplinary perspectives to generate novel, useful, and robust understandings of organizational science phenomena
- Demonstrate competence in planning, conducting, and evaluating Organizational Science research
- Demonstrate competence in teaching, communicating, and disseminating organizational science knowledge to others in an effective and pedagogically appropriate manner
- Demonstrate competence in collaborating with a diverse group of professionals, students, research participants, and consumers of organizational science services
- Demonstrate competence in applying research in organizational science to practice leading to applications and interventions that benefit the individual, the organization, the customer, and the larger community in which the organization operates

By meeting these objectives, graduates of the program will be prepared to assume leadership roles as organizational scholars, researchers, and educators in academic institutions and as practitioners and policy makers in a wide range of public and private settings. By doing so, our graduating doctoral students will be further promoting our core mission to advance employee and organizational health, well-being, and effectiveness.

Admission Requirements

In addition to the general requirements for admission to the Graduate School, we ask students to submit the following:

- 1) Official report of score on the GRE and/or GMAT
- 2) A one to two-page professional statement (discuss interest in the program and objectives for pursuing this degree)
- 3) A current resume or vita
- 4) International students (whose native language is not English) must submit official test scores on the Test of English as a Foreign Language (TOEFL) of at least 550 on the written test or 220 on the computer-based test or a score of at least 85% on the Michigan English Language Assessment Battery (MELAB). All tests must have been taken within the past two years

The following are recommended admissions requirements:

- 1) Completed undergraduate degree with a GPA of 3.0 or above
- 2) Completion of statistics and research methodology courses
- 3) Research experience

Degree Requirements

Outlined below are the requirements of the Ph.D. in Organizational Science program. Additional detail on all can be found in the *Organizational Science Graduate Handbook*.

- 1) 77 credit hours (post baccalaureate) are required
- 2) Graduate students must have a 3.0 GPA in the courses on their degree plan of study in order to graduate. More than two grades of C or one U will result in termination from the program
- 3) Students who have taken graduate coursework but have not earned graduate degrees may transfer in up to six credit hours of coursework. Students who have earned master's degrees may transfer up to thirty credit hours
- 4) Beyond the 30 hours that students with a Master's degree can transfer into the program, all coursework that will count toward the Ph.D. will be 6000-level or above. The majority of the coursework will be at the 8000 level
- 5) Master's thesis or Independent Pre-Doctoral Research Project is required
- 6) A qualifying exam is required. Failure to pass the qualifying examination after two attempts will result in termination from the Graduate Program
- 7) A Dissertation is required
- 8) An organizational science practicum is optional
- 9) Each year, a student will have a performance appraisal assessment
- 10) A student may choose a disciplinary "emphasis" (e.g., an emphasis in Business, Sociology, Psychology, or Communication Studies). An emphasis includes three discipline-specific courses. A disciplinary emphasis would provide an opportunity for a student to combine

interdisciplinary training with a core disciplinary specialization. Students preparing for careers in academia may benefit most from having such an emphasis. Students may choose to not have an "emphasis" and instead take electives that span across all disciplines. Program director approval is needed in order to count a course toward an emphasis

- 11) A student can consider co-enrolling in other MA programs at UNC Charlotte
- 12) Students must complete their degree, including dissertation, within eight years

Curriculum

The curriculum has 2 major curricular components: (1) Core Organizational Science and Research, (2) Electives/Advanced Seminars, and (3) Dissertation Research.

Core Organizational Science and Research Courses (41 credit hours)

- OSCI 8000 Organizational Science Overview (3)
- OSCI 8001 Current Topics and Events in Organizational Science (1) (*7 required; if OS overview does not include a lab, 8 credit hours will be required*)
- OSCI 8100 Organizational Science Lab (1-2)
- OSCI 8102 Research Methodologies in Behavioral Sciences (3)
- OSCI 8103 Basic Quantitative Analyses for Behavioral Sciences (3)
- OSCI 8206 Qualitative Research Methods (3)
- OSCI 8208 Advanced Qualitative Data Analysis (3)
- OSCI 8610 Micro Organizational Science I (3)
- OSCI 8611 Macro Organizational Science I (3)
- OSCI 8620 Micro Organizational Science II (3)
- OSCI 8621 Macro Organizational Science II (3)
- OSCI 8948 Independent Pre-Doctoral Organizational Science Research Project I (3)
- OSCI 8949 Independent Pre-Doctoral Organizational Science Research Project II (3)

Elective Courses (18 credit hours)

Select from the following:

- OSCI 8002 Ethics and Professional Issues in Organizational Science (2)
- OSCI 8003 Writing & Publishing in Organizational Science (1 or 2)
- OSCI 8130 Social Psychology (3)
- OSCI 8207 Psychometrics (3)
- OSCI 8630 Micro Seminar in Organizational Science (3) (*repeated up to 3 times*)
- OSCI 8640 Macro Seminar in Organizational Science (3) (*repeated up to 3 times*)
- OSCI 8650 Research Methods Seminar in Organizational Science (3) (*repeated up to 3 times*)

Other Options

OSCI 8899 Organizational Science Readings and Research (1-3) *(maximum of 6 credit hours can count for this elective unless approved by the Director; however, there is no limit on the amount of readings and research credits a student can take)*

Content (e.g., strategy, decision making) or methods courses (multivariate, social networking, categorical methods, SEM, longitudinal) outside of OS that have approval of the program director can also serve as electives. These “outside” courses will typically originate from the Departments of Psychology, Sociology, Communication Studies, and the College of Business. They must be at the 6000 or 8000 level.

Dissertation Research (18 credit hours)

OSCI 8998 Organizational Science Dissertation I (6)

OSCI 8999 Organizational Science Dissertation II (6)

Additional Elective Research Courses

Students may take additional credit hours of OSCI 8998 or OSCI 8999, or use up to 6 credit hours from OSCI 8899 to fulfill the remaining 6 credit hours of the 18 credit hour requirement for dissertation research.

OSCI 8998 Organizational Science Dissertation I (6)

OSCI 8999 Organizational Science Dissertation II (6)

OSCI 8899 Organizational Science Readings and Research (1-3)

COURSES IN ORGANIZATIONAL SCIENCE (OSCI)

OSCI 8000. Organizational Science Overview. (3)

Cross-listed as PSYC 6000. Prerequisites: Full graduate standing in the Ph.D. in Organizational Science program or permission of instructor. Provides broad overview of the field of Organizational Science including its historical foundations. Each week is a mini-seminar on a particular topic within the field.

OSCI 8001. Current Topics and Events in

Organizational Science. (1) Cross-listed as PSYC 6001. Prerequisites: Full graduate standing in the Ph.D. in Organizational Science program or permission of instructor. New and innovative research and practice topics related to Organizational Science will be discussed / delivered / facilitated by student researchers, faculty and invited speakers. These “cutting edge” topics will span all of micro and macro organizational science and will change each semester. *Graded on a Pass/Unsatisfactory basis. May be repeated for credit.*

OSCI 8002. Ethics and Professional Issues in Organizational Science. (2)

Cross-listed as PSYC 6002. Prerequisites: Full graduate standing in the Ph.D. in Organizational Science program or permission of instructor. Discusses ethical standards in professional practice, testing, research; business ethics; expectations and problems confronting organizational science practitioners in industrial and professional organizations.

OSCI 8003. Writing and Publishing in Organizational Science. (1-2)

Cross-listed as PSYC 6003. Prerequisites: Full graduate standing in the Ph.D. in Organizational Science program or permission of instructor. Seminar to enhance effective technical/scientific writing (e.g., learning APA style, presentation of statistical analyses) and understanding the publication process (e.g., selecting an appropriate outlet, preparing a manuscript, the review process). Students will actively engage in writing as well as the review process (as both a reviewer and author).

OSCI 8100. Organizational Science Lab. (1-2)

Prerequisites: Full graduate standing in the Ph.D. in Organizational Science program or permission of instructor and co-enrollment in OSCI 8000. Special topics seminar connected with the Organizational Science Overview course (typically taught by the same instructor). Topics cover the field of Organizational Science. Science/practice/research issues emphasized. The instructor determines whether the course is taken for a letter grade or Pass/Unsatisfactory.

OSCI 8102. Research Methodologies in Behavioral Sciences. (3)

Cross-listed as PSYC 8102. Prerequisite: Admission to the Ph.D. in Organizational Science program, or by permission of instructor. This interdisciplinary course provides a broad overview of the major research methodologies and methodological considerations in the behavioral sciences. Using examples drawn from the literature, the course focuses on general principles and perspectives of social science research. Topics include: foundational concepts across the behavioral sciences (e.g., sampling, measurement, ethics, logic of hypothesis testing, etc.), and the evaluation of specific methodologies (e.g., experimentation, observation, survey, archival, epidemiological/ecological designs, etc.). Practical research considerations are also covered (e.g., basics of APA writing, IRB process and forms, data management and data cleaning, development of experimental protocols, etc.).

OSCI 8103. Basic Quantitative Analyses for Behavioral Sciences. (3)

Cross-listed as PSYC 8103. Prerequisite: OSCI 8102. Introduction to quantitative data analysis and interpretation. Focuses on the strategic application of the multiple regression and

correlational framework (including specific instantiations such as ANOVA, path analyses, etc.) including the incorporation of manipulated or categorical independent and categorical dependent variables.

OSCI 8104. Advanced Quantitative Analyses for Behavioral Sciences. (3) Cross-listed as PSYC 8104. Prerequisite: OSCI 8103 or equivalent; admission to the Ph.D. in Organizational Science program; or permission of instructor. A topical course that focuses on selected advance quantitative analyses used within behavioral sciences. Topics may include: survival analysis, repeated measures analyses, latent model analyses, multi-level modeling, advanced categorical variable analyses, meta-analysis. *May be repeated for credit with change of topic.*

OSCI 8130. Social Psychology. (3) Cross-listed as PSYC 6130. Prerequisites: Full graduate standing in the Ph.D. in Organizational Science program or permission of instructor. Human social behavior; topics include affiliation, person perception, conformity and attitudes.

OSCI 8205. Field and Lab Based Quantitative Research Methods. (3) Cross-listed as PSYC 6205. Prerequisites: Full graduate standing in the Ph.D. in Organizational Science program or permission of instructor. Examines quantitative approaches to Organizational Science research such as experimental designs, quasi-experimental designs, organizational surveys, longitudinal models and field research.

OSCI 8206. Qualitative Research Methods. (3) Cross-listed as PSYC 6206. Prerequisites: Full graduate standing in the Ph.D. program in Organizational Science or permission of instructor. Examines qualitative approaches to Organizational Science research such as focus groups, verbal protocol, interviewing, naturalistic observation, and content analysis.

OSCI 8207. Psychometrics. (3) Prerequisite: Full graduate standing in the Ph.D. in Organizational Science program or permission of instructor. Presents an introduction to classical and modern test theory and methods. Theoretical and statistical bases for the measurement of psychological constructs are covered including Classical True Score Theory, reliability and validity inferences, item response theory, scaling, and an introduction to factor analysis.

OSCI 8208. Advanced Qualitative Data Analysis. (3) Prerequisite: OSCI 8206 or permission of instructor. This course extends the foundational approaches presented in OSCI 8206 to provide advanced instruction on the assumptions, contingencies, techniques, and practices of computer-supported

qualitative data analysis systems (CAQDAS). Students will work with several advanced software packages that facilitate the management, analysis, and display of qualitative data.

OSCI 8477. Organizational Science Practicum. (1-6) Prerequisites: Full graduate standing in the Ph.D. in Organizational Science program or permission of instructor. Practical experience/Internship in an organizational setting. With permission from the program director, a research assistantship on a grant can fulfill this requirement. *Graded on a Pass/Unsatisfactory basis. May be repeated for credit.*

OSCI 8610. Micro Organizational Science I. (3) Cross-listed as PSYC 6610. Prerequisites: Full graduate standing in the Ph.D. in Organizational Science program or permission of instructor. Examines research, theory and application regarding individual differences (e.g., abilities, personality), assessment (e.g., tests, inventories, interviews, assessment centers), criterion development (e.g., job analysis, performance models) and organizational staffing processes (i.e., recruitment, selection, basic legal concepts).

OSCI 8611. Macro Organizational Science I (3) Cross-listed as PSYC 6611. Prerequisite: Full graduate standing in the Ph.D. in Organizational Science program or permission of instructor. Examines research, theory and application on the following topics: motivation, communication systems and processes, stress, job design, leadership, employee attitudes and emotions, teamwork, and decision making.

OSCI 8620. Micro Organizational Science II. (3) Cross-listed as PSYC 6620. Prerequisite: Full graduate standing in the Ph.D. in Organizational Science program or permission of instructor. Examines research, theory and application regarding post-entry personnel issues such as training, performance management, performance appraisal, compensation, and employee socialization.

OSCI 8621. Macro Organizational Science II. (3) Cross-listed as PSYC 6621. Prerequisites: Full graduate standing in the Ph.D. in Organizational Science program or permission of instructor. Examines research, theory and application on the following topics: organizational development, organizational change, organizational climate, organizational culture, organizational theory, and relations between organizations and their environment.

OSCI 8630. Micro Seminar in Organizational Science. (3) Prerequisites: Full graduate standing in the Ph.D. in Organizational Science program or

permission of instructor. Examination of special topic(s) germane to Micro Organizational Science. The seminar may focus on one or a small number of topics salient to this area. Extensive reading and discussion of topics from multiple perspectives. *May be repeated for credit with change of topic.*

OSCI 8640. Macro Seminar in Organizational Science. (3) Prerequisite: Full graduate standing in the Ph.D. in Organizational Science program or permission of instructor. Examination of special topic(s) germane to Macro Organizational Science. The seminar may focus on one or a small number of topics salient to this area. Extensive reading and discussion of topics from multiple perspectives. *May be repeated for credit with change of topic.*

OSCI 8650. Research Methods Seminar in Organizational Science. (3) Cross-listed as PSYC 6650. Prerequisites: Full graduate standing in the Ph.D. in Organizational Science program or permission of instructor. Examination of special topic(s) germane to research methods in Organizational Science. The seminar may focus on one or a small number of topics that define this area (e.g., a data analytic technique, a methodological approach). Extensive reading and discussion of topics from multiple perspectives. *May be repeated for credit.*

OSCI 8899. Organizational Science Readings and Research. (1-3) Prerequisites: Full graduate standing in the Ph.D. in Organizational Science program or permission of instructor. Research and/or reading on a topic agreed on by a student and a faculty member. These elective hours may also be used toward the Graduate School's 18-credit hour dissertation research requirement once 12 dissertation credit hours (6 from OSCI 8998 and 6 from OSCI 8999) are met. *Graded on a Pass/Unsatisfactory basis. May be repeated for credit.*

OSCI 8948. Independent Pre-Doctoral Organizational Science Research Project I. (3) Prerequisites: Full graduate standing in the Ph.D. in Organizational Science program or permission of instructor. Identification of a focused research question and development of a research proposal comparable in scope to a Master's thesis. Conducted under the direction of a research chair and committee. *Graded on a Pass/Unsatisfactory basis. May be repeated for credit.*

OSCI 8949. Independent Pre-Doctoral Organizational Science Research Project II. (3) Prerequisites: OSCI 8948 and Full graduate standing in the Ph.D. in Organizational Science program or permission of instructor. Research and defense of on an Independent Pre-Doctoral Research Project

conducted under the direction of a research chair and committee. *Graded on a Pass/Unsatisfactory basis. May be repeated for credit.*

OSCI 8998. Organizational Science Dissertation I. (6) Prerequisites: Full graduate standing in the Ph.D. in Organizational Science program or permission of instructor. Identification of a research question and development of the proposal for a research study appropriate a dissertation project. Conducted under the direction of a research chair and committee. *Graded on a Pass/Unsatisfactory basis. May be repeated for credit.*

OSCI 8999. Organizational Science Dissertation II. (6) Prerequisites: OSCI 8998 and Full graduate standing in the Ph.D. in Organizational Science program or permission of instructor. Research and defense of on an Independent Dissertation Project conducted under the direction of a research chair and committee. *Graded on a Pass/Unsatisfactory basis. May be repeated for credit.*

Physics

• M.S. in Applied Physics

Department of Physics and Optical Science

physics.uncc.edu

Graduate Program Director

Dr. Donald Jacobs

Graduate Faculty

Dr. Ishwar D. Aggarwal, Research Professor
 Dr. Yildirim Aktas, Associate Professor
 Dr. Vasily N. Astratov, Associate Professor
 Dr. Glenn D. Boreman, Professor
 Dr. Angela Davies, Professor
 Dr. Faramarz Farahi, Professor
 Dr. Michael A. Fiddy, Professor
 Dr. Nathaniel Fried, Professor
 Dr. Greg Gbur, Professor
 Dr. Tsing-Hua Her, Associate Professor
 Dr. Donald Jacobs, Professor
 Dr. Yuri Nesmelov, Assistant Professor
 Dr. Irina Nesmelova, Associate Professor
 Dr. Manelaos K. Poutous, Assistant Research Professor
 Dr. M. Yasin Akhtar Raja, Professor
 Dr. Thomas J. Suleski, Professor
 Dr. Susan R. Trammell, Associate Professor

MASTER OF SCIENCE IN APPLIED PHYSICS

The Applied Physics degree program is excellent preparation for those planning to continue their education through the Ph.D., either in physics or an engineering field, or for a career as an instructor in a two-year college. Students electing the Thesis Option will be well qualified for employment in industry or in a research laboratory.

Students have opportunities for research in Biophysics, Computational Physics, Medical Physics, and Optics. The major research emphasis in the department is in the area of applied optics. The Department of Physics and Optical Science is the administrative coordinator of M.S. and Ph.D. programs in Optical Science and Engineering. These degree programs are interdisciplinary involving five science and engineering departments (Physics & Optical Science, Chemistry, Mathematics & Statistics, Electrical & Computer Engineering, and Mechanical Engineering & Engineering Science), the Center for Optoelectronics & Optical Communications, and the Center for Precision Metrology. A second area of emphasis is in biophysics, where there is a strong interdisciplinary relationship with the Ph.D. programs

in Nanoscale Science, Biology, Bioinformatics and Computational Biology, and Applied Mathematics. The M.S. in Applied Physics program emphasizes basic and applied interdisciplinary education and research in many diverse areas that include:

- Statistical and computational physics
- Biological molecular motors
- Protein folding, stability, and dynamics
- Structural-based drug discovery
- Nuclear molecular resonance spectroscopy
- Observational astronomy
- Micro-optics and nanophotonics
- Fiber and integrated optics
- Optoelectronic materials and devices
- Biomedical optics
- Optical interferometry and metrology
- Optical fabrication
- Nanoscale imaging and spectroscopy
- Adaptive optics
- Optical communication
- Novel light-matter interactions
- Quantum optics
- Optical sensors and measurements

A complete description of the programs and course offerings in Optical Science and Engineering can be accessed online at optics.uncc.edu and under the "Optical Science and Engineering" heading in this section of the *Catalog*.

Additional Admission Requirements

In addition to fulfilling the University's general requirements for graduate admission at the Master's level, applicants seeking admission into the M.S. in Applied Physics program must also:

- 1) Possess a Bachelor's degree in Physics, or a closely allied field, from an accredited college or university. Applicants from fields other than Physics may expect to be required to remove deficiencies in their physics background.
- 2) Present satisfactory scores on the aptitude portion of the Graduate Record Examination.
- 3) Possess an overall grade point average of at least 2.75 (based on a 4.0 scale) on all of the applicant's previous work beyond high school. The average in the major should be 3.0 or above.
- 4) Present satisfactory scores on the Test of English as a Foreign Language, if the applicant is from a non-English speaking country.
- 5) Demonstrate evidence of sufficient interest, ability, and preparation in physics to adequately profit from graduate study, as determined by the Physics Department's Graduate Committee.

Degree Requirements

The M.S. in Applied Physics requires the completion of 30 credit hours approved by the Department of Physics and Optical Science. A minimum of 15 credit hours presented for the degree must be in courses numbered 6000 and above.

At the time of admission, up to 6 credit hours of graduate transfer credit may be accepted if approved by the Department of Physics and Optical Science and the Graduate School.

Students may, with departmental approval, apply up to 9 credit hours in non-cross-listed courses from graduate programs in related areas such as Bioinformatics, Biology, Chemistry, Engineering, Mathematics, and Nanoscale Science toward the 30 credit hour degree requirement.

All candidates for the degree must pass a final examination administered by their Advisory Committee.

Prerequisite Courses

Entering students not having the equivalent of PHYS 4222, PHYS 4232, or PHYS 4242 are required to take PHYS 5222, PHYS 5232, and/or PHYS 5242, as appropriate, before the end of their first year of residence. Courses for which undergraduate credit has been awarded may not be repeated for graduate credit.

Concentrations

There are two concentrations within the M.S. in Applied Physics program that include both thesis and non-thesis degree options:

- 1) Applied Physics Concentration (*Thesis or non-thesis option*)
- 2) Applied Optics Concentration (*Thesis option only*)

Thesis Option

The thesis defense is the final examination for students selecting the thesis option. Students selecting a concentration with a thesis option must present credit of at least 3 credit hours for each of the following courses:

PHYS 6991 Physics Thesis Research I (3)
PHYS 6992 Physics Thesis Research II (3)

Non-Thesis Option

Students selecting the non-thesis option must pass a final examination administered by their Advisory Committee. Example questions relating to subject matter for the examination are prepared by the Advisory Committee and given to students at least 30 days prior to the examination date. Students prepare

responses to these questions and make an oral presentation to members of the Committee that is based upon the prepared responses. Committee members may question students on any and all aspects of the relevant test material.

Grade Requirements

A minimum grade point average of 3.0 is required on all coursework attempted for the degree.

Admission to Candidacy

In addition to the general requirements for admission to candidacy, students enrolled in the Master of Science program in Applied Physics program should have:

- 1) Removed all identified entrance deficiencies by the time of application for admission to candidacy
- 2) Completed at least 18 approved credit hours with a GPA of 3.0 or above
- 3) Selected a major advisor and formed an advisory committee

Advisory Committee

Each student in the M.S. in Applied Physics Program must have a major advisor and an advisory committee. The student should select a major advisor before the end of the first year of residency. The student and the major advisor jointly determine the advisory committee. The advisory committee must have at least 3 members, the majority of which must be from the Department of Physics and Optical Science. The major advisor and the advisory committee must be in place prior to applying for degree candidacy.

Assistantships

Support for beginning graduate students is usually a teaching assistantship. Continuing students are often supported by research assistantships.

COURSES IN PHYSICS (PHYS)

Any physics course at the 5000- or 6000-level can be applied to the 30-hour requirement. Any other courses to be applied toward the 30-hour-course requirement must be approved, in advance, by the Department of Physics and Optical Science. Courses approved by the department as appropriate for meeting the 30-hour-degree requirement are listed below. A minimum of 15 credit hours must be in courses with a 6000 number.

PHYS 5000. Selected Topics in Physics. (0-4)

Prerequisite: Permission of instructor. Selected

advanced topics in physics. *May be repeated for credit with permission of department.*

PHYS 5220. Computational Methods in Physics. (3)

Prerequisite: Permission of instructor. Use of computers in solving physics problems including computational and mathematical methods to solve problems in classical mechanics, quantum mechanics, electromagnetism, nuclear physics, optics, and solid state physics. Computer solutions include numerical methods of integration, solving differential equations, curve fitting, and statistical analysis in physics.

PHYS 5222. Classical Mechanics II. (3) Prerequisite: PHYS 3121 and MATH 2241. Continuation of PHYS 3121. The second course of a two-semester sequence treating particle dynamics, the motion of systems of particles, rigid body motion, moving coordinate systems, Lagrange's equations, Hamilton's equations, and small oscillations. Three lecture hours a week.

PHYS 5232. Electromagnetic Theory II. (3)

Prerequisite: PHYS 4231. Continuation of PHYS 4231. The second course in a two-semester sequence. Topics include: magnetostatics in free space and in matter, electromagnetic induction, vector and scalar potentials, magnetic properties of materials, Maxwell's equations in free space and in matter, propagating electromagnetic waves, and boundary value problems. Three lecture hours a week.

PHYS 5242. Modern Physics II. (3) Prerequisite: PHYS 4241. An extension of PHYS 4241 to include more advanced topics such as generalized eigenvalue problems, angular momentum, spin, the hydrogen atom, and perturbation theory, with selected applications from atomic, solid state, and nuclear physics. Three lecture hours a week.

PHYS 5271. Waves and Optics. (3) Cross-listed as OPTI 5371. Prerequisites: PHYS 2102 with a grade of C or above, and MATH 2171; or permission of instructor. Topics include: the mathematics of wave motion, light as an example of an electromagnetic wave, the superposition of periodic and non-periodic waves, and selected topics from geometrical and physical optics.

PHYS 5350. Teaching and Learning Physics. (3)

Prerequisites: PHYS 2102 or permission of instructor. A course on how people learn and understand key ideas related to physics. Course focus includes physics content, pedagogical methods and curriculum, cognitive science, and physics education research. Course includes opportunities for teaching and individualized projects.

PHYS 6000. Selected Topics in Physics. (0-4)

Prerequisite: Permission of instructor. Selected advanced topics in physics. *May be repeated for credit with permission of department.*

PHYS 6101. Biophysics. (3) Prerequisite: Permission of instructor. Principles of physics relevant to biological media; electrical activity, optical microscopy, and spectrophotometry. Photosynthesis and light absorption. Models of blood flow and the cardiovascular system. Dynamics of membrane lipids and ionic flow. Visual and audio systems. Radiation biophysics, ultrasonic interaction in biological media. Credit cannot be awarded for both PHYS 6101 and 8101.

PHYS 6121. Classical Dynamics. (3) Prerequisite: PHYS 4222. Variational principles and Lagrange's equations. Hamilton's principles and mechanics of particles. The two-body central force problem. Rigid body motion. Small oscillations and the eigenvalue equation.

PHYS 6131. Classical Electromagnetism I. (3)

Prerequisite: PHYS 4232. Electrostatic and boundary value problems. Multipole expansions, dielectrics and magnetostatics. Maxwell's equations, time varying fields and conservation laws. Plane electromagnetic waves and wave propagation. Wave guides and resonant cavities. Simple radiating systems. Scattering and diffraction theory.

PHYS 6132. Classical Electromagnetism II. (3)

Prerequisite: PHYS 6131. Special theory of relativity. Dynamics of relativistic particles and electromagnetic fields. Charged particle collisions and scattering. Radiation by moving charges. Bremsstrahlung, virtual quanta, and beta decay theory. Multipole expansions and fields. Radiation damping. Self-fields of particles. Scattering and absorption of radiation by a bound system.

PHYS 6141. Quantum Theory I. (3) Cross-listed as OPTI 6341 and OPTI 8341. Prerequisite: PHYS 4242. Principles of non-relativistic wave mechanics. The Schrodinger equation, linear harmonic oscillator and WKB approximation. Central forces and angular momentum. The hydrogen atom.

PHYS 6142. Quantum Theory II. (3) Prerequisite: PHYS 6141. Scattering theory, linear vector spaces, spin, two level systems. Quantum dynamics, symmetry operations, bound state and time-dependent perturbation theory. Theory of scattering, angular momentum, and identical particles.

PHYS 6201. Fourier Optics. (3) Prerequisite: PHYS 4271 or permission of instructor. Principles of scalar, Fresnel, and Fraunhofer diffraction theory. Coherent

optical imaging systems, optical filtering, optical data processing, and holography. Application of Fourier optics and holography.

PHYS 6202. Fundamentals of Biomedical Optics. (3)

Cross-listed as OPTI 6202. Basic principles underlying tissue optics, laser-tissue interactions, and optical imaging, microscopy, and spectroscopy for medical applications.

PHYS 6203. Methods of Molecular Modeling and Simulation in Physics. (3) Prerequisite: Permission of instructor. Numerical methods. Atomic models of soft-matter systems: liquids, polymers, and biomolecules. Molecular dynamics and Monte Carlo methods. Inter-particle potentials. Methods of efficient conformational sampling. Free energy calculations. Introduction to fundamental methods of molecular simulations designed to characterize and predict properties of microscopic systems in materials, physics, and biology. Classical simulations and their connection to experimentally measurable properties. (*Spring, On demand*)

PHYS 6210. Theoretical Physics. (3) Prerequisite: Permission of department. Topics include: Matrices, power series, solutions to ordinary and partial differential equations, Hilbert space, Fourier integrals, boundary value problems, Green's functions, and complex analysis.

PHYS 6211. Introduction to Modern Optics. (3) Prerequisite: PHYS 4271 or permission of department. Theory of laser oscillation, optical resonators, interaction of radiation and atomic systems, giant pulsed lasers, laser systems. Wave propagation in nonlinear media, modulation of optical radiation, noise in optical detection and generation. Interaction of light and sound. Laser types and applications including the free-electron laser.

PHYS 6220. Computational Methods in Physics. (3) Prerequisite: PHYS 6210. Use of computers in solving physics problems including computational and mathematical methods to solve problems in classical mechanics, quantum mechanics, electromagnetism, nuclear physics, optics, and solid state physics. Computer solutions include numerical methods of integration, solving differential equations, curve fitting, and statistical analysis in physics.

PHYS 6221 Optical Communications I. (3)

Prerequisite: Prerequisites: PHYS 4242, PHYS 6241, or ECGR 5165. Introduction to optical communications. Optical waveguides (attenuation, dispersions, etc.). Basic communication blocks such as lasers, optical modulators, and optical transceivers. Passive and active photonic components such as tunable lasers, optical amplifiers, SOAs, I-converters,

and filters. Coherent and incoherent detection. Signal processing, photonic switching, and point-to-point connections. Three lecture hours per week.

PHYS 6241. Light Sources and Detectors. (3)

Prerequisite: PHYS 4241 or permission of department. Wave nature of light, basic semiconductor properties, light sources, light detectors and modulators, optical waveguides, optical systems with applications, and selected topics in nonlinear optics.

PHYS 6251. Statistical Physics. (3) Prerequisite: Permission of instructor. Classical and quantum statistical mechanics. Statistical thermodynamics. Ensembles, partition functions, fluctuations, ideal Fermi and Bose gas systems.

PHYS 6261. Nuclear Physics. (3) Prerequisite: Permission of instructor. A study of the nucleus, radioactivity, nuclear reactions, fission, fusion, interactions of radiation with matter and measurement of radiation.

PHYS 6271. Advanced Solid State Physics. (3) Cross-listed as OPTI 6371 and OPTI 8371. Prerequisite: Permission of instructor. Crystal structure. Electromagnetic, electron, mechanical, and elastic wave interactions with crystals. Theory of X-ray diffraction. Energy band theory of metals and semiconductors. Optical properties of solids, phase transitions, and amorphous solids. Quantum mechanics of covalent bonding, phonon excitation, and thermal energy.

PHYS 6281. Modern Optics Laboratory. (3)

Prerequisite: PHYS 3281 or permission of instructor. Selected experiments in such modern optics areas as fiber optics, holography, spectroscopy, and Fourier optics. Six laboratory hours each week.

PHYS 6991. Physics Thesis Research I. (1-3)

Prerequisite: admission to candidacy and permission of instructor. Research for the thesis. Letter grade assigned. *May be repeated for credit up to 6 credits.*

PHYS 6992. Physics Thesis Research II. (1-4)

Prerequisite: PHYS 6991 and permission of instructor. Research for the thesis. *Graded on a Pass/Unsatisfactory basis. May be repeated for credit up to 4 credits.*

Psychology

- **M.A. in Psychology**
- **M.A. in Industrial/Organizational Psychology**

Department of Psychology

psych.uncc.edu

Graduate Program Directors

Dr. Eric Heggstad, M.A. in Industrial/Organizational Psychology program

Dr. Richard Tedeschi, M.A. in Psychology program

Graduate Faculty

Dr. Laura Armstrong, Assistant Professor

Dr. Fary M. Cachelin, Professor

Dr. James R. Cook, Professor

Dr. George Demakis, Professor

Dr. Ryan Kilmer, Professor

Dr. Richard D. McAnulty, Associate Professor

Dr. Amy Peterman, Associate Professor

Dr. Richard Tedeschi, Professor

Dr. Jennifer Webb, Associate Professor

Industrial/Organizational Psychology

Dr. Alyssa McGonagle, Assistant Professor

Dr. Anita Blanchard, Associate Professor

Dr. Eric Heggstad, Associate Professor

Dr. Steven Rogelberg, Professor

Dr. Enrica Ruggs, Assistant Professor

Dr. Linda Shanock, Professor

Other Members of the Graduate Faculty

Dr. Jeanette Bennett, Assistant Professor

Dr. Kim Buch, Professor

Dr. Amy Canevello, Assistant Professor

Dr. Andrew Case, Assistant Professor

Dr. Mark Faust, Associate Professor

Dr. Jane F. Gaultney, Professor

Dr. Virginia Gil-Rivas, Associate Professor

Dr. Susan K. Johnson, Professor

Dr. Sara Levens, Assistant Professor

Dr. Albert A. Maisto, Professor

Dr. Charlie Reeve, Professor

Dr. Victoria Scott, Assistant Professor

Dr. W. Scott Terry, Professor

Dr. Lori Van Wallendael, Associate Professor

MASTER OF ARTS IN PSYCHOLOGY

The objective of the M.A. in Psychology program is to train psychologists in the knowledge and skills necessary to address problems encountered in modern living. The program provides a foundation in

the research methods and content of basic psychology as well as excellent preparation for doctoral programs in psychology. The relatively small, competitively selected student body receives individual attention from faculty members who maintain rigorous standards of academic excellence.

Additional Admission Requirements

To be considered for admission, a student must present the following requirements in addition to those required by the Graduate School:

- 1) Completed application by March 1
- 2) 18 credit hours of undergraduate psychology including Introductory Psychology & Research Methods
- 3) An undergraduate course in statistics
- 4) Acceptable scores on the Verbal and Quantitative GRE

Admission to the program is very competitive for the spaces available each year. Most students who are admitted have much better records than the minimum required. The primary application deadline is March 1 for admission in the Fall semester, but if space is still available, late applications will be considered until May 1.

Degree Requirements

The program requires at least 30 credit hours of graduate coursework. Full-time students should be able to complete the program in two calendar years. A thesis is required.

Core Courses (18-21 credit hours)

Methodology Courses (6 credit hours)

Select one of the following options:

Option A (Health):

PSYC 8102 Research Design and Quantitative Methods in Psychology (3)

PSYC 8103 Basic Quantitative Analyses for Behavioral Sciences (3)

Option B (Community):

PSYC 6205 Field and Lab Based Quantitative Research Methods (3)

PSYC 6145 Applied Research Design & Program Evaluation (3)

Option C (Cognition):

Courses in research methods approved by student's thesis committee

Ethics Courses (2-3 credit hours)

Select one of the following:

PSYC 6107 Ethical and Professional Issues in Psychology (3)

PSYC 8107 Ethical and Professional Issues in Psychology (3)

PHIL 6240 Research Ethics in the Biological and Behavioral Sciences (3)

PHIL 8240 Research Ethics in the Biological and Behavioral Sciences (3)

Specialty Area Courses (6-9 credit hours)

Select one of the following options:

Option A (Health):

PSYC 6200 Health Psychology (3)

or PSYC 8200 Health Psychology (3)

PSYC 6202 Health Psychology II (3)

or PSYC 8201 Health Psychology II (3)

Option B (Community):

Select three of the following:

PSYC 6155- Community Psychology (3)

PSYC 6255 Community Interventions (3)

PSYC 6355 Community Research Practicum (3)

PSYC 6455 Practicum in Community Psychology (3)

Option C (Cognition):

Select two of the following:

PSYC 5316 Cognitive Neuroscience (3)

PSYC 6115 Sensation and Perception (3)

PSYC 6116 Cognition (3)

Thesis Course (3 credit hours)

PSYC 6999 Thesis (1-3)

Thesis committees shall have at least 3 members. At least one member should be a member of the psychology faculty. The committee must be approved by the student's advisor and the program director. After submitting the formal written proposal to the committee, a proposal defense will be scheduled. Approval of the thesis proposal by the committee must be unanimous. Following a successful proposal, the student shall execute the study, write and submit the complete thesis to the committee. An oral defense in front of the committee shall then be scheduled. Approval of the completed thesis by the committee must be unanimous.

Elective Courses (9-12 credit hours)

A minimum of 9-12 elective credit hours selected in consultation with the student's Advisory Committee is required.

Hours beyond the required 30 credit hours of graduate course work may be required by the academic advisor and the student's advisory committee. The faculty conduct a thorough review of student performance on a regular basis. Continuation in the program is contingent upon a favorable review during these evaluations. Students who consistently show borderline course performance, who fail to complete coursework in a timely basis, or who otherwise perform unprofessionally or unsatisfactorily,

may be required to complete additional courses or may be removed from the program. The enrollment of a student who receives three grades of C or one Unsatisfactory (U) grade during his or her graduate career is automatically terminated.

Assistantships

A variety of resources are available for financial assistance. These include teaching assistantships, research assistantships from faculty grants, and graduate assistantships in other campus units such as the Learning Center and Disability Student Services.

Research Experiences

Students are encouraged to become involved in ongoing research in the department, and they are required to complete a thesis.

MASTER OF ARTS IN INDUSTRIAL/ORGANIZATIONAL PSYCHOLOGY

The objective of UNC Charlotte's nationally recognized master's degree program in Industrial/Organizational (I/O) Psychology is to provide students with the knowledge and skills necessary to improve the world of work from both an employee and organizational point of view. The program and its curriculum are built on five key foundational elements: Leadership, Organizational Change and Development, Talent, Culture/Climate, and Analytics. The program provides these foundations in the context of science-driven practice. Specifically, students are provided with a strong foundation in (a) reading, understanding and applying the science of I/O Psychology to solve organizational problems and (b) collecting, critically evaluating, and statistically examining data to support organizational decision-making. Students receive individual attention from faculty members who maintain rigorous standards of academic excellence.

Working Professionals

The program is designed to be accessible for working professionals. Courses are offered in the evenings and on weekends so that individuals who work full-time can complete the program. The program is ideal for people working in an I/O-related field, such as in a Human Resources function within an organization, who are looking for a degree that will allow them to expand their career options. The program is also appropriate for working individuals looking to change careers and for individuals who have just completed an undergraduate degree. Work in an I/O-related career is not required for admittance into the program.

Advisory Board

An Advisory Board has been established for the I/O Program. The Board, made up of leading I/O psychologists and human resource professionals working in the Charlotte Community (see the department website for a list of current Board members), provides regular reviews and evaluations of the programs' curriculum to ensure that course content addresses current topics and issues facing I/O psychologists working in the business community. The Board also plays a key role in identifying business leaders in the community who can provide information or guidance to students.

Admission Requirements

The Graduate School requires that applicants submit scores from the Graduate Record Exam (GRE), Graduate Management Admission Test (GMAT), or Miller Analogies Test (MAT). The I/O program will accept scores from any one of these tests.

The Graduate School also requires two letters of recommendation. Working professionals who received a bachelor's degree more than five years ago are suggested to seek out recommenders who can speak to their capabilities and potential as an I/O or HR professional (e.g., supervisors, coworkers, individuals with an advanced I/O degree). Applicants who have recently graduated from a bachelor's program, should seek out academic recommenders who can speak to their potential for graduate studies.

Applications must also include a statement of purpose. Minimally, the statement should address: (a) motivation for seeking a degree in I/O psychology, (b) preparation for graduate studies in I/O Psychology, and (c) expectation of how the degree will positively impact your career. Statements should be kept to approximately two pages.

Applicants must also have a bachelor's degree from an accredited university (the Graduate School requires that applicants upload transcripts from each institution attended). While a degree in psychology or business is not required, applicants with backgrounds in these disciplines may be given preferential treatment.

The Graduate School has additional requirements for applications. Please see the Graduate School section of this *Catalog* and/or the website at graduateschool.uncc.edu for additional details.

Admission to the program is competitive. Applicants whose native language is other than English must offer acceptable scores on the Test of English as a Foreign Language (see graduateschool.uncc.edu for what constitutes an acceptable score). Applications should be submitted by February 1 of years that applications

are accepted (applications are accepted on an every other year basis).

Degree Requirements

At least 31 credit hours of graduate coursework is required.

Core Courses

PSYC 6102 Organizational Research Methods (3)
 PSYC 6171 Industrial/Organizational Psychology (3)
 PSYC 6172 Talent Acquisition (3)
 PSYC 6173 Job Attitudes (3)
 PSYC 6175 Organizational Development and Change (3)
 PSYC 6177 Talent Management (3)
 PSYC 6205 Field and Lab Based Quantitative Research Methods (3)
 PSYC 6207 Measurement in Organizations (3)
 PSYC 6630 Topics in Talent Management (3)
 PSYC 6640 Topics in Organizational Psychology (3)
 PSYC 6899 Readings and Research in Psychology (1) *(taken for 1 credit hour if taking the comprehensive exam)*
 or PSYC 6999 Thesis (6) *(taken for 6 credit hours if completing the empirical thesis)*

Additional Information

Courses will be required in the summer between the first and second year in the program.

Students who receive two grades of C or one Unsatisfactory (U) grade during their graduate career are automatically terminated from the program.

Students must complete either a comprehensive examination or orally defend a thesis project. Failure to pass the qualifying exam or the oral defense after two attempts will result in termination from the program.

Additional details about these requirements can be found in the *I/O Psychology Graduate Student Handbook*.

Specialization

Students will be able to pick a specialization track: a thesis research track or a practice track. These tracks allow the student to tailor, in part, their educational experience to their career objectives. The only difference between the tracks is the capstone experience; students choosing the thesis track defend an empirical thesis (and complete 6 credit hours of PSYC 6999), whereas students who choose the practice track complete a standardized comprehensive examination in the summer of year two in the program (and register for 1 credit hour of PSYC 6899). The examination samples content from across the I/O Psychology discipline. A complete

description of the specialization tracks and requirements (including a thorough discussion of the comprehensive exam) can be found in the most recent version of the *I/O Psychology Graduate Student Handbook*.

Practica and Applied Experiences

Students who desire I/O-related work experiences have a wide range of opportunities for applied experiences. These can occur as part of a formal practicum experience (i.e., internships) or more informally through the UNC Charlotte Organizational Science Consulting and Research Unit. While practicum experiences are not required as part of the program, Faculty and Advisory Board members have connections within the local community to help students find relevant experiences.

COURSES IN PSYCHOLOGY (PSYC)

PSYC 5316. Cognitive Neuroscience. (3) Prerequisite: graduate standing or permission of instructor. Biological basis of consciousness and the neurobiology of mental processes by which we perceive, act, learn, and remember; representation of mental processes from electrophysiological and brain imaging techniques, clinical neurology, and computational science.

PSYC 6000. Organizational Science Overview. (3) Cross-listed as OSCI 8000. Prerequisites: Full graduate standing in the I/O psychology graduate program or permission of instructor. Provides broad overview of the field of Organizational Science including its historical foundations. Each week is a mini-seminar on a particular topic within the field.

PSYC 6001. Current Topics and Events in Organizational Science. (1) Cross-listed as OSCI 8001. Prerequisites: Full graduate standing in the I/O psychology graduate program or permission of instructor. New and innovative research and practice topics related to Organizational Science will be discussed/delivered/facilitated by student researchers, faculty and invited speakers. These “cutting edge” topics will span all of micro and macro organizational science and will change each semester. *Graded on a Pass/Unsatisfactory basis. May be repeated for credit.*

PSYC 6002. Ethics and Professional Issues in Organizational Science. (2) Cross-listed as OSCI 8002. Prerequisites: Full graduate standing in the I/O psychology graduate program or permission of instructor. Discusses ethical standards in professional practice, testing, research; business ethics; expectations and problems confronting organizational

science practitioners in industrial and professional organizations.

PSYC 6003. Writing and Publishing in Organizational Science. (1-2) Cross-listed as OSCI 8003.

Prerequisites: Full graduate standing in the I/O psychology graduate program or permission of instructor. Seminar to enhance effective technical/scientific writing (e.g., learning APA style, presentation of statistical analyses) and understanding the publication process (e.g., selecting an appropriate outlet, preparing a manuscript, the review process). Students will actively engage in writing as well as the review process (as both a reviewer and reviewee).

PSYC 6010. Topics in Learning and Cognition. (3) An examination of selected topics in the areas of learning, memory and cognition, and behavior modification, with an emphasis on the applications to the areas of clinical, community and industrial psychology. *May be repeated for credit with permission of department.*

PSYC 6015. Topics in Perception and Physiological Psychology. (3) An examination of selected topics in the areas of sensation and perception, physiological and neuropsychology, with an emphasis on the applications to the areas of clinical, community, and industrial psychology. *May be repeated for credit with permission of department.*

PSYC 6020. Topics in Developmental Psychology. (3) An examination of selected topics in child and adult development, aging, and developmental disabilities, with an emphasis on the applications to the areas of clinical, community, and industrial psychology. *May be repeated for credit with permission of department.*

PSYC 6030. Topics in Social Psychology and Personality. (3) An examination of selected topics in personality and social psychology, with an emphasis on the applications to the areas of clinical, community, and industrial psychology. *May be repeated for credit with permission of department.*

PSYC 6050. Topics in Psychological Treatment. (3) Cross-listed as PSYC 8050. Prerequisite: PSYC 6151. A topical course which will focus on issues in treatment, alternative treatment perspectives, special client populations. *May be repeated for credit with permission of department.*

PSYC 6099. Topics in Psychology. (3) Cross-listed as PSYC 8099. A discussion of selected topics in psychology. *May be repeated for credit with change of topic.*

PSYC 6102. Organizational Research Methods. (3) Prerequisite: Full graduate standing in the I/O

Psychology graduate program. Research design and the application of statistical methods to I/O research, with a specific focus on gathering and evaluating organizational data.

PSYC 6107. Ethical and Professional Issues in Psychology. (3) Cross-listed as PSYC 8107. Roles and responsibilities of psychologists, including ethical standards in professional practice, testing and research; expectations and problems confronting psychologists in industrial, clinical and professional organizations.

PSYC 6111. Psychology of Learning and Memory. (3) Principles, theories and current research in learning with emphasis on human learning and memory.

PSYC 6112. Applied Behavior Analysis. (3) Cross-listed as PSYC 8112. Use of behavior principles in applied settings. Topics include: behavioral assessment, positive and negative reinforcement, punishment, extinction, stimulus control, maintenance and generalization of behavior change. Each student will design and carry out a behavior change project.

PSYC 6113. Physiological Psychology. (3) The relationships between the nervous system and behavior. Topics include: the structure of the nervous system and nerve conduction, the functional organization of the central nervous system, neuronal and hormonal control of behavior, biofeedback and other appropriate topics.

PSYC 6115. Sensation and Perception. (3) Processes involved in receiving and interpreting sensory data including all the sensory systems with an emphasis on vision.

PSYC 6116. Cognition. (3) Concerned with how humans acquire information, retain information in memory, and use this information to reason and solve problems. Current emphases include memory, category learning, planning, concept formation, problem solving, mental models, and knowledge representation.

PSYC 6120. Developmental Psychology. (3) Psychological development across the lifespan.

PSYC 6124. Psychology of Aging. (3) Psychology of aging with particular emphasis on issues related to community/clinical psychology and industrial/organizational psychology. Topics include: myths and stereotypes about aging, problems faced by older workers, retirement, mental health and normal aging, counseling the older adult, and psychological disorders in later life.

PSYC 6130. Social Psychology. (3) Cross-listed as OSCI 8130. Human social behavior; topics include affiliation, person perception, conformity and attitudes.

PSYC 6135. Psychology of Personality. (3) A critical evaluation of major personality theories including an extensive survey of current research.

PSYC 6140. Psychological Measurement and Evaluation. (3) Prerequisite: PSYC 6102. Measurement of psychological characteristics; scaling, reliability, validity and norms; construction and use of the intelligence tests, personality inventories, interest tests, attitude scales, etc., interviewing, survey techniques and behavioral assessment.

PSYC 6141. Intellectual Assessment. (4) Cross-listed as PSYC 8141. Theories of intelligence and methods of intellectual assessment, including practice in administering intelligence tests, interpreting results, and writing evaluation reports. Three lecture hours and one two-hour lab per week.

PSYC 6142. Personality Assessment. (4) Cross-listed as PSYC 8142. Prerequisites: PSYC 6151, PSYC 6141, or permission of department. Theories and methods used in the assessment of personality and psychopathology, including practice in administering personality tests, interpreting results and writing evaluation reports. Three lecture hours and one two-hour lab per week.

PSYC 6145. Applied Research Design and Program Evaluation. (3) Cross-listed as PSYC 8145. Prerequisite: PSYC 6102. Models of evaluative research; also techniques, designs and administration of program evaluation. Topics include: role conflicts, entry issues, goal setting, research for program planning and implementation and examples of actual program design and evaluation.

PSYC 6150. Introduction to Psychological Treatment. (4) Cross-listed as PSYC 8150. Prerequisite: PSYC 6151. Major approaches to psychological intervention, including psychodynamic, behavioral, humanistic and cognitive-behavioral systems. Emphasis on practical therapy considerations, including crisis intervention, client behaviors at various stages of therapy, handling difficult clients and ethical and professional issues. Three lecture hours and one two-hour lab per week.

PSYC 6151. Behavior Disorders. (4) Cross-listed as PSYC 8151. Diagnostic systems in current use and the implications of these systems for psychologists; several perspectives on psychological processes, behavior disorders and diagnosis including psychodynamic, behavioral and social models;

practice in diagnostic interviewing. Three lecture hours and one two-hour lab per week.

PSYC 6153. Classification of Psychological Dysfunctions. (3) Introduction to systems for classifying psychological disorders for counselors and review of current theoretical, experimental, and clinical perspectives on abnormal psychology, including the current Diagnostic and Statistical Manual of Mental Disorders. Credit will not be given for both PSYC 6153 and PSYC 6151.

PSYC 6155. Community Psychology. (3) Cross-listed as PSYC 8155. Research, intervention techniques and settings associated with major approaches in community psychology including the mental health, organizational, ecological, and social action models.

PSYC 6171. Industrial/Organizational Psychology. (3) Human behavior within organizations. Topics include: recruitment, hiring, competency modeling, talent management, leadership, job attitudes, and organizational development and change.

PSYC 6171L. Laboratory in Industrial/Organizational Psychology. (1) Corequisite: PSYC 6171. Practice in administration and scoring of surveys and tests. Experience in role plays, training practices, and interviews.

PSYC 6172. Talent Acquisition. (3) Issues associated with the attraction and evaluation of job applicants. Topics include: job analysis, testing in industry, interviews, personality measures, assessment centers, and managing the hiring process.

PSYC 6173. Job Attitudes. (3) The individual within the organization, including job attitudes, engagement, and motivation.

PSYC 6174. Organizational Dynamics. (3) Prerequisite: PSYC 6171. Group processes, including group formation, group decision-making, leadership, and group structure.

PSYC 6175. Organizational Development and Change. (3) Organization theories and organizational change methods.

PSYC 6176. Counseling Psychology in Organizations. (3) Application of psychology to special problems within the organization, especially the counseling of employees experiencing life problems: for example, retirement, alcoholism, interpersonal conflict.

PSYC 6177. Talent Management. (3) Theoretical bases of talent management. Topics include: performance appraisal, legal issues, succession

planning, human resource planning, and training and development.

PSYC 6200. Health Psychology I. (3) Cross-listed as PSYC 8200. Intensive review of the contributions of the discipline of psychology to the promotion and maintenance of health, the prevention and treatment of illness, and the improvement of the healthcare system. Examines links between psychology and health by emphasizing interactions among biological, behavioral and social systems that impact health and illness experiences. Topics include: stress, coping, pain, chronic disease and psychoneuroimmunology. Emphasizes the relevance of age, gender, personality, and culture for understanding health-related behaviors.

PSYC 6202. Health Psychology II. (3) Cross-listed as PSYC 8201. Prerequisite: PSYC 6200. Continuation of Health Psychology I.

PSYC 6205. Field and Lab Based Quantitative Research Methods. (3) Cross-listed as OSCI 8205. Prerequisites: Full graduate standing in a psychology graduate program or permission of instructor. Examines quantitative approaches to Organizational Science research such as experimental designs, quasi-experimental designs, organizational surveys, longitudinal models and field research.

PSYC 6206. Qualitative Research Methods. (3) Cross-listed as OSCI 8206. Prerequisites: Full graduate standing in a psychology graduate program or permission of instructor. Examines qualitative approaches to Organizational Science research such as focus groups, verbal protocol, interviewing, naturalistic observation, and content analysis.

PSYC 6207. Measurement in Organizations. (3) Prerequisite: Full graduate standing in a psychology graduate program or permission of instructor. Presents an introduction to classical and modern test theory and methods. Topics include: Classical True Score Theory, reliability and validity inferences, and an introduction to factor analysis. Special emphasis is given to evaluating the quality of existing tests and assessments.

PSYC 6213. Physiological Foundations of Health Psychology. (3) Prerequisite: PSYC 6200. Biological theories and models will be introduced and applied to health issues. Topics may include addiction, mental illness, neuropsychology, and psychophysiology. Emphasizes the relation between the nervous system and behavior for understanding health and illness.

PSYC 6216. Introduction to Cognitive Science. (3) Cross-listed as ITCS 6216 and ITIS 6216. This course presents multiple perspectives on the study of

intelligent systems. Broad coverage of such topics as philosophy of mind; human memory processes; reasoning and problem solving; artificial intelligence; language processing (human and machine); neural structures and processes; and vision. Also included is participation in the cognitive science seminar.

PSYC 6230. Applications of Social Psychology to Health Psychology. (3) Prerequisite: PSYC 6200.

Social psychology theories and models will be introduced and applied to health issues. Topics may include the role of social perception processes in understanding and adjusting to illness, social influence strategies and promoting health-maintaining behaviors, self-efficacy and coping, and other factors related to health maintenance or recovery.

PSYC 6255. Community Interventions. (3) Cross-listed as PSYC 8255. Prerequisite: PSYC 6155 or PSYC 8155. Intensive review of the use of system- and organizational-level interventions to promote and maintain health, prevent illness, and improve quality of life. Presents an historical overview of the effectiveness of different types of interventions, and theoretical and empirical background regarding the conditions and factors that contribute to successful community interventions. Students develop and implement a community intervention, in collaboration with a local organization, and develop a grant proposal that would fund a community intervention.

PSYC 6260. Topics in Health Psychology. (3) Cross-listed as PSYC 8260. Prerequisite: PSYC 6200. An examination of selected topics in Health Psychology. *May be repeated for credit with permission of department.*

PSYC 6261. Independent Study in Health Psychology. (1-3) Prerequisite: PSYC 6200. Directed individual study of an issue in health psychology arranged with a faculty member. *May be repeated for credit.*

PSYC 6262. Practicum in Health Psychology. (1-3) Cross-listed as PSYC 8262. Prerequisites: PSYC 6200 and permission of the department. Experience in assessment and treatment with clients at local health agencies under supervision from a faculty member on campus. Applications of the principles of health psychology to special problems with in a healthcare organization or setting. *May be repeated for credit with permission of department.*

PSYC 6355. Community Research Practicum. (3) Cross-listed as PSYC 8355. Prerequisite: PSYC 6155 or PSYC 8155. Methods for conducting applied community research. Students develop and implement applied research project.

PSYC 6450. Practicum in Clinical Psychology. (1-3) Cross-listed as PSYC 8450. Prerequisites: PSYC 6150 and permission of department. Experience in clinical assessment and/or psychotherapy with clients at local agencies under supervision from a faculty member on campus. *May be repeated for credit with permission of department.*

PSYC 6455. Practicum in Community Psychology. (1-3) Cross-listed as PSYC 8455. Applications of the principles of community psychology to special problems within an organization or community setting. The project might include, but would not be limited to, consultation, program development, training, community education or program evaluation. *May be repeated for credit with permission of department.*

PSYC 6477. Projects in Industrial/Organizational Psychology. (1-3) Prerequisite: PSYC 6171. A structured practicum experience or research paper in industrial/organizational psychology. *May be repeated for credit with permission of department.*

PSYC 6610. Micro Organizational Science I. (3) Cross-listed as OSCI 8610. Prerequisites: Full graduate standing in the I/O psychology graduate program or permission of instructor. Examines research, theory and application regarding individual differences (e.g., abilities, personality), assessment (e.g., tests, inventories, interviews, assessment centers), criterion development (e.g., job analysis, performance models) and organizational staffing processes (i.e., recruitment, selection, basic legal concepts).

PSYC 6611. Macro Organizational Science I. (3) Cross-listed as OSCI 8611. Prerequisites: Full graduate standing in the I/O psychology graduate program or permission of instructor. Examines research, theory and application on the following topics: motivation, communication systems and processes, stress, job design, leadership, employee attitudes and emotions, teamwork, and decision making.

PSYC 6620. Micro Organizational Science II. (3) Cross-listed as OSCI 8620. Prerequisites: Full graduate standing in the I/O psychology graduate program or permission of instructor. Examines research, theory and application regarding post-entry personnel issues such as training, performance management, performance appraisal, compensation, and employee socialization.

PSYC 6621. Macro Organizational Science II. (3) Cross-listed as OSCI 8621. Prerequisites: Full graduate standing in the I/O psychology graduate program or permission of instructor. Examines

research, theory and application on the following topics: organizational development, organizational change, organizational climate, organizational culture, organizational theory, and relations between organizations and their environment.

PSYC 6630. Topics in Talent Management. (3)

Prerequisite: Full graduate standing in the I/O psychology graduate program or permission of instructor. Examination of special topic(s) germane to talent management. The seminar may focus on one or a small number of topics salient to this area. *May be repeated for credit with change of topic.*

PSYC 6640. Topics in Organizational Psychology. (3)

Prerequisite: Full graduate standing in the I/O psychology graduate program or permission of instructor. Examination of special topic(s) germane to organizational psychology. The seminar may focus on one or a small number of topics salient this area. *May be repeated for credit with change of topic.*

PSYC 6650. Research Methods Seminar in Organizational Science. (3)

Cross-listed as OSCI 8650. Prerequisites: Full graduate standing in a psychology graduate program or permission of instructor. Examination of special topic(s) germane to research methods in Organizational Science. The seminar may focus on one or a small number of topics that define this area (e.g., a data analytic technique, a methodological approach). Extensive reading and discussion of topics from multiple perspectives. *May be repeated for credit.*

PSYC 6899. Readings and Research in Psychology. (1-4)

Cross-listed as PSYC 8899. Prerequisite: Permission of instructor and department to be obtained in the semester preceding the semester in which the course is to be taken. Individual study in psychology which may take the form of conducting empirical research or formulating a critique and synthesis of existing research. *May be repeated for credit.*

PSYC 6999. Thesis. (1-3) The thesis is coordinated with the student's interests and practical experience during the second year to allow the development of an area of specialization. Thesis projects can be of three types: an original experiment that will contribute to the psychological literature; a thorough case analysis including literature review and application; the development of a community psychology program or intervention to accomplish an important, well-defined goal. A completed paper and oral presentation are required. *May be repeated for credit with permission of department.*

Public Administration

- **The Gerald G. Fox Master of Public Administration (MPA)**
- **MPA/JD Dual Degree** (*in conjunction with the Charlotte School of Law*)
- **Graduate Certificate in Emergency Management**
- **Graduate Certificate in Nonprofit Management**
- **Graduate Certificate in Public Budgeting and Finance**
- **Graduate Certificate in Urban Management and Policy**

Department of Political Science and Public Administration

mpa.uncc.edu

Graduate Program Director

Dr. Thomas Barth

Graduate Faculty

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 Dr. Maureen Brown, Professor
 Dr. Joanne Carman, Associate Professor
 Dr. Jacqueline Chattopadhyay, Assistant Professor
 Dr. Cindy Combs, Professor
 Dr. James W. Douglas, Professor
 Dr. Suzanne Leland, Professor
 Dr. Zachary Mohr, Assistant Professor
 Dr. Sarah Pettijohn, Assistant Professor
 Dr. Jaclyn Piatak, Assistant Professor

MASTER OF PUBLIC ADMINISTRATION (MPA)

The primary objective of the Master of Public Administration (MPA) degree program is to provide professional training in public administration. The curriculum of this National Association of Schools of Public Affairs and Administration (NASPAA) accredited program emphasizes the analysis of the political and administrative environments as well as the administrative decision-making approaches of public administration. Application of techniques and administrative skills to the management of nonprofit organizations is also included in the curriculum. The methods of instruction employed in the program expose students to a variety of approaches to public management.

Students may enroll in the Master of Public Administration program on either a full-time or part-time basis. The majority of classes are scheduled in the evening throughout the year. Classes meet on the main University campus and at UNC Charlotte Center City.

Admission Requirements

Admission to the Master of Public Administration program is open to qualified graduates of recognized colleges and universities accredited by a regional or general accrediting agency. There are seven major requirements for admission:

- 1) Application submitted online to the Graduate Admissions Office, accompanied by the application fee, which is neither deductible nor refundable
- 2) Possession of a bachelor's degree, or its equivalent, from an accredited college or university
- 3) An undergraduate grade point average of at least 3.0 on a 4.0 scale
- 4) An appropriate score on the Verbal, Quantitative, and Analytical portions of the Graduate Record Exam (GRE). Although there is no required score for these exams, typically an acceptable score would be above the 35th percentile.
- 5) A written statement of professional career goals and a description of any significant work experience, particularly in the public or nonprofit sectors
- 6) Three supporting letters of recommendation from professors or employers
- 7) Submission of two official transcripts from all postsecondary educational institutions in which the candidate was enrolled

Prerequisite Requirements

In addition to the admission requirements, MPA students must complete STAT 1222 (Elementary Statistics for the Social Sciences) or its equivalent with a grade of C or above; and demonstrate proficiency in computer applications (e.g., ability to use Microsoft Word, Excel, and PowerPoint) prior to taking MPAD 6126. Also, POLS 1110 (Introduction to American Government) or its equivalent with a grade of C or above must be completed prior to taking MPAD 6102. Students may complete these after admission into the program.

Degree Requirements

The Master of Public Administration program is structured in three distinct phases: 1) Core, 2) Advanced Work, and 3) directed Study Or Research Project. In all, the program requires 39 hours of graduate credit for completion of the degree. The

MPA Program Handbook, available online at mpa.uncc.edu, presents the most up-to-date listing of degree requirements.

Core Courses (18 credit hours)

All students are required to complete 18 credit hours in core study. The emphasis in the core is twofold: (a) Understanding the various managerial and analytical approaches salient to the environment of public administration, and (b) Achieving an overall perspective on the problems of public administration. Students must attain a grade of B or above in each core course prior to enrolling in MPAD 6187 and MPAD 6188. Students earning grades of C in a core course must retake that course at the earliest possible opportunity. The core courses are:

- MPAD 6102 Foundations in Public Administration (3)
- MPAD 6104 Public Organizations and Management (3)
- MPAD 6125 Quantitative Research Methods in Public Administration (3)
- MPAD 6126 Data Analysis for Decision Making (3)
- MPAD 6131 Public Budgeting and Finance (3)
- MPAD 6134 Human Resources Management (3)

Advanced Courses

Elective Courses (12-15 credit hours)

The MPA program offers several advanced elective courses in areas important to public administrators. With the approval of the program director, students may take advanced elective work with other departments. Students are required to take a minimum of fifteen hours of advanced electives unless they opt for the Directed Study option (see below), in which case they need only take twelve hours of advanced electives. The MPA electives are:

- MPAD 6000 Topics for Graduate Study in Public Administration (1-4)
- MPAD 6128 Foundations of Public Policy Analysis
- MPAD 6142 Grant Writing and Reporting (3)
- MPAD 6143 Introduction to Administrative Law (3)
- MPAD 6160 Leadership in the Digital Era (3)
- MPAD 6172 Administration of Healthcare Systems in the U.S. (3)
- MPAD 6174 Public Policy and Politics in Healthcare Administration (3)
- MPAD 6184 Urban Government and Politics (3)
- MPAD 6185 Intergovernmental Relations (3)
- MPAD 6210 Aging and Public Policy (3)
- MPAD 6211 Administration of Aging Programs (3)
- MPAD 6290 Emergency Management (3)
- MPAD 6291 Homeland Security and Terrorism (3)
- MPAD 6292 Disaster Management (3)
- MPAD 6310 Foundations of the Nonprofit Sector (3)
- MPAD 6311 Intro to Nonprofit Management (3)
- MPAD 6312 Fundraising (3)
- MPAD 6314 Marketing for Arts and Nonprofit

Organizations (3)

MPAD 6316 Introduction to Arts Administrations (3)

MPAD 6318 Arts Administration II (3)

MPAD 6324 Financial Analysis for Nonprofit

Organizations (3)

MPAD 6326 Applied Economics for Public

Administrators (3)

MPAD 6327 Internal Capacity Building in Nonprofit

Organizations (3)

MPAD 6328 Urban and Community Development (3)

MPAD 6329 Nonprofit Organizations and their

Environment (3)

MPAD 6330 Program Evaluation for the Public &

Nonprofit Sectors (3)

MPAD 6332 Project Management (3)

MPAD 6350 Public Sector Financial Management (3)

MPAD 6352 Public Sector Financial Reporting and

Analysis (3)

MPAD 6820 Independent Study (1-3)

Capstone Seminar (3 credit hours)

Students are required to complete the capstone course. Students must successfully complete all of their Core Courses with a grade of B or above prior to enrolling in this course.

MPAD 6187 Advanced Seminar in Public

Management Problem Solving (3)

Directed Study or Research Applications Courses

Each MPA student must complete one of the options (A or B). Students must successfully complete all of their Core Courses with a grade of B or above prior to enrolling in any courses listed in this section.

Research Applications Course

Students who select this option complete a one-semester written project course on an approved topic of significance in public administration or nonprofit management. The project includes the submission of revised paper drafts based on instructor evaluation. Students must enroll in the following course, which is graded A, B, C, or U:

MPAD 6188 Research Applications in Public

Administration (3)

Directed Study Courses

Students who select this option complete a written project on a topic of significance based on a field experience or research in public administration, nonprofit management, or arts administration. The Directed Study requires the following courses, graded on a pass/unsatisfactory basis:

MPAD 6800 Directed Study in Public Administration (Proposal) (3)

MPAD 6801 Directed Study in Public Administration (Completed Study) (3)

University regulations governing the preparation and submission of Master's theses apply to the Directed Study option. Rules for the Directed Study committee are provided in the *MPA Program Handbook*. Students who select option B may take one less elective course for 3 credit hours to complete the MPA degree in the required 39 credit hours.

Degree Concentrations

Students complete one of five approved 15 credit hour concentrations or they may develop their own program of study from elective courses. Students who choose a concentration must focus their research in MPAD 6188, or MPAD 6800 and MPAD 6801 on an approved topic related to the concentration subject matter.

Arts Administration Concentration

Prerequisites: For students with an undergraduate degree not in the arts: You are required to take no less than four 3-credit hour undergraduate arts courses (or the equivalent) in order to develop the necessary foundation of appreciation for the arts required of arts administrators. The exact set of courses is determined by the field of arts on which you desire to focus and in consultation with your advisor. The prerequisites vary by visual arts, dance, theater, and music. Ideally, these prerequisites are completed prior to admission into the MPA program. However, students who opt for the arts administration concentration after being admitted to the MPA program will have to complete these prerequisites prior to admission into MPAD 6187, MPAD 6188, or MPAD 6316. Substantive professional experience in the arts field can be used as a substitute or partial substitute (e.g., students may be required to take less than 4 arts courses) for the undergraduate prerequisites at the discretion of the MPA Program Director.

The Concentration in Arts Administration consists of 15 credit hours within the MPA curriculum. Students must fulfill the following requirements:

Required Courses (6 credit hours)

MPAD 6311 Introduction to Nonprofit Management (3)

MPAD 6316 Introduction to Arts Administration (3)

Elective Courses (9 credit hours)

Group A

Select one of the following:

MPAD 6312 Fundraising (3)

MPAD 6314 Marketing for Arts and Nonprofit Organizations (3)

Group B

Select one of the following:

MPAD 6128 Foundations of Public Policy (3)
 MPAD 6142 Grant Writing and Reporting (3)
 MPAD 6160 Leadership in the Digital Era (3)
 MPAD 6324 Financial Analysis for Nonprofit Organizations (3)
 MPAD 6327 Internal Capacity Building in Nonprofit Organizations (3)
 MPAD 6329 Nonprofit Organizations and their Environment (3)
 MPAD 6318 Arts Administration II (3)
 COMM 5102 Federal Interpretation of the First Amendment (3)
 COMM 6145 Communication Campaign Management (3)
 COMM 6146 Media Relations (3)
 HIST 6310 Museum Studies (3)
 ANTH 5120 Intercultural Communications (3)
 ENGL 5182 Information Design and Digital Publishing (3)

Group C

Select one of the following:

MPAD 5000-6999 (3)

Note: Appropriate non-MPAD courses may be taken within this concentration upon approval of the student's advisor and the MPA Director.

Emergency Management Concentration

The Concentration in Emergency Management concentration consists of 15 credit hours within the MPA curriculum. Students must fulfill the following requirements:

Required Courses (6 credit hours)

MPAD 6290 Emergency Management (3)
 MPAD 6185 Intergovernmental Relations

Elective Courses (9 credit hours)

Group A

Select one of the following:

MPAD 6142 Grant Writing and Reporting (3)
 MPAD 6291 Homeland Security and Terrorism (3)
 MPAD 6292 Disaster Management (3)
 GEOG 5110 Geographic Information Systems for Non-Majors (3)
 GEOG 5120 Introduction to Geographic Information Systems (3)

Group B

Select one of the following:

MPAD 6128 Foundations of Public Policy (3)
 MPAD 6143 Administrative Law (3)
 MPAD 6160 Leadership in the Digital Era (3)
 MPAD 6184 Urban Government and Politics (3)
 MPAD 6324 Financial Analysis for Nonprofit Organizations (3)
 MPAD 6330 Program Evaluation for the Public and Nonprofit Sectors (3)

MPAD 6332 Project Management (3)
 GEOG 5130 Advanced Geographic Information Systems (3)
 CJUS 5103 International Criminal Justice (3)
 CJUS 6120 Criminal Justice Management and Decision Making (3)
 CJUS 6132 Legal Issues in Law Enforcement
 COMM 5102 Federal Interpretation of the First Amendment (3)
 COMM 6120 Communication and the Network Society (3)
 PSYC 6155 Community Psychology (3)
 ITIS 5250 Computer Forensics (3)
 CSLG 7680 Crisis Counseling (3)

Group C

Select one of the following:

MPAD 5000-6999 (3)

Note: Appropriate non-MPAD courses may be taken within this concentration upon approval of the student's advisor and the MPA Director.

Nonprofit Management Concentration

The Concentration in Nonprofit Management consists of 15 credit hours within the MPA curriculum. Students must fulfill the following requirements:

Required Courses (6 credit hours)

MPAD 6311 Introduction to Nonprofit Management (3)
 MPAD 6324 Financial Analysis for Nonprofit Organizations (3)

Elective Courses (9 credit hours)

Group A

Select two of the following:

MPAD 6142 Grant Writing and Reporting (3)
 MPAD 6310 Foundations of the Nonprofit Sector (3)
 MPAD 6312 Fundraising (3)
 MPAD 6314 Marketing for Arts and Nonprofit Organizations (3)
 MPAD 6316 Introduction to Arts Administration (3)
 MPAD 6318 Arts Administration II (3)
 MPAD 6327 Internal Capacity Building in Nonprofit Organizations (3)
 MPAD 6329 Nonprofit Organizations and their Environment (3)
 MPAD 6330 Program Evaluation for the Public and Nonprofit Sectors (3)
 MPAD 6332 Project Management (3)

Group B

Select one of the following:

MPAD 5000-6999 (3)

Note: Appropriate non-MPAD courses may be taken within this concentration upon approval of the student's advisor and the MPA Director.

Public Finance Concentration

The Concentration in Public Finance consists of 15 credit hours within the MPA curriculum. Students must fulfill the following requirements:

Required Courses (9 credit hours)

MPAD 6326 Applied Economics for Public Administrators (3)
 MPAD 6350 Public Sector Financial Management (3)
 MPAD 6352 Public Sector Financial Reporting and Analysis (3)

Elective Courses (6 credit hours)

Select two of the following:

MPAD 6142 Grant Writing and Reporting (3)
 MPAD 6184 Intergovernmental Relations (3)
 MPAD 6324 Financial Analysis for Nonprofit Organizations (3)
 MPAD 6330 Program Evaluation for the Public and Nonprofit Sectors (3)
 MPAD 6332 Project Management (3)
 ECON 6112 Graduate Econometrics (3)
 ECON 6218 Advanced Business and Economic Forecasting (3)
 MBAD 6159 Real Estate Development (3)

Note: Appropriate non-MPAD courses may be taken within this concentration upon approval of the student's advisor and the MPA Director.

Urban Management and Policy Concentration

The Concentration in Urban Management and Policy consists of 15 credit hours within the MPA curriculum. Students must fulfill the following requirements:

Required Courses (6 credit hours)

MPAD 6184 Urban Government and Politics (3)
 MPAD 6185 Intergovernmental Relations (3)

Elective Courses (9 credit hours)**Group A**

Select two of the following:

MPAD 6128 Foundations of Public Policy (3)
 MPAD 6142 Grant Writing and Reporting (3)
 MPAD 6143 Introduction to Administrative Law (3)
 MPAD 6160 Leadership in the Digital Era (3)
 MPAD 6290 Introduction to Emergency Management (3)
 MPAD 6324 Financial Analysis for Nonprofit Organizations (3)
 MPAD 6326 Applied Economics for Public Administrators (3)
 MPAD 6328 Urban and Community Development (3)
 MPAD 6330 Program Evaluation for the Public and Nonprofit Sectors (3)
 MPAD 6332 Project Management (3)
 MPAD 6350 Public Sector Financial Management (3)

MPAD 6352 Public Sector Financial Reporting and Analysis (3)

GEOG 5155 Retail Location (3)

GEOG 5110 Geographic Information Systems for Non-Majors (3)

or GEOG 5120 Introduction to Geographic Information Systems (3)

GEOG 5210 Urban Planning Methods (3)

GEOG 5260 Transportation Policy Formulation (3)

GEOG 6300 Applied Regional Analysis (3)

GEOG 6301 Industrial Location (3)

GEOG 6500 Urban Planning: Theory and Practice (3)

Group B

Select one of the following:

MPAD 5000-6999 (3)

Note: Appropriate non-MPAD courses may be taken within this concentration upon approval of the student's advisor and the MPA Director.

Internships

Each student in the Master of Public Administration Program is required to complete a field experience. This requirement may be satisfied in one of these ways: (1) through a position in a public or nonprofit organization; (2) through a position in a business where the work experience is approved for internship by the MPA director; or (3) through an approved internship in a public or nonprofit organization. Each student must complete an "MPA Internship Information" form and submit it to the MPA Program office for approval. Forms to evaluate the internship experience must also be completed. These forms are available in the main MPA office. Current guidelines for the internship requirement are provided in the *MPA Program Handbook*.

Advising

Each student is assigned an advisor and given access to the *MPA Program Handbook* when admitted to the program. The advisor is a member of the MPA Program faculty. Students should meet with their advisors each semester to develop a schedule before registering. Students are also encouraged to meet with the Program Director for additional advising when necessary.

Transfer Credit

Up to six credit hours taken at another university can be transferred to the MPA Program on the recommendation of the Director and the approval of the Dean of the Graduate School.

Scholarships

1) The North Carolina City and County Management Association funds a scholarship for an MPA student to help train students for careers in North

Carolina local government. The MPA Program selection committee nominates the eligible recipient each fall.

- 2) Burkhalter-Rassel Alumni Scholarship - the MPA Alumni Association has established a scholarship fund to honor a former Charlotte City Manager.
- 3) Brown-Dorton MPA Scholarship - the MPA selection committee nominates eligible recipients each fall.
- 4) Susan Burgess Scholarship – the MPA selection committee nominates eligible recipients
- 5) Gerald G. Fox Scholarship – the MPA selection committee nominates eligible recipients
- 6) Other awards are available on a competitive basis through the Graduate School.
- 7) Other professional associations occasionally offer scholarships for which MPA students have competed successfully.

Public Service Fellowships

The department works with local area government and nonprofit agencies to provide fellowships to students on a competitive basis. Host agencies employ fellows on a part-time basis (20 hours per week) for a period of one to two years. In exchange for their services, agencies pay fellows a small stipend and tuition expenses for Fall and Spring semesters.

MPA/JD DUAL DEGREE

This dual degree program allows students to earn a Master of Public Administration (MPA) degree from the College of Liberal Arts & Sciences at UNC Charlotte and a Juris Doctor (JD) degree from the Charlotte School of Law in eight semesters of study.

Prospective dual-degree program students must apply separately to both UNC Charlotte and the Charlotte School of Law. Full-time students spend the first full year of study at either UNC Charlotte or the Charlotte School of Law. They then spend their entire second or third year at the other institution. For the remainder of the program, students take classes at both UNC Charlotte and the Charlotte School of Law. Each school grants nine (9) units of credit for courses taken at the other school.

Visit mpa.uncc.edu and charlottelaw.edu for additional information.

GRADUATE CERTIFICATE IN EMERGENCY MANAGEMENT

The Graduate Certificate in Emergency Management is designed to provide graduate education in emergency management to those individuals who are currently serving as managers in public, nonprofit,

and private organizations, or those who might want to pursue a career in emergency management. The certificate is also intended to serve the interests of students enrolled in UNC Charlotte graduate programs currently. Topics of study include, but are not limited to, homeland security and terrorism, emergency prevention and response, and disaster management. The focus of the certificate is to provide the knowledge and skills necessary to manage emergency programs in the most effective, efficient, and legally sound manner.

Admission Requirements

Admission to the Graduate Certificate program in Emergency Management is open to graduates of colleges and universities accredited by a regional or general accrediting agency. To apply, the student must meet the following requirements:

- 1) A completed Graduate Admissions application form and statement of professional goals
- 2) 12 months of full-time continuous employment in a government agency, nonprofit organization, or appropriate business organization (or be currently enrolled in another graduate program). This requirement may be waived for students who already have a Master's degree.
- 3) Two official transcripts from post-secondary educational institutions
- 4) Three letters of recommendation from academic or professional sources
- 5) An overall GPA of 2.75 on a 4.0 scale

Certificate Requirements

The Graduate Certificate Program in Emergency Management requires 15 credit hours.

Core Courses (6 credit hours)

MPAD 6290 Emergency Management (3)
MPAD 6185 Intergovernmental Relations (3)

Elective Courses (9 credit hours)

Group A

Select one of the following:

MPAD 6142 Grant Writing and Reporting (3)
MPAD 6291 Homeland Security and Terrorism (3)
MPAD 6292 Introduction to Disaster Management (3)
GEOG 5190 Geographic Information Systems for Non-Majors (3)

Group B

Select one of the following:

MPAD 6128 Foundations of Public Policy (3)
MPAD 6143 Administrative Law (3)
MPAD 6160 Leadership in the Digital Era (3)
MPAD 6184 Urban Government and Politics (3)
MPAD 6324 Financial Analysis for Nonprofit Organizations (3)

MPAD 6330 Program Evaluation for the Public and Nonprofit Sectors (3)
 MPAD 6332 Project Management (3)
 CJUS 5103 International Criminal Justice (3)
 CJUS 6120 Criminal Justice Management and Decision Making (3)
 CJUS 6132 Legal Issues in Law Enforcement (3)
 COMM 5102 Federal Interpretation of the First Amendment (3)
 COMM 6120 Communication and the Network Society (3)
 CSLG 7680 Crisis Counseling (3)
 GEOG 5130 Advanced Geographic Information Systems (3)
 ITIS 5250 Computer Forensics (3)
 PSYC 6155 Community Psychology (3)

Group C

Select one of the following:

MPAD 5000-6999 (3)

Note: Appropriate non-MPAD courses may be taken within this concentration upon approval of the student's advisor and the MPA Director.

Transfer Credit

No more than three credit hours may be transferred into the certificate program from other academic institutions.

GRADUATE CERTIFICATE IN NONPROFIT MANAGEMENT

The Graduate Certificate in Nonprofit Management is designed to provide graduate education in nonprofit management for those individuals who are currently serving as managers or volunteers in nonprofit organizations, or those who might want to pursue careers in nonprofit management. The certificate is also intended to serve the interests of students currently enrolled in UNC Charlotte graduate programs.

Admission Requirements

Admission to the Graduate Certificate program in Nonprofit Management is open to graduates of colleges and universities accredited by a regional or general accrediting agency. To apply, the student must meet the following requirements:

- 1) A completed Graduate Admissions application form and statement of professional goals
- 2) 12 months of full-time continuous employment in a government agency, nonprofit organization, or appropriate business organization (or be currently enrolled in another graduate program). This

requirement may be waived for students who already have a Master's degree.

- 3) Two official transcripts from post-secondary educational institutions
- 4) Three letters of recommendation from academic or professional sources
- 5) An overall GPA of 3.0 on a 4.0 scale

Certificate Requirements

The Graduate Certificate in Nonprofit Management consists of 15 credit hours within the MPA curriculum.

Core Courses (6 credit hours)

MPAD 6311 Introduction to Nonprofit Management (3)
 MPAD 6324 Financial Analysis for Government and Nonprofit Organizations (3)

Elective Courses (9 credit hours)

Group A

Select two of the following:

MPAD 6142 Grant Writing and Reporting (3)
 MPAD 6310 Foundations of the Nonprofit Sector (3)
 MPAD 6312 Fundraising (3)
 MPAD 6314 Marketing for the Arts and Nonprofit Organizations (3)
 MPAD 6316 Introduction to Arts Administration (3)
 MPAD 6318 Arts Administration II (3)
 MPAD 6327 Internal Capacity Building in Nonprofit Organizations (3)
 MPAD 6329 Nonprofit Organizations and the Environment (3)
 MPAD 6330 Program Evaluation for the Public and Nonprofit Sectors (3)
 MPAD 6332 Project Management (3)

Group B

Select one of the following:

MPAD 5000-6999 (3)

Note: Appropriate non-MPAD courses may be taken within this concentration upon approval of the student's advisor and the MPA Director.

Transfer Credit

No more than three credit hours may be transferred into the certificate program from other academic institutions.

GRADUATE CERTIFICATE IN PUBLIC BUDGET AND FINANCE

The Graduate Certificate in Public Budgeting and Finance is designed to provide graduate education in public finance to managers in public sector organizations.

Admission Requirements

Admission to the Graduate Certificate program in Public Budgeting and Finance is open to graduates of colleges and universities accredited by a regional or general accrediting agency. To apply, the student must meet the following requirements:

- 1) A completed Graduate Admissions application form and statement of professional goals.
- 2) Official transcripts from all post-secondary educational institutions.
- 3) Three letters of recommendation from academic or professional sources.
- 4) An overall GPA of 3.0 on a 4.0 scale.

Certificate Requirements

The Public Budgeting and Finance Certificate consists of 18 credit hours within the MPA curriculum.

Required Courses (12 credit hours)

MPAD 6131 Public Budgeting and Finance (3)
 MPAD 6326 Applied Economics for Public Administrators (3)
 MPAD 6350 Public Sector Financial Management (3)
 MPAD 6352 Public Sector Financial Reporting and Analysis (3)

Elective Courses (6 credit hours)

Select two of the following:

MPAD 6142 Grant Writing and Reporting (3)
 MBAD 6159 Real Estate Development (3)
 MPAD 6184 Intergovernmental Relations (3)
 MPAD 6324 Financial Analysis for Nonprofit Organizations (3)
 MPAD 6330 Program Evaluation for the Public and Nonprofit Sectors (3) 84
 MPAD 6332 Program Planning (3)
 ECON 6112 Graduate Econometrics (3)
 ECON 6218 Advanced Business and Economic Forecasting (3)

Note: Appropriate non-MPAD courses may be taken within this concentration upon approval of the student's advisor and the MPA Director.

Transfer Credit

No more than three credit hours may be transferred into the certificate program from other academic institutions.

GRADUATE CERTIFICATE IN URBAN MANAGEMENT AND POLICY

The Graduate Certificate in Urban Management and Policy is designed to provide graduate education in urban local government to individuals who are currently serving as managers in public organizations in the Charlotte Region, or those who might want to pursue a career in local government management.

Admission Requirements

Admission to the Graduate Certificate program in Urban Management and Policy is open to graduates of colleges and universities accredited by a regional or general accrediting agency. To apply, the student must meet the following requirements:

- 1) A completed Graduate Admissions application form and statement of professional goals.
- 2) Official transcripts from all post-secondary educational institutions.
- 3) Three letters of recommendation from academic or professional sources.
- 4) An overall GPA of 3.0 on a 4.0 scale. The GPA will be weighed less heavily for students who have at least 3 years of experience working in the public or nonprofit sectors after graduating from their undergraduate programs.

Certificate Requirements

The Graduate Certificate in Urban Management and Policy consists of 15 credit hours within the MPA curriculum.

Required Courses (6 credit hours)

MPAD 6184 Urban Government and Politics (3)
 MPAD 6185 Intergovernmental Relations (3)

Elective Courses (9 credit hours)

Group A

Select two of the following:

MPAD 6128 Foundations of Public Policy (3)
 MPAD 6142 Grant Writing and Reporting (3)
 MPAD 6143 Introduction to Administrative Law (3)
 MPAD 6160 Leadership in the Digital Era (3)
 MPAD 6290 Introduction to Emergency Management (3)
 MPAD 6324 Financial Analysis for Nonprofit Organizations (3)
 MPAD 6326 Applied Economics for Public Administrators (3)
 MPAD 6328 Urban and Community Development (3)
 MPAD 6330 Program Evaluation for the Public and Nonprofit Sectors (3)
 MPAD 6332 Project Management (3)
 MPAD 6350 Public Sector Financial Management (3)

MPAD 6352 Public Sector Financial Reporting and Analysis (3)
 GEOG 5155 Retail Location (3)
 GEOG 5110 Geographic Information Systems for Non-Majors (3)
 or GEOG 5120 Introduction to Geographic Information Systems (3)
 GEOG 5210 Urban Planning Methods (3)
 GEOG 5260 Transportation Policy Formulation (3)
 GEOG 6300 Applied Regional Analysis (3)
 GEOG 6301 Industrial Location (3)
 GEOG 6500 Urban Planning: Theory and Practice (3)

Group B

Select one of the following:

MPAD 5000-6999 (3)

Note: Appropriate non-MPAD courses may be taken within this concentration upon approval of the student's advisor and the MPA Director.

Transfer Credit

No more than three credit hours may be transferred into the certificate program from other academic institutions.

COURSES IN PUBLIC ADMINISTRATION (MPAD)

MPAD 6000. Topics for Graduate Study in Public Administration. (1-4) Intensive study of a topic in public administration. The topic of investigation may vary from semester to semester. *May be repeated for credit.*

MPAD 6102. Foundations in Public Administration. (3) Pre- or corequisite: POLS 1110 or its equivalent, and admission into MPAD Program. Consideration of the political context of contemporary public administration, with attention to the role of administration in the policy process, the legal basis for public administration, legislative-executive relations, and accountability, ethics, and responsibility in democratic administration.

MPAD 6104. Public Organizations and Management. (3) Pre- or corequisite: Admission into MPAD Program. Changing images of people, organizations and organizational environments; research findings and applications related to organization structure, motivation, leadership, communications, decision-making, group dynamics, interpersonal skills; ethics and values important to the study and practice of organizational leadership; and assessment of value systems and the impact of competing value systems on public and organizational policy making.

MPAD 6125. Research Methods for Public Administrators. (3) Pre- or corequisite: STAT 1222 or its equivalent, and admission into MPAD Program. An introduction to the application of social science research methods to problems in public management and policy. Topics include: research design, measurement, data collection techniques, sampling, and decision-making theory. Includes basic introduction to the manipulation of data sets with statistical software.

MPAD 6126. Data Analysis for Decision Making. (3) Prerequisite: STAT 1222 or its equivalent and MPAD 6125; and admission into MPAD Program. Continuation of MPAD 6125 by developing proficiency with an array of statistical procedures and tools for choosing which procedure applies to various decision making situations. Focus is on problem setup, computer-based computations, and outcome interpretation in applied settings.

MPAD 6128. Foundations of Public Policy. (3) An examination of the role of public administrators in the policy process. Topics focus on issue formation, agenda setting, decision making, implementation, and policy evaluation. Course emphasizes the role of political actors and institutional constraints in various policy arenas.

MPAD 6131. Public Budgeting and Finance. (3) Pre- or corequisite: Admission into MPAD Program. An introduction to the basics of public finance and an examination of the theory and development of public budgeting, the budget processes, the budget cycle, budget reforms, capital budgets, revenue sources, taxation policies and processes, intergovernmental fiscal relations and governmental accounting practices, debt management and cash management in public organizations.

MPAD 6134. Human Resources Management. (3) Pre- or corequisite: Admission into MPAD Program. Study of the context of public personnel administration; basic functions of job evaluation and compensation, employee rights and responsibilities; the legal constraints including equal opportunity, health and safety, collective bargaining; government productivity. (*Spring, Summer*)

MPAD 6141. Conflict Management in Public Organizations. (3) Deals with how to handle conflict within public and nonprofit agencies, as well as between organizations. Students will examine how the "publicness" of government agencies makes conflict management an especially difficult endeavor.

MPAD 6142. Grant Writing and Reporting. (3) Focuses on the life cycle of grants and the researching, writing, managing, and reporting skills

necessary to manage grants in public and nonprofit organizations.

MPAD 6143. Introduction to Administrative Law. (3)

Prerequisite: MPAD 6102 or permission of instructor. Examines the legal principles governing the modern administrative state, including: the Constitutional status of administrative agencies; legislative, judicial, and executive control of administrative agencies; discretion in making, adjudicating, and enforcing law and policy; the Administrative Procedures Act; and judicial review of agency action.

MPAD 6160. Leadership in the Digital Era. (3) Public and nonprofit organizations are increasingly dependent on information technology in the delivery of services. This course examines the organizational challenges and best practices associated with successful information technology outcomes. Specifically, it focuses on the implementation of IT on organizational performance. It exposes the student to many of the challenges of leading organizations in a digital environment.

MPAD 6172. Administration of the Healthcare Systems in the United States. (3) Components of the healthcare system in the United States, with emphasis on the relationships among public (local, state and federal), private, voluntary and nonprofit entities; including points of access for recipients of healthcare; relationships with other human services and professions involved in providing healthcare; and the regulatory environment governing these relationships.

MPAD 6174. Public Policy and Politics in Healthcare Administration. (3) Cross-listed as HADM 6142. Prerequisites: HADM 6100 and MPAD 6172. Examination of the formulation, adoption and implementation of public policy for healthcare through federal, state and local political processes.

MPAD 6184. Urban Government and Politics. (3) Prerequisite: MPAD 6102 or permission of instructor. Introduces students to urban affairs: the development of urban areas, the structures of local governmental bodies, the actors common to urban political scenes, and the incentives that motivate citizens and city officials. Illustrates urban policy issues such as poverty, race, transportation, housing, public safety, education, economic development, land-use, and service delivery.

MPAD 6185. Intergovernmental Relations. (3) Survey of the complex relationships of governments in an urban environment set in the federal system. A review of the problems created by that system and the approaches to their solutions.

MPAD 6187. Advanced Seminar in Public

Management Problem Solving. (3) Prerequisite: All core courses in the MPAD Program and approval by the Program Director. Seminar viewed as a capstone to the student's coursework in public management and is required to be taken by all students. Seminar devoted to topics in public management, which involve problem identification and solution.

MPAD 6188. Research Applications in Public

Administration. (3) Prerequisite: All core courses in the MPAD Program and approval by the Program Director. Preparation of a major paper on a topic of significance in public or nonprofit administration. Topics must be approved by the instructor, and paper drafts will be revised by the student following evaluation by the instructor. Each paper must be well grounded in the appropriate professional literature and must demonstrate competence in professional communication skills.

MPAD 6210. Aging and Public Policy. (3) Cross-listed as GRNT 6210. Examination of the public policy making process with attention to aging policy. Consideration of determinants of aging policy and institutions and actors in the policy making process and piecemeal development of legislation will be analyzed as factors related to the making of policy for the aged.

MPAD 6211. Administration of Aging Programs. (3)

Cross-listed as GRNT 6211. Focuses on the implementation of public policies and programs for the aged and the development and administration of these programs. Students become familiar with the process through which policies are transformed into aging programs and the budgetary, management and evaluative considerations that must be considered.

MPAD 6290. Emergency Management. (3)

Focuses on the principles and practices of emergency management at the local, state, and national levels and will explore the concepts of preparedness, mitigation, response and recovery. Conducted from the perspective of emergency management's impact on local government and infrastructure, and the community's ability to prepare for, respond to, and recover from a wide array of catastrophes.

MPAD 6291. Homeland Security and Terrorism. (3)

Investigates the organization and operation of the Department of Homeland Security, with a special emphasis placed on how the department deals with the threat of terrorism. Strategies and tactics for fighting terrorism as well as other threats to homeland security will be examined.

MPAD 6292. Disaster Management. (3) Emergency managers must be prepared to face a wide variety of

natural, technological and public health disasters in their communities. Having a good understanding of a potential disaster's unique characteristics and dynamics can help an emergency manager better prepare for the worst-case scenario. Focuses on a series of natural and weather-related disasters, technological or man-made disasters and public health disasters.

MPAD 6310. Foundation of the Nonprofit Sector. (3) Survey of the history, culture and legal foundation of the nonprofit sector. Key definitions, scope and relationships between the nonprofit, for profit and government sectors are discussed. Examines current policy issues confronting nonprofits.

MPAD 6311. Introduction to Nonprofit Management. (3) Examination of the structure, function and administration of nonprofit organizations. Developing strategies to ensure financial and ethical management.

MPAD 6312. Fundraising. (3) Provides a comprehensive overview of fundraising techniques geared toward various types of nonprofit organizations including education, health, arts and social services. Topics include: Annual giving, major gifts, estate planning, working with corporations and foundations, ethics and legal responsibilities. Students learn to balance organizational needs with donor interests and the vehicles that can accomplish those goals.

MPAD 6314. Marketing for Arts and Nonprofit Organizations. (3) Recognizing the breadth and complexity of cultural organizations, the purpose of this class is to familiarize students with the fundamentals of marketing organizational programs and activities within the visual art field. Students will be given a broad overview of the functional components of administrative management and participation in the theory and techniques of public relations, audience development, market research, advertising and various promotional strategies. They will have the opportunity to explore, discuss and understand the principles of successful marketing for art organizations.

MPAD 6316. Introduction to Arts Administration. (3) Prerequisite: MPAD 6311. Recognizing the breadth and complexity of career options in art administration, the purpose of this class is to orient students to the basic profiles of organizational activities within the visual art field. Students are given a broad overview of the fundamentals of administrative structure, standards of operation, and functional components that are found in various visual art organizations. Students have the opportunity to explore, discuss, and

understand the principles of successful art organization management.

MPAD 6318. Arts Administration II. (3) Prerequisite: MPAD 6316. An advanced course in the administration of arts nonprofits. Details several issues that are unique to the field of arts management, including career paths in arts administration, marketing, legal issues, arts boards, arts councils, cultural districts, and constituent development.

MPAD 6324. Financial Analysis for Nonprofit Organizations. (3) Topics include: fund accounting basics for nonprofit organizations, preparation and analysis of financial statements, evaluating and monitoring financial condition, capital budgeting and investment analysis, debt policy and management.

MPAD 6326. Applied Economics for Public Administrators. (3) Introduces students to the fundamental concepts of microeconomics in order to enhance their analytical skills to a level that is appropriate for practitioners in the public sector. Focuses on how the market works, why the market results in beneficial exchanges between sellers and buyers, what effects government intervention can have upon the market, whether government intervention is necessary, and how the tools of economics can be used by public administrators to improve decision making.

MPAD 6327. Internal Capacity Building in Nonprofit Organizations. (3) Development of proficiency among an array of internal management tools, including: strategic planning; volunteer recruitment, management, and retention; and program evaluation and performance measurement.

MPAD 6328. Urban and Community Development. (3) Examines the policies and programs designed to reduce social and economic distress in U.S. communities and focuses on local and neighborhood-based efforts to address problems of inadequate housing, unemployment, lack of community services and facilities, crime etc. Considers the various roles that government, private sector, and nonprofit organizations play in community revitalization.

MPAD 6329. Nonprofit Organizations and their Environment. (3) Development of the skills needed to navigate in the complex external environment, including: fundraising, resource development, and donor development; networking, strategic alliances, and public relations; and legal requirements and issues of liability.

MPAD 6330. Program Evaluation for the Public and Nonprofit Sectors. (3) Designed to give students a comprehensive overview of the theory, concepts,

methods, and tools of program evaluation. In addition to providing an overview of various types and uses of program evaluation, the course emphasizes building expertise in evaluation design, developing process and outcome measures, analyzing data, and reporting results. Addresses the use of evaluation tools to support the development and management of programs.

MPAD 6332. Project Management. (3) A project is a temporary endeavor undertaken to create a unique product, service, or result. The temporary nature of projects indicates a definite beginning and end. The end is reached when the project's objectives have been achieved or when the project is terminated because its objectives will not or cannot be met, or when the need for the project no longer exists. This course explores the discipline of project management across the project lifecycle. Based on the Project Management Institute's (PMI) *Project Management Body of Knowledge*. At the completion of the course, students should have the knowledge to successfully complete the PMI's certification exam.

MPAD 6350. Public Sector Financial Management. (3) Takes students beyond the introductory material in MPAD 6131 into a more thoroughgoing analysis of the finance function in modern governments. The dimensions of budgeting and financial management theory and practice which are examined include: public sector managerial accounting for revenues and expenditures; basic governmental accounting principles and procedures; the relationship of budgets to the accounting system; principles and concepts of revenue policy and administration. Topics covered are some of the fundamental aspects of public financial management.

MPAD 6352. Public Sector Financial Reporting and Analysis. (3) Extending the coverage of public financial management topics to include the accounting and reporting activities of government and nonprofit organizations. The dimensions of accounting and financial management theory and practice which are examined include: accounting for revenues and expenditures; basic governmental accounting principles and procedures, business-type activities of governments, governmental third-party fiduciary activities, agency relationships, the relationship of budgets to the accounting system, financial reporting and auditing, financial statement analysis, and credit analysis. A unit of the course also concerns ethics, risk-taking and accountability, with a special emphasis on high-risk "derivative securities," and the need to maintain the highest standards of fiduciary responsibility.

MPAD 6800. Directed Study in Public Administration. (3) Prerequisites: All core courses in

the MPAD Program and approval by the Program Director. Individual project proposal on a directed topic of significance based on field experience in public administration. *Graded on a Pass/In Progress basis.*

MPAD 6801. Directed Study in Public

Administration. (3) Prerequisites: MPAD 6800 and approval by the MPAD Program Director. Individual project report on a directed topic of significance based on field experience in public administration. *Graded on a Pass/In Progress basis.*

MPAD 6820. Independent Study. (1-3) Prerequisite: Permission of instructor and the MPAD Program Director. Supervised study of a public administration topic or problem of special interest to the student, within the instructor's expertise, and normally an extension of previous coursework with the instructor. *May be repeated for credit with change of topic.*

Public Policy

• Ph.D. in Public Policy

Public Policy Program

publicpolicy.uncc.edu

Graduate Program Director

Dr. Martha E. Kropf (Interim)

Graduate Faculty

Criminal Justice

Dr. Bruce Arrigo, Professor
Dr. Beth Bjerregaard, Professor
Dr. Lyn Exum, Associate Professor
Dr. Shelley Listwan, Associate Professor
Dr. John Stogner, Assistant Professor

Criminal Justice (Affiliate Faculty)

Dr. Anita Blowers, Associate Professor
Dr. Michael Turner, Professor

Economics

Dr. Peter Schwarz, Professor
Dr. Arthur Zillante, Associate Professor

Economics (Affiliate Faculty)

Dr. Paul Gaggl, Assistant Professor
Dr. Lisa Schulkind, Assistant Professor
Dr. Carol O. Stivender, Clinical Professor
Dr. Jennifer Troyer, Professor

Geography and Earth Sciences

Dr. Harrison Campbell, Associate Professor
Dr. William Graves, Associate Professor
Dr. Isabelle Nilsson, Assistant Professor
Dr. Jean-Claude Thill, Distinguished Professor

Geography and Earth Sciences (Affiliate Faculty)

Dr. Robert Boyer, Assistant Professor
Dr. Edd Hauser, Professor
Dr. Heather Smith, Professor

Public Health Sciences

Dr. Sarah Laditka, Associate Professor
Mr. Winsor Schmidt, J.D., L.L.M., Distinguished Professor

Public Health Sciences (Affiliate Faculty)

Dr. Yvette Huet, Professor
Dr. Michele Issel, Professor
Dr. James Laditka, Professor

Philosophy

Dr. Gordon Hull, Associate Professor

Political Science and Public Administration

Dr. Joanne Carman, Associate Professor
Dr. Jacqueline Chattopadhyay, Assistant Professor
Dr. Eric Heberlig, Professor
Dr. Martha Kropf, Professor
Dr. Suzanne Leland, Professor
Dr. Cherie Maestas, Distinguished Professor
Dr. Jaclyn Piatek, Assistant Professor
Dr. John Szmer, Associate Professor

Political Science and Public Administration (Affiliate Faculty)

Dr. Justin Conrad, Associate Professor
Dr. Zachary Mohr, Assistant Professor
Dr. James Walsh, Professor
Dr. Beth Whitaker, Associate Professor

Sociology

Dr. Yang Cao, Associate Professor
Dr. Scott Fitzgerald, Associate Professor
Dr. Rosemary Hopcroft, Professor
Dr. Roslyn Mickelson, Professor
Dr. Stephanie Moller, Professor
Dr. Beth A. Rubin, Professor
Dr. Teresa Scheid, Professor
Dr. Elizabeth Stearns, Professor
Dr. Joseph Whitmeyer, Professor

Sociology (Affiliate Faculty)

Dr. Wei Zhao, Associate Professor

Other Affiliated Faculty

Dr. Jurgen Buchenau, Professor, History
Dr. Lisa Driscoll, Associate Professor, Educational Leadership
Dr. Annelise Mennicke, Assistant Professor, Social Work
Dr. Gregory Mixon, Professor, History
Dr. Aaron Shapiro, Associate Professor, History
Dr. Gregory Starrett, Professor, Anthropology
Dr. Lori Thomas, Assistant Professor, Social Work
Dr. Peter Thorsheim, Professor, History
Dr. Mark Wilson, Professor, History
Dr. Jay Wu, Professor, Civil and Environmental Engineering

PH.D. IN PUBLIC POLICY

The Ph.D. in Public Policy at UNC Charlotte is an interdisciplinary program focusing on the study of policy development, implementation, and evaluation. It stresses the development of skills, tools, and specialties, as well as a theoretical understanding of them, that contribute to our understanding of the structure of institutional systems and sub-systems and of how policy should be shaped within political environments.

The Ph.D. in Public Policy prepares students to be researchers, decision makers and policy analysts in local, state or federal governments, not-for-profit agencies, for-profit institutions, and academia. The Program stresses applied and empirical policy research grounded in an interdisciplinary theoretical foundation. Students will become versed in analytical techniques suitable for research and policy analysis to address substantive issues and problems in varied geographic and political contexts. The intellectual focus of the Program is guided by three overarching themes:

- 1) **Interdisciplinary Perspective:** Effective policy analysis and policy formation are not informed by any single discipline. Rather, public policy requires knowledge of the historical, cultural, political, institutional, geographic, and economic dimensions of policy problems facing any community.
- 2) **Applied and Empirical Policy Analysis:** Public policy is an inherently applied endeavor that seeks practical solutions and cogent analysis. While theory informs all research and analysis, the purpose of policy research is to elevate public discourse and improve public decision-making.
- 3) **Place-Based Research:** To exercise applied policy analysis in an interdisciplinary context, policy research must be place-based. Real policy analysis, based on real data, applied to actual geographic and political settings is a strength of the Program.

Admission Requirements

The following are general guidelines for successful admissions into the Ph.D. in Public Policy Program:

- 1) A master's degree in a social science or other field related to policy studies is required for admission to full standing in the Ph.D. in Public Policy.
- 2) Exceptional performance at the master's level is required. This means a GPA of at least 3.3 in a master's degree program is required for admission. Students with baccalaureate degrees may be admitted on a conditional basis if they have an overall undergraduate GPA of at least 3.5 and are currently enrolled in a master's level program at UNC Charlotte in a field related to policy studies. However, such students will not formally be admitted to the Ph.D. program until completion of the requirements for the master's degree.
- 3) Admission to the program requires strong scores (at least at the fiftieth percentile) on the verbal, quantitative, and analytic sections of the Graduate Record Examination. The Graduate Record Examination is a required part of the application package.

- 4) Three strong, positive letters of recommendation, at least two of which must come from faculty in the student's previous academic programs. All letters should be written by individuals in a position to judge the applicant's likely success in a Ph.D. level program. Letters should address the applicant's suitability for a Ph.D. program and ability to complete the program in a timely fashion. Letters from the student's master's level program are preferred.
- 5) Admission to the program of students who are not native English speakers requires strong scores on the TOEFL exam. The TOEFL exam is a required part of the application package for non-native English speakers.
- 6) Students entering the program are expected to remedy any coursework deficiencies identified by the Admissions Committee and Program Director in the first semester after enrolling in the Program. The amount and kinds of remedial coursework required for the program depends on the background of the student and are established by the Admissions Committee and the Program Director. Possible deficiencies are indicated in the prerequisites for the required core courses of the program. This program emphasizes the quantitative and analytical skills necessary to confront the challenges of contemporary policy dilemmas that communities face at the local, state, federal, and international levels.

Documents for Admission:

- 1) Official transcripts from all colleges and universities attended
- 2) Official GRE scores (verbal, quantitative, and analytical writing)
- 3) The UNC Charlotte application for graduate admission form
- 4) Three letters of reference from academics who have taught or worked directly with the applicant
- 5) An essay that addresses professional goals and motivation for pursuing the degree, suitability for the program, career goals following the degree, and the policy specialty the applicant would pursue within the Program
- 6) TOEFL scores (if the student is not a native English speaker)

Admission Assessment

- 1) An Admissions Committee reviews applications and recommends to the Program Director whether each applicant should be admitted and, if so, under what conditions.
- 2) The Program's Admissions Committee assesses each student's previous academic coursework in light of the student's stated direction of study. This assessment is used to identify the strengths and weaknesses of the student's previous

academic history and to suggest specific coursework for the student's public policy program. Any remedial coursework required for the program depends on the student's background and will be established by the Admissions Committee and the Program Director. The Admissions Committee may also suggest specific coursework based on the student's intended direction of study within the program. The Admissions Committee conducts this assessment upon the student's acceptance and formal declaration of intent to attend. For each entering student, the Director of the Public Policy Program serves as his or her major advisor for the first year in the Program before the student chooses his or her committee chair.

Student Responsibility

Students entering the program must present evidence that their background is sufficient to undertake the coursework required of them. Such evidence ideally should include some combination of:

- 1) Familiarity with political and legal processes, behaviors, and institutions
- 2) A graduate level social science methods or statistics course
- 3) College coursework in both macro- and micro-economics
- 4) Substantial background in a public policy specialty area

Students may have completed appropriate courses to provide this background elsewhere. Normally, transcripts provide the evidence required by the Admissions Committee; however, if the student's previous experience is offered as evidence, the student must document such experience. A more detailed list of the types of prerequisite coursework can be found online at publicpolicy.uncc.edu.

Degree Requirements

The total number of credit hours is established by the student's advisor according to a plan of study that must be presented after the successful completion of 18 credit hours of coursework. The Ph.D. Program requires 26 credit hours of core course credit, at least 6 credit hours of advanced analysis coursework, 18 credit hours of dissertation credit (enrollment contingent on admission to candidacy), and a minimum of 15 credit hours for specialty elective courses. Students can complete the program with 65 credit hours, but will likely take more. Students progress through the program in five stages:

- 1) Core Courses
- 2) Qualifying Examinations
- 3) Advanced Analysis Coursework and Specialty Policy Field Courses

- 4) Dissertation Proposal Defense
- 5) Dissertation

Core Courses (26 credit hours)

Introductory Course

GRAD 8100 Accelerated Introduction to Quantitative Techniques (2)

Nature of the Field Courses

PPOL 8600 Policy Process I (3)

PPOL 8602 Research Design (3)

PPOL 8635 Ethics of Public Policy (3)

PPOL 8690 Seminar in Public Policy (1) (*Students enroll in this course a total of three times*)

Methods of Analysis Courses

GRAD 8101 Linear Regression (3)

PPOL 8630 Advanced Program Evaluation (3)

Economic Analysis Courses

PPOL 8640 Economic Analysis I (3)

PPOL 8641 Economic Analysis II (3)

Advanced Analysis Courses (6 credit hours)

Prior to defending a dissertation proposal, students must complete at least six (6) credit hours of advanced analysis coursework at the doctoral level. These credit hours may also be taken outside the Public Policy program with the approval of the Program Director. Students are encouraged to choose courses that cover the types of analysis that are prevalent in the student's policy area of interest. Students may select from the following list or take courses in other departments with permission of the Program Director:

BPHD 8120 - Econometrics I (3)

BPHD 8130 - Econometrics II (3)

GRAD 8009 Topics in Graduate Studies (3) (*topic in advanced analysis*)

GRAD 8101 Linear Regression (3)

GRAD 8102 Categorical Outcomes (3)

GRAD 8103 Classificatory Methods and Time Series (3)

GRAD 8104 Spatial Statistics (3)

PPOL 8622 Qualitative Methods in Public Policy (3)

PPOL 8625 Advanced Seminar in Spatial Decisions Support Systems (3)

Policy Application Courses (15 credit hours)

After students have completed the 26 core course credit hours and the 6 advanced analysis course hours, they are prepared to select a substantive application for their dissertation research. Students, in consultation with their advisor, take a minimum of 5 courses (15 credit hours) in a substantive area on which their dissertation will focus. While the core courses prepare students to develop, implement, and evaluate policy, the dissertation research provides the opportunity to put those tools into a substantive

context. Public Policy at UNC Charlotte is in Charlotte's Urban Research University, and the program is particularly strong in studying the various aspects of urban policy, including issues of economics, social inequality, education, health, development, criminal justice, and other aspects of urban life locally and globally. Thus, students should, in consultation with their advisor, develop a set of research questions and substantive interest on which their dissertation will focus. Students are encouraged to work with their advisor and the Program Director to design a program of study tailored to their policy interests by combining courses in several of these policy areas. While the particular courses required in each policy area may vary according to prerequisites needed by the student or individual programs of study, the minimum number of required courses in any given policy area is five (5) for 15 credit hours.

Examples of such areas and typical course sequences include:

Economic Policy

The Policy Field in Economic Policy focuses on the study of policy issues related to market, government, firm, and individual behavior. This specialty allows students to build knowledge regarding economic theory and tools used by economists to consider policy issues. In addition, the specialty offers several courses in which theoretical and statistical tools are applied to specific policy areas, including public economics, urban and regional economics, and health economics.

The following advanced quantitative methods courses are strongly recommended, and students are encouraged to work with their advisor to identify other relevant advanced methods courses:

BPHD 8120 Econometrics I (3)
BPHD 8130 Econometrics II (3)

Students are encouraged to choose courses of interest from the following offerings:

PPOL 8642 Regional Economic Development (3)
PPOL 8667 Economics of Health and Healthcare
PPOL 8705 Advanced Urban and Regional Economics (3)
PPOL 8707 Game Theory and Experiments
PPOL 8709 Public Economics (3)
PPOL 8711 Monetary and Financial Theory (3)

In addition, the following economic theory courses are recommended for students without Master's level training in Economics:

PPOL 8701 Advanced Macroeconomic Theory (3)
PPOL 8703 Advanced Microeconomic Theory (3)

Other courses appropriate for each specialty may be available, and students may take these or substitute

them for one of the listed classes in consultation with their advisor and the Program Director.

Students are encouraged to develop a focus in other related fields or design their specialty based on faculty resources available. As with all programs, such a program would need the approval of the student's advisor and the Program Director. Program faculty continue to develop additional substantive and methods courses.

Environmental/Infrastructure Policy

The Policy Field in Environmental/Infrastructure Policy focuses on environmental issues impacted by energy production and consumption, growth, pollution, and population change. This specialty allows interested students to gain knowledge on the economic factors related to environmental degradation and improvement. It also allows them the opportunity to become familiar with the scientific aspects of urban air, water, and earth systems. Policy making and policy analysis related to these issues will all be covered by courses in this specialty.

Courses for this specialty typically include:

PPOL 8600 Transportation Policy (3)
PPOL 8650 Environmental Policy (3)
PPOL 8652 Energy and Environmental Economics (3)

Two additional courses from these or other choices:

PPOL 8653 Urban Air Quality (3)
PPOL 8655 Watershed Science and Policy (3)
PPOL 8656 Earth Systems Analysis: Biogeochemical Cycles (3)

Health Policy

The Policy Field in Health Policy focuses on applied research in the organization, delivery and financing of healthcare and population-based issues in health (including mental health). A multidisciplinary faculty in epidemiology, health economics and finance, health policy, medical sociology, bioethics, and health law is ideally suited to prepare quantitative health service researchers and health policy analysts. Qualified students without a relevant Master's degree can prepare for the Ph.D. by completing coursework in the master in health administration (MHA), the MA in medical sociology, or the MS in Health Promotion while enrolled in the Ph.D. with a field specialty in Health Policy.

Courses for this specialty typically include:

PPOL 8636 - The Social Context of Mental Health (3)
PPOL 8661 Social Organization of Healthcare (3)
PPOL 8663 Health Policy (3)
PPOL 8665 Analytic Epidemiology (3)
PPOL 8667 Economics of Health and Healthcare (3)
PPOL 8669 Investigating Health and Health Services (3)

Justice Policy

The Justice Policy Field provides an interdisciplinary approach to the study of crime and society's response to it. This specialty prepares students to conduct research and policy analysis on local, state, and national policies and policy initiatives and provide information for policy makers. The primary goal of this specialization is to provide students with the tools necessary for critically and objectively assessing policies related to the administration of justice. Toward that end, students gain the appropriate analytical skills, an understanding of the nature of criminal behavior and its impact, and knowledge about the criminal justice system as well as about a variety of issues related to the control of crime. They also become familiar with the process of making and implementing justice policy and with those organizations involved in this process.

Courses for this specialty typically include:

PPOL 8000 Topics in Public Policy (1-4)
 PPOL 8617 Law and Management (3)
 PPOL 8671 Criminal Justice Policy (3)
 PPOL 8672 Theories of Crime and Justice (3)
 PPOL 8673 Law and Social Control (3)

Social Policy

The Policy Field in Social Policy prepares scholars, researchers, practitioners, and policy makers to address crucial social issues facing communities and our nation including social welfare, education, poverty, housing and homelessness and the role of public, nonprofit, and private sectors in alleviating and contributing to such problems. In addition to dealing with these topics in their own right, the social policy field focuses on the complex interrelationships among these issues and the manner in which they are influenced by--and in turn influence--prevailing patterns of racial, ethnic, and gender stratification. The social policy specialization provides the theoretical background, methodological training, and substantive knowledge that will allow students to make important contributions to the development, implementation, and evaluation of public policies addressing the most vexing and important social issues of our time.

Courses for this specialty typically include:

PPOL 8681 Race, Gender, Class and Public Policy (3)
 PPOL 8682 Stratification and Social Policy (3)
 PPOL 8683 Population Dynamics and Social Policy (3)
 PPOL 8685 Aging and Social Policy (3)
 PPOL 8687 Education Policy (3)
 PPOL 8688 Political Economy of School Reform (3)
 PPOL 8689 The Social Context of Schooling (3)

Urban and Regional Development Policy

The Urban and Regional Development Policy Field stresses applied and empirical policy research that is grounded in an interdisciplinary theoretical foundation. Students will be prepared in analytical techniques suitable for research and policy analysis through courses addressing several topics at the neighborhood, city and regional levels, including: Economic Development; Transportation Policy; Infrastructure Provision; Public Service Delivery; Growth Management; Regionalism and Governance.

Courses for this specialty typically include:

PPOL 8610 Urban Regional Environment (3)
 PPOL 8611 Metropolitan Governance and Administration (3)
 PPOL 8612 Theory of Urban Development (3)
 PPOL 8613 Transportation Policy (3)
 PPOL 8614 Colloquium in 20th Century Black Urban History (3)
 PPOL 8615 The Restructuring City (3)
 PPOL 8616 Urban Planning Theory and Practice (3)
 PPOL 8617 Law and Management (3)
 PPOL 8618 Growth Management Systems (3)
 PPOL 8642 Regional Economic Development (3)
 PPOL 8643 Rural Development Issues (3)
 PPOL 8644 Public Budgeting and Financing (3)

Advising/Committees

While the Program Director serves as the *de facto* advisor for each student for the first year, the Program Director works with the students and faculty to help the student work with a suitable advisor. Once the student is matched with the advisor, they work closely with that advisor on suggested schedules of classes, research options, and other issues important to success. After approximately one year in the program, each student is expected to have identified the faculty member with whom they would like to mentor, with the expectation that this mentor would ultimately serve on the student's committees. Following completion of the policy field courses, students establish their dissertation advisor and form a dissertation committee. The procedures for establishing these committees are in the *Student Handbook* and are addressed in the Public Policy Seminar.

Grade Requirements

A student must maintain a cumulative average of 3.0 in all coursework taken for graduate credit. An accumulation of three C grades will result in termination of the student's enrollment in the graduate program. If a student receives a grade of U in any course, enrollment in the program will be terminated.

Transfer Credit

The Program will accept up to two courses in the core curriculum as transfer credit from other regionally

accredited doctoral institutions, providing that the Admissions Committee determines that these courses are equivalent to those offered in the core or one of the specialty areas. The acceptance of transfer credit is subject to the approval of the Graduate School. The grade in these transfer credits must have been A or B. All of the dissertation work must be completed at UNC Charlotte.

Dissertation

The program requires that the student complete 18 hours of dissertation credit. Enrollment in dissertation credit is contingent on admission to candidacy. The dissertation topic may be proposed after the student has passed the qualifying exams. The doctoral student advances to candidacy after the dissertation proposal has been defended to, and approved by, the student's advisory committee and reported to the Director of the Ph.D. in Public Policy and the Dean of the Graduate School. The student must complete and defend the dissertation based on a research program approved by the student's dissertation committee that results in a high quality, original, and substantial piece of research.

Seminar

Students in the program develop their appreciation of the varied nature of policy applications and improve their communication skills by participating in at least three seminar series throughout the course of their program. This seminar also serves as a clearinghouse, introducing students to the varied faculty in the program. Each semester, a series of guest speakers prepare monthly seminars reflecting a range of policy issues and challenges. Students engage in activities aimed at professional development for both practitioners and for those interested in pursuing careers in academia.

PPOL 8690 Seminar in Public Policy (1)

Research Opportunities

The Ph.D. Program in Public Policy has an extensive pool of professors to enhance the research opportunities and experiences for the students. Each program of study could be individually tailored for the research of the student with the possibility of individual studies under the supervision of an advisor.

Admission to Candidacy

After completing the core courses, students are required to write a qualifying examination covering the nature of the field, methodology, and economic analysis skills. After completing the qualifying examination, students take their policy field courses. Successful completion of core courses and the qualifying examinations allows students to proceed to the dissertation proposal preparation and defense

stage. The dissertation proposal defense includes an oral presentation and written proposal. Prior to the proposal defense, with the guidance of their advisor, students develop a topic paper that outlines the policy area on which their dissertation will focus. After a topic approval meeting, students develop that topic paper into a full proposal. During the oral component of the proposal defense, the student addresses not only the specific research topic about which they will write but situates that topic in the larger body of relevant policy literatures; the defense serves as the comprehensive examination. Procedures for establishing the dissertation committee are addressed in the *Student Handbook* and in the Public Policy Seminar course.

Application for Degree

Each student should make application for his/her degree by completing the online Application for Degree through Banner Self Service no later than the filing date specified in the University Academic Calendar. After successful defense of the dissertation, a student will be conferred with the doctoral degree.

Residency Requirement

Students must satisfy the residency requirement for the program by completing 21 hours of continuous enrollment, either as coursework or dissertation credits. Residence is considered continuous if the student is enrolled in one or more courses in successive semesters until 21 hours are earned. All 18 hours of dissertation credit must be earned at UNC Charlotte.

Time Limits for Completion

The student must achieve admission to candidacy within six years after admission to the program. All requirements for the degree must be completed within eight years after first registration as a doctoral student. These time limits are maximums; full-time students will typically complete the degree requirements in five years.

Assistantships

The Ph.D. in Public Policy is committed to academic year funding for all full-time students. Additional support for summer sessions may be available through program funds and research grants working with program faculty. Available options for funding include graduate assistantships, teaching assistantships for those interested in careers in academia, and scholarships. For more information on funding options, contact the Director of the Public Policy Program.

COURSES IN PUBLIC POLICY (PPOL)*Notes:*

- *The core courses listed below are available only to students admitted into the Ph.D. in Public Policy or to students admitted to other Ph.D. programs.*
- *Permission of instructor is required on all courses in the Ph.D. in Public Policy program.*
- *There are no specific prerequisites for many of the courses listed below; however, the general levels of preparation are described in greater detail online at publicpolicy.uncc.edu and in the Student Handbook.*
- *Occasionally, these courses are offered during Summer, as well as during Fall or Spring semesters.*

PPOL 8000. Topics in Public Policy. (1-4)

Prerequisites: Full graduate standing in the Ph.D. in Public Policy program or permission of instructor. Study of selected topics in Public Policy. *May be repeated for credit.*

PPOL 8600. Policy Process I. (3) Prerequisites: Prior coursework or experience relevant to political and legal processes, behaviors, and institutions. This is a Core Course in the Ph.D. in Public Policy program. Examination of the field of public policy analysis to include both theory and practice. Process includes everything from sources of public problems to feedback mechanisms after policy implementation. Emphasis on the policy process in growing urban regions and the ability to communicate with stakeholders to determine value conflicts and to communicate policy solutions. Examination of the context (legal, institutional, historical, philosophical, social, political, physical and spatial) within which policy is made with sensitivity to gender, race and ethnicity, and class concerns.

PPOL 8602. Research Design in Public Policy. (3)

This is a Core Course in the Ph.D. in Public Policy program. Introduces students to various quantitative and qualitative approaches to doing policy research. Considers such major issues in philosophy of science as causality, measurement, and post-positive approaches to research. Students may use the course to prepare their dissertation proposals or research grant and contract proposals.

PPOL 8610. Urban Regional Environment. (3) Cross-listed as GEOG 6123 and GEOG 8123. Prerequisite: Prior coursework or experience relevant to the nature of urban regions. Examination of the nature of urban regions. The basic factors that shape urban regions as they grow. Impact of: geography; history; social factors; economic factors; concerns about gender,

race and ethnicity, and class; and other determinants of the nature of urban regions, their problems, and possible policy solutions.

PPOL 8611. Metropolitan Governance and Administration. (3)

Prerequisite: Full graduate standing in the Ph.D. in Public Policy program or permission of instructor. Introduction of major issues in urban politics and related trends and problems in urban governance and administration.

PPOL 8612. Theory of Urban Development. (3)

Prerequisite: Full graduate standing in the Ph.D. in Public Policy program or permission of instructor. Analysis of urban economics and politics within the context of public policy and planning. Focuses on theory and application to understand the rationale for and effects of urban policy, urban economic development, and planning. Provides basic understanding of the operation of urban real estate markets and the motivation for public sector interventions. Applies theoretical foundations to the study of current urban problems and controversies. Familiarity with introductory microeconomics is required.

PPOL 8613. Transportation Policy. (3)

Cross-listed as GEOG 6600 and 8600. Prerequisite: Full graduate standing in the Ph.D. in Public Policy program or permission of instructor. Examines surface transportation from a broad public policy perspective with a special focus on its institutional components and the changing role of government in transportation policy-making including the evolution of, and relationships among, various federal, state and local policies that affect investment decisions in transportation infrastructure.

PPOL 8614. Colloquium in 20th Century Black Urban History. (3)

Prerequisite: Full graduate standing in the Ph.D. in Public Policy program or permission of instructor. Examination of major and topical monographic works in African American urban history during the twentieth century. The focus will be on such topics as "classical urban examinations by black scholars, ghettoization and alternative theories, community and its institutions, riot and urban rebellions, biography, black mayors, and urban policy.

PPOL 8615. The Restructuring City. (3)

Cross-listed as GEOG 6210 and 8210. Prerequisite: Full graduate standing in the Ph.D. in Public Policy program or permission of instructor. This course places at center stage the causes and consequences of contemporary urban restructuring and evaluates the theoretical, planning, and policy challenges inevitably presented.

PPOL 8616. Urban Planning Theory and Practice. (3)

Prerequisite: Full graduate standing in the Ph.D. in Public Policy program or permission of instructor. Alternative planning theories and application of theories in urban planning practices.

PPOL 8617. Law and Management. (3)

Prerequisite: Full graduate standing in the Ph.D. in Public Policy program or permission of instructor. Constitutional and administrative law issues, including a survey of academic debates over contested issues, and selected areas in constitutional law on civil liberties and civil rights.

PPOL 8618. Growth Management Systems. (3)

Prerequisite: Full graduate standing in the Ph.D. in Public Policy program or permission of instructor. Exploration of growth management programs, legal and planning issues, and legislation to determine their merits, weaknesses and abilities to promote more sustainable development patterns. Will emphasize difficulty of changing traditional procedures of development and land use.

PPOL 8622. Qualitative Methods in Public Policy. (3)

Advanced qualitative methods as applied to analysis and solution of public problems. Use of qualitative methods to analyze public problems; to devise appropriate, effective, acceptable public policies; to evaluate public programs; and to present the results of qualitative analysis to appropriate audiences.

PPOL 8625. Advanced Seminar in Spatial Decisions Support Systems. (3)

Prerequisite: GEOG 5120 or permission of instructor. Theoretical aspects of spatial DSS including technical, social, political and psychological considerations; system s design; systems manipulation; and case studies. Three hours of lecture and one-two hour lab per week.

PPOL 8630. Advanced Program Evaluation. (3) This is a CORE course in the Ph.D. in Public Policy program. Development and application of policy analysis to the evaluation of existing public policies. Particular attention to the use of multiple techniques of analysis and presentation of program evaluations to relevant audiences.

PPOL 8635. Ethics of Public Policy. (3)

This is a CORE course in the Ph.D. in Public Policy program. Ethical questions in the study, formation, implementation, and evaluation of public policies. Ethical dilemmas faced by the public policy analyst, and the importance of use of values analysis. Emphasis on understanding how values are communicated by a variety of stakeholders in policy systems and how communicating public policy solutions involves an understanding of the role of

values in successful policy formation and implementation.

PPOL 8636. The Social Context of Mental Health. (3)

Cross-listed as SOCY 6635, SOWK 6635, and PSYC 8636. Prerequisite: Admission to graduate program or permission of instructor. Draws upon contributions from the field of psychiatry, psychology, social work, and anthropology. Focuses on mental health and illness it is social context, with an emphasis on the relationship between social structure and mental health/disorder. Examines the social factors which shape psychiatric diagnosis, the effects of socio-demographic variables on mental health, and the role of social support and stress for different groups. Also examines the organization, delivery, and evaluation of mental health services, and mental healthcare policy.

PPOL 8640. Economic Analysis of Public Policy I. (3)

This is a CORE course in the Ph.D. in Public Policy program. Economic role of government, efficiency versus equity, externalities, and public goods, market failures and government failures, economics of centralized versus decentralized decision making, public choice theory, economics of privatization, economic role of nonprofits and non-governmental organizations.

PPOL 8641. Economic Analysis of Public Policy II. (3)

Prerequisite: PPOL 8640. This is a CORE course in the Ph.D. in Public Policy program. Economics of taxation and government borrowing, benefit-cost analysis, regional growth and development, econometric analysis of local and regional public policy issues.

PPOL 8642. Regional Economic Development. (3)

Cross-listed as GEOG 6302 and GEOG 8302. Prerequisites: Full graduate standing in the Ph.D. in Public Policy program; PPOL 8610; intermediate microeconomics; or permission of instructor. Course covers classical, neo-classical and contemporary theories of trade, economic geography, and regional development. Topics include: theories of urban and regional growth, location theories, human capital, labor force and entrepreneurial contributions to growth. Policy dimensions of urban growth and development are addressed from theoretical and empirical perspectives.

PPOL 8643. Rural Development Issues. (3)

Prerequisite: Full graduate standing in the Ph.D. in Public Policy program or permission of instructor. This course provides research experiences that focus on policy formulation, and demographic, economic and planning issues in rural areas.

PPOL 8644. Public Budgeting and Financing. (3)

Prerequisite: Full graduate standing in the Ph.D. in Public Policy program or permission of instructor. Focus is on the public budget process as a means of policy development, analysis and implementation. It will also address in more depth issues of financing the policies authorized in the budget and for which appropriations are sought.

PPOL 8650. Environmental Policy. (3)

Prerequisite: Full graduate standing in the Ph.D. in Public Policy program or permission of instructor. This course draws upon concepts and tools from economics, geography, law, sociology, political science, and planning to explore the concept of sustainable development, a central tenet of environmental policy. Environmental policy will be analyzed within the federalist framework.

PPOL 8652. Energy and Environmental Economics. (3)

Prerequisite: Full graduate standing in the Ph.D. in Public Policy program or permission of instructor. Economics issues of both energy and environment. Energy issues include the historical development of energy resources, supply and demand considerations, and projections of the future energy balance. Environmental issues are externalities, common property resources, and government regulation. Policy considerations include environmental standards, pollution charges, and property rights. Cost-benefit analysis and microeconomic theory are applied.

PPOL 8653. Urban Air Quality. (3)

Prerequisites: Ph.D. student and permission of instructor. Examination of the relationships between climatic processes and urban air quality with emphasis on trends and patterns. Topics will include health and environmental effects of air pollution, ozone climatology, pollutant transport, transportation related emissions, risk assessment, and air quality management.

PPOL 8655. Watershed Science Policy. (3)

Prerequisite: Full graduate standing in the Ph.D. in Public Policy program or permission of instructor. Examination of the cycling of water and chemical elements within forested, agricultural and urbanized watersheds. Land use regulations designed to protect water quality are examined with respect to hydrologic and biogeochemical process that operate at the watershed scale.

PPOL 8656. Earth Systems Analysis: Biogeochemical Cycles. (3)

Prerequisite: Full graduate standing in the Ph.D. in Public Policy program or permission of instructor. Examines the Earth's water and major elemental cycles including those of carbon, nitrogen, sulfur, phosphorus and the major crustal elements.

Uncertainties in the current state of global elemental cycles are examined. Special emphasis is placed on how these cycles are currently being modified through human activities.

PPOL 8661. Social Organization of Healthcare. (3)

Prerequisite: Full graduate standing in the Ph.D. in Public Policy program or permission of instructor. Focuses on the structures and operations of healthcare institutions and providers. The topics covered include the socio-historical development of the existing healthcare system, healthcare occupations and professions, professional power and autonomy, professional socialization, inter-professional and provider-client relations, healthcare organizations, and how change affects the delivery of healthcare services.

PPOL 8663. Health Policy. (3)

Cross-listed as HSRD 8005. Prerequisite: Full graduate standing in the Ph.D. in Public Policy program and a graduate level course providing an adequate introduction to the U.S. healthcare system such as HADM 6100 or MPAD 6172, or permission of instructor. Examines the formulation, adoption, implementation, and evaluation of health policy at national, state, and local levels through extensive readings in relevant health and policy literatures.

PPOL 8665. Analytic Epidemiology. (3)

Cross-listed as HCIP 6260, HLTH 6260, HLTH 8260, and HSRD 8003. Prerequisite: Full graduate standing in the Ph.D. in Public Policy program and a graduate level course such as HADM 6104 or permission of instructor. Principles and methods of studying advanced epidemiology, with emphasis on the analytic approach, including advanced techniques in the establishment of disease causation in groups and communities. Topics include: risk assessment, environmental exposures, stratification and adjustment, and multivariate analysis in epidemiology. Emphasis is also placed on quality assurance and control and communicating results of epidemiological studies in professional publications and settings.

PPOL 8667. Economic of Health and Healthcare. (3)

Cross-listed as ECON 6260 and HSRD 8004. Prerequisite: Full graduate standing in the Ph.D. in Public Policy program, PPOL 8640 and PPOL 8641 or permission of instructor. Uses economic theory and econometrics to analyze the functioning of the healthcare sector and appropriate public policy. Topics include: how markets for medical care differs from other markets, the demand for medical care, the demand and supply of health insurance, the role of competition in medical markets, managed care, managed competition, and the role of the public sector in regulating and financing healthcare.

PPOL 8669. Investigating Health and Health

Services. (3) Prerequisites: Full graduate standing in the Ph.D. in Public Policy program, GRAD 8101, and GRAD 8103; or permission of instructor. How to conduct and evaluate research necessary to health policy. Students are expected to conduct research utilizing a variety of methodologies and learn how to access available secondary data sets relevant to healthcare and policy. Topics include: multidisciplinary collaboration, measurement of health related constructs and healthcare outcomes, and health evaluation (cost, quality, access). Students are expected to develop their dissertation proposals as one outcomes of this course. Designed to be a seminar, and active participation in class discussion and activities is essential.

PPOL 8671. Criminal Justice Policy. (3) Prerequisite: Full graduate standing in the Ph.D. in Public Policy program or permission of instructor. Examination of the criminal justice subsystems (law enforcement, courts, corrections) with particular focus on the development of policy and the effectiveness of current policies aimed at reducing crime.

PPOL 8672. Theories of Crime and Justice. (3) Prerequisite: Full graduate standing in the Ph.D. in Public Policy program or permission of instructor. Exposes students to mainstream and critical theoretical approaches to crime, justice, and criminal behavior. An emphasis on both broad conceptual orientations allows us to assess the development of criminology within an array of historical and philosophical contexts during the past three centuries.

PPOL 8673. Law and Social Control. (3) Prerequisite: Full graduate standing in the Ph.D. in Public Policy program or permission of instructor. Examines how the criminal law functions as a powerful tool of social control in our society. Particular emphasis is given to understanding the constitutional limitations placed on construction of law, the elements of criminal offenses, and criminal defenses.

PPOL 8681. Race, Gender, Class, and Public Policy. (3) Prerequisite: Full graduate standing in the Ph.D. in Public Policy program or permission of instructor. An overview of major theories, trends, and debates on the topic of gender, race and economic inequality in the contemporary United States.

PPOL 8682. Stratification and Social Policy. (3) Prerequisite: Full graduate standing in the Ph.D. in Public Policy program or permission of instructor. Examines: (a) structures and processes underlying social stratification in the United States, particularly the inequality that is grounded in social class, gender, ethnicity, and race; and (b) the social policy

implications that follow from our analysis of the nature and sources of stratification.

PPOL 8683. Population Dynamics and Social Policy.

(3) Prerequisite: Full graduate standing in the Ph.D. in Public Policy program or permission of instructor. Basic population characteristics, such as age distribution, life expectancy, fertility, and trends in these characteristics are relevant to nearly all social policy. An introduction to basic concepts and tools of demographic analysis and how they may be applied to the study of social policy including family policy, aging policy, and minority groups' policy.

PPOL 8685. Aging and Social Policy. (3) Prerequisite: Full graduate standing in the Ph.D. in Public Policy program or permission of instructor. Utilizes the concepts of social gerontology as a Springboard for examining social policy for an aging population. Examination of the public policy making process with attention to aging policy. Consideration of determinants of aging policy and institution and actors in the policy making process and piecemeal development of legislation analyzed as factors related to the making of policy for the aged.

PPOL 8687. Education Policy. (3) Prerequisite: Full graduate standing in the Ph.D. in Public Policy program or permission of instructor. Examines equity, efficiency, and diversity tradeoffs among alternatives systems of delivering K-12 education. The course also examines how to evaluate educational policies and programs.

PPOL 8688. Political Economy of School Reform. (3) Prerequisite: Full graduate standing in the Ph.D. in Public Policy program or permission of instructor. Examines between business leaders' vision for school reform and the school restructuring movement, the reforms which arise from their construction of the problem, local educational restructuring efforts within the context of the larger national reform movement, and the opportunities and dangers of corporate-inspired educational policies.

PPOL 8689. The Social Context of Schooling. (3) Prerequisite: Full graduate standing in the Ph.D. in Public Policy program or permission of instructor. Examines the relationships among certain aspects of the contemporary social structure and educational processes and outcomes. It explores the ways that the social class structure, race, and gender stratification affect the ways individuals experience, understand, and acquire education.

PPOL 8690. Seminar in Public Policy. (1)

Prerequisite: Full graduate standing in the Ph.D. in Public Policy program or permission of instructor. This is a CORE course in the Ph.D. in Public Policy

program. Series of guest speakers and exercises on a range of policy issues. Designed to increase familiarity with the variety of topics and methods covered by policy making and analysis as well as career options. Student participation and oral critique of a selected speaker and their topic. *Must be repeated for credit for a total of 3 credits.*

PPOL 8701. Advanced Macroeconomic Theory. (3)

Cross-listed as ECON 6201. Prerequisites: Admission to graduate program and permission of program director. Theories of aggregate income determination, inflation, unemployment, interest rates and economic growth; macro-economic consumption and investment behavior; the business cycle.

PPOL 8703. Advanced Microeconomic Theory. (3)

Cross-listed as ECON 6202. Prerequisites: Admission to graduate program and permission of program director. Theories of the firm, of the consumer, and of resource owners; determination of prices under different market structures; general equilibrium analysis and welfare economics.

PPOL 8705. Advanced Urban and Regional Economics. (3) Cross-listed as ECON 6250.

Prerequisite: Admission to graduate program. Applications of microeconomic theory to problems of cities, metropolitan areas and regions; methods in regional analysis, location theory, land use planning, measurement of economic activity; transportation, housing, poverty, and growth issues.

PPOL 8707. Game Theory and Experiments. (3)

Cross-listed as ECON 6206. Prerequisite: Permission of the graduate program director. Focuses on game theoretic analysis and the experimental methodology which can be used to test game theoretic models. The primary topics in game theory include: static games with complete information, dynamic games with complete information, static games with incomplete information, and dynamic games with incomplete information. Some topics are introduced by way of an economic experiment, and the experiment is followed by a rigorous analysis of the game theoretic solution to the game. The latter part of the course focuses on how to design economic experiments as a means of testing the predictions of game theoretic models.

PPOL 8709. Public Economics. (3) Cross-listed as ECON 6256. Prerequisite: MATH 1241 or equivalent, and permission of the program director. Public economics is the study of the way governments choose spending, taxation, and regulatory policy; the ways such policies may affect economic welfare; and mechanisms to evaluate the economic effects of such policies.

PPOL 8711. Monetary and Financial Theory. (3)

Cross-listed as ECON 6235. Prerequisites: ECON 6201 or ECON 6202; and ECON 6112 or equivalent. Theory and empirical tests of money supply, money demand, and financial markets; portfolio theory with special attention to portfolio choices of banks; term structure of interest rates; dynamic models of money and economic activity.

PPOL 8800. Independent Study. (1-3) Prerequisite:

Permission of instructor and the program director. Supervised study of a public policy topic or problem of special interest to the student and within the instructor's expertise. *May be repeated for credit.*

PPOL 8801. Dissertation. (1-9) Prerequisites: Passage

of qualifying examinations, and approval of dissertation topic by the student's advisory committee. In-depth study of a practical problem in public policy. Analysis of the problem, preparation of a policy solution, and presentation of the solution to appropriate stakeholders and the public. *Graded on a Pass/Unsatisfactory basis.* Maximum of 18 hours allowed under this course designation.

Religious Studies

• M.A. in Religious Studies

Department of Religious Studies

religiousstudies.uncc.edu

Graduate Program Director

Dr. Sean McCloud

Graduate Faculty

Dr. Kent L. Brintnall, Associate Professor

Dr. Sean McCloud, Professor

Dr. John C. Reeves, Professor

Dr. Joanne Maguire Robinson, Associate Professor

Dr. Julia Robinson-Harmon, Associate Professor

Dr. James D. Tabor, Professor

Dr. Barbara Thiede, Lecturer

Dr. J. Daniel White, Associate Professor

MASTER OF ARTS IN RELIGIOUS STUDIES

The M.A. in Religious Studies program approaches the academic study of religion and religions from a variety of critical and interdisciplinary perspectives, with an emphasis placed on the global and multicultural aspects of religion. The department offers courses in theories and methods as well as a variety of religious traditions, studied in their historical and contemporary manifestations.

Additional Admission Requirements

In addition to meeting the university's graduate admission requirements, all prospective students must submit an essay (statement of purpose) that specifically addresses their motivation for pursuing the M.A. in Religious Studies, including some discussion of their research interests and career or professional goals. Standardized test scores and letters of reference can be no more than five years old.

Degree Requirements

The Master of Arts in Religious Studies requires the completion, with a GPA of 3.0 or above, of a minimum of 30 credit hours of approved graduate coursework. At least 15 credit hours of this total must be in courses open only to graduate students (i.e., at the 6000 level or higher). Students have two options for completing their degree: (1) Students may complete an M.A. Thesis option that consists of 24 credit hours of coursework and 6 credit hours of thesis work; or (2) Students may complete a comprehensive examination option consisting of 30 credit hours of coursework and comprehensive examinations in three

areas. All degree requirements must be completed within six calendar years of first enrollment in the program.

Core Courses

All M.A. candidates must complete the following courses with grades of B (3.0) or above within three semesters of their initial admission into the program.

RELS 6101 Approaches to the Study of Religion (3)

RELS 6102 Teaching in Religious Studies and the Humanities (3)

Elective Courses

Up to 6 hours of related graduate credit may be earned outside the Department of Religious Studies. Such courses must be formally approved by the Graduate Program Director.

Advising

The Graduate Program Director serves as formal advisor to the department's graduate students.

Transfer Credit

Up to 6 credit hours earned from other accredited institutions may be eligible for transfer credit. Formal approval must be obtained from the Graduate Program Director and the Dean of the Graduate School.

Foreign Language Requirement

Although students are not required to demonstrate proficiency in a foreign language as a formal matriculation requirement of the program, they are expected to acquire competency in and use whatever languages they need to pursue their research interests.

Committees for Thesis and Examination Options

Three-member faculty committees, consisting of two graduate faculty members from the Department of Religious Studies and a third member selected from Religious Studies or another department, conduct the comprehensive examinations and oversee the student's thesis work. For those choosing the exam option, one of the examining faculty members will be the student's instructor for RELS 6101.

Application for Degree

Each student should make application for his/her degree by completing the online Application for Degree through Banner Self Service no later than the filing date specified in the University Academic Calendar.

COURSES IN RELIGIOUS STUDIES (RELS)

RELS 5000. Topics in Religious Studies. (3)

Prerequisite: Permission of instructor. Major topics in religious studies. *May be repeated for credit.*

RELS 5010. Major Figure in Religious Studies. (3) The life and works of a major figure who has contributed to religious studies. *May be repeated for credit with change of figure.*

RELS 5101. Religion and Modern Thought. (3) The interaction of modern thought and modern religious sensibilities.

RELS 5107. Early Judaism. (3) Prerequisite: RELS 2104 or 2105 or 3110 or permission of instructor. Comparative historical and literary study of the varieties of Judaism evidenced during late antiquity (circa 70-640 C.E.), with special attention devoted to the formation and development of rabbinic Judaism.

RELS 5108. Medieval Judaism. (3) Prerequisite: RELS 2104 or 3110 or permission of instructor. Comparative historical and literary study of the varieties of Judaism evidenced in Western Europe, the Byzantine Empire, and Islamicate realms from approximately 640 C.E. to approximately 1492 C.E.

RELS 5109. Modern Judaism. (3) Prerequisite: RELS 3110, RELS 4107, RELS 4108, or permission of instructor. Historical and conceptual study of Judaism and Jewish experience in Europe, America, and Israel, from the 16th century to the present, with special attention paid to the development of denominations, Zionism, and the Holocaust.

RELS 5110. Contemporary Jewish Thought. (3) An examination of philosophy, religion, morality, politics, sociality, culture, family, and self-identity, in the light of modern and recent Jewish thought.

RELS 5201. Religion, Morality, and Justice. (3) Explores the ethical and social dimensions of selected religious traditions in their cultural contexts.

RELS 6000. Topics in Religious Studies. (3)

Prerequisite: Permission of instructor. Major topics in religious studies. *May be repeated for credit.*

RELS 6101. Approaches to the Study of Religion. (3) Prerequisite: Permission of department. This course provides students with critical tools for research, analytical thinking, and writing in the academic study of religion. The topics and individuals this course covers represent several major currents of thought in the field of religious studies.

RELS 6102. Teaching in Religious Studies and the Humanities. (3)

Prerequisite: Permission of department. Approaches the academic study of religion through the lens of its particular pedagogical challenges and rewards. Explores the history of religious studies in American classrooms, and surveys the scholarship of teaching and learning. Examination of a range of pedagogical philosophies where students may articulate their own vision of teaching. Students also have an opportunity to develop teaching portfolios, syllabi, and to create meaningful assignments.

RELS 6103. Material Christianity. (3)

Prerequisite: Permission of department. Explores the ways in which individuals and societies throughout the Christian tradition have invested material objects with sanctity and power.

RELS 6104. Religion and Art in Islam. (3)

Prerequisite: Permission of department. Explores the relationships between Islamic thought and the development of Islamic art and architecture.

RELS 6105. Religion, Art, and Architecture of East Asia. (3)

Prerequisite: Permission of department. A study of the religious ideas in physical forms in the cultures of China and Japan. The course focuses on the Confucian, Daoist, and Buddhist traditions.

RELS 6111. Qumran and its Literature. (3)

Prerequisite: Permission of department. A study of the manuscripts recovered from the caves of Qumran. Attention given to their connections to Second Temple Judaism, early Christianity, and later developments in Islam.

RELS 6602. Seminar in the Religion of Ancient Israel. (3)

Prerequisite: Permission of department. Current and seminal issues related to the study of the religion of ancient Israel. A general theme must be chosen which at times will be keyed to the pertinent archaeological evidence available for evaluating the complex scope of Israelite religiosity, but which at other times may selectively focus on narratological descriptions of religious behavior (e.g., the religious ideology of Deuteronomy). Extensive attention is devoted to the comparative study of Israelite religion within its ancient Near Eastern context. *May be repeated with change of topic.*

RELS 6603. Seminar in Early Judaism. (3)

Prerequisite: Permission of department. Current and seminal issues related to the historical-critical study of early Judaism and its literature. A general theme must be chosen: a narrative source (Mishnah, Midrash, Talmud); a subdivision of texts (Jewish apocrypha and pseudepigrapha) or literary genres (apocalyptic

literature); a single ancient text (1 Enoch; Avot de R. Natan); or a topical investigation (written and oral Torah; construction of authority in rabbinic Judaism; sectarian disputes within early Judaism; cultural impact of the Roman destruction of the Temple). *May be repeated with change of topic.*

RELS 6612. Seminar in Christian Origins. (3)

Prerequisite: Permission of department. Current and seminal issues related to the historical-critical study of the origins and development of earliest Christianity. A general theme must be chosen; an historical figure (John the Baptist, Jesus, Paul, James); an ancient text (a New Testament document; Gospel of Thomas; the Gnostic Nag Hammadi codices); or a topical investigation (Jesus and the Dead Sea Scrolls; the development of early Christian liturgy; the development of early Christian Christology; ancient Judaism and emerging Christianity). *May be repeated with change of topic.*

RELS 6615. Seminar in the Religions of Late Antiquity. (3)

Prerequisite: Permission of department. Current and seminal issues related to the academic study of one or more of the religions practiced in the Roman and/or Sasanian Empires during late antiquity. A general theme must be chosen that may center upon one or more specific religious identities or trajectories; one or more textual traditions; an influential figure or interpretive school; or a topical investigation. *May be repeated for credit with change of topic.*

RELS 6622. Seminar in Religion and Modern Culture. (3)

Prerequisite: Permission of department. A seminar on issues related to the historical-critical study of the interaction between religion and modern culture. One or more general themes will be chosen: leading theorists, appropriate historical contexts, global contexts, or a topical investigation. *May be repeated with change of topic.*

RELS 6625. Seminar in American Religions. (3)

Prerequisite: Permission of department. Current and seminal issues related to the academic study of one or more of the religions of North America. A general theme must be chosen that may center upon one or more specific religious traditions; an important individual figure or character; an historical period or epoch; or a topical investigation. *May be repeated for credit with change of topic.*

RELS 6631. Seminar in Islamic Studies. (3)

Prerequisite: Permission of department. Current and seminal issues related to the academic study of Islam. A general theme must be chosen that may center upon one or more schools of thought; an important individual figure or character; one or more textual sources or literary genres; an historical period or

epoch; or a topical investigation. *May be repeated for credit with change of topic.*

RELS 6641. Seminar in Asian Religions. (3)

Prerequisite: Permission of department. Current and seminal issues related to the academic study of one or more of the religions of South and/or East Asia. A general theme must be chosen that may center upon one or more specific religious traditions; an important individual figure or character; one or more textual sources or literary genres; an historical period or epoch; or a topical investigation. *May be repeated for credit with change of topic.*

RELS 6651. Seminar in the History of Religions. (3)

Prerequisite: Permission of department. Current and seminal issues related to the academic study of one or more of the interpretive categories or concepts associated with the practice and expression of religion(s). A general theme must be chosen that may center upon a specific interpretive category or concept; an influential scholar or school of interpretation; a prominent historical period or cultural movement; or a topical investigation. *May be repeated for credit with change of topic.*

RELS 6671. Seminar in Theory and Methods. (3)

Prerequisite: Permission of department. Current and seminal issues related to contemporary theory and cultural studies and their import for the academic study of religion(s). A general theme must be chosen that may center one or more specific theories or methods; an influential thinker or school of thought; an historical period or cultural movement; or a topical investigation. *May be repeated for credit with change of topic.*

RELS 6800. Directed Readings/Research. (1-3)

Prerequisite: Prior written permission of instructor. Investigation of a topic in religious studies culminating in a research paper. *May be repeated for credit with change of topic.*

RELS 6999. Thesis. (3 or 6) The thesis is coordinated with the student's interests and practical experience to allow the development of an area of specialization. Appropriate research and written exposition of that research is required. *May be repeated for credit with permission of department, if taken for 3 credit hours.* Six hours of Thesis may be taken during a single semester.

Sociology

• M.A. in Sociology

Department of Sociology

sociology.uncc.edu

Graduate Program Director

Dr. Scott Fitzgerald

Graduate Faculty

Dr. Judy R. Aulette, Associate Professor
 Dr. Martha Bottia, Research Assistant Professor
 Dr. Zinobia Bennefield, Assistant Professor
 Dr. Charles J. Brody, Professor
 Dr. Yang Cao, Associate Professor
 Dr. Joseph Dippong, Assistant Professor
 Dr. Christy Erving, Assistant Professor
 Dr. Scott Fitzgerald, Associate Professor
 Dr. Rosemary L. Hopcroft, Professor
 Dr. Kendra Jason, Assistant Professor
 Dr. Roslyn Mickelson, Professor
 Dr. Stephanie Moller, Chair and Professor
 Dr. Sarah Pollock, Lecturer
 Dr. Beth Rubin, Professor
 Dr. Teresa L. Scheid, Professor
 Dr. Vaughn Schmutz, Assistant Professor
 Dr. Elizabeth Stearns, Professor
 Dr. Lisa S. Walker, Professor
 Dr. Murray Webster, Jr., Professor
 Dr. Joseph M. Whitmeyer, Professor
 Dr. Wei Zhao, Associate Professor

MASTER OF ARTS IN SOCIOLOGY

The Master of Arts in Sociology provides students with theoretical and methodological skills necessary to undertake analysis of contemporary social issues and problems. The curriculum is designed to meet the needs of students seeking master's level research skills for occupations requiring such expertise: in government, marketing, program planning and evaluation, business, the media, and in the nonprofit sector. The curriculum also prepares students who wish to pursue the Ph.D., whether in sociology or a related discipline. The Department of Sociology is a core part of the Ph.D. programs in Public Policy and Organizational Science at UNC Charlotte.

Program of Study

Coursework concentrates on building skills in research design, sampling, data analysis, interpretation and sociological theory. Students complete either a thesis, with oral defense, or a research practicum. Either option entails the student applying sociological knowledge to a problem/topic

of his/her interest. In addition to traditional classroom courses, students can tailor their coursework to specific areas of interest through individualized tutorials. A variety of research interests are represented among the Sociology faculty. Among these are Education, Healthcare, Group Processes (Social Psychology), Social Movements, Stratification, Organizations, and Mathematical Sociology. Through coursework and tutorials students can gain a substantive knowledge base that complements their social research skills.

Additional Admission Requirements

- 1) An overall undergraduate GPA of 3.0 or above
- 2) Acceptable score on the Graduate Record Examination (GRE)
- 3) Demonstrated undergraduate competence in research methods, theory and statistics for social research.
- 4) Eighteen credit hours of social science undergraduate courses.

Degree Requirements

The program requires 35 credit hours of coursework. To provide all students with a solid grounding in theory and methods of sociological inquiry, 15 credit hours of core courses are required. In addition to the core, students must take one additional course in research methods and at least two elective courses in the department. Students must complete either a thesis (6 credit hours) or a research practicum (6 credit hours). The remaining 8 credit hours are electives.

Core Courses (15 credit hours)

SOCY 5151 Pro-Seminar: Social Problems and Social Policy (3)
 SOCY 6651 Social Theory (3)
 SOCY 6652 Issues in Social Research (3)
 GRAD 6100 Basic Statistics and Probability (3)
 GRAD 6101 Linear Regression (3)

Students must earn at least a B in each Core Course. Students earning a C in one of these courses must repeat the course and earn at least a B the next time it is offered. Students earning a C in two of these courses will be suspended from the program. The Graduate Program Director may waive the requirement for GRAD 6100 if the student presents evidence of quantitative skills comparable to what is learned in the course. This would not alter the number of credit hours required for the major.

Restricted Elective Courses (6 credit hours)

Select at least two SOCY courses.

Thesis or Research Practicum (6 credit hours)

Select one of the following:

SOCY 6897 Research Practicum (1-6)

SOCY 6996 Thesis (1-6)

Unrestricted Elective Courses (8 credit hours)

Subject to the approval of the Graduate Program Director, students may take elective courses (up to 6 credit hours) from other departments as long as courses are at the graduate level (5000 or above) and the student's areas of interest overlap with other programs (e.g., psychology, education, organizational science, public policy, history, geography). Courses taught in other programs (e.g., Public Policy, Organizational Science) by Sociology faculty do not count as coursework outside of the department.

Admission to Candidacy

Completion of at least 24 credit hours of required coursework is required for admission to candidacy.

Assistantships

The Department of Sociology offers both teaching assistantships and research assistantships; the latter are dependent upon faculty research funding. Teaching assistants assist faculty with coursework, or teach the undergraduate lab sections in research methods and statistics. They are paid approximately \$10,000 for nine months of twenty hours per week work during the academic year. The workload and pay for research assistants varies. Assistantships are awarded on the basis of merit and experience.

Internships

While there is no formal system of ongoing internships, agencies do contact the department to find students who would be interested in an internship. Consequently, internships are optional and dependent upon a match between an agency's needs and a student's skills and interests.

Advising

The Graduate Program Director advises all graduate students until they select a person to serve as their Committee Chair.

Transfer Credit

With departmental approval, students may transfer in up to six credit hours of graduate work for which the applicant received a grade of B or above from another institution, related UNC Charlotte degree program or related post-baccalaureate work.

Committee

The student's committee shall consist of three faculty members: the Chair and two other individuals who assist with completion of the thesis or research practicum. One member of the committee, not the chair, may be from outside the department.

Thesis

Students formulate a theoretically motivated or applied research question or argument and collect or analyze existing empirical data to answer that question.

Research Practicum

As an alternative to the traditional thesis, students have the option of a research practicum. This may be combined with an internship. The student works with an organization or agency to complete a research evaluation project for the agency.

Research Opportunities/Experiences

Faculty members are actively engaged in research and students are strongly recommended to work with faculty to develop research expertise. In addition, a number of faculty members have funded research projects or internships on which qualified graduate students are able to work.

Financial Assistance

Other than the assistantships and waivers described above, the Department offers the Pearson Fellowship, which is awarded annually to a graduate or undergraduate student who has interests and goals in improving race relations, expanding social justice, and establishing a more peaceful world. The award is made every spring and consists of \$1,000 to be applied to tuition at UNC Charlotte.

COURSES IN SOCIOLOGY (SOCY)

SOCY 5090. Topics in Sociology. (3) Prerequisite: Permission of instructor. Intensive treatment or survey of related topics, depending on student needs and interests. *May be repeated for credit with change of topic.*

SOCY 5111. Social Inequality. (3) Distribution of power, privilege and prestige; correlates and consequences of inequality; national and international comparisons.

SOCY 5125. Urban Sociology. (3) Cross cultural analysis of urban development, social structure, ecology, demographic composition, and social problems.

SOCY 5130. Sociology of Health and Illness. (3) The cultural and structural influences on the definition of health and illness; models of illness behaviors; health demography and epidemiology; social influences on the delivery of healthcare; ethical issues surrounding health and illness; the development of relevant social policy.

SOCY 5131. Family Policy. (3) Critical analysis of four aspects of family policy; the historical and cultural factors that have resulted in specific policies affecting the family; the specification of contemporary family policy at both the national and state level; the intended and actual application of existing family policy; and the implications and impact of policies as they are interpreted and implemented.

SOCY 5134. Families and Aging. (3) Theories explaining the formation and functioning of American families with emphasis on the impact of the aging of society; examination of the current demographic trends and expectations of multigenerational families as well as the future demands and modifications.

SOCY 5135. Sociology of Education. (3) Educational institution; the school class as a social system; the school as a social environment and a complex organization.

SOCY 5150. Older Individual and Society. (3) Review of the theories explaining the formation and functioning of American families with emphasis on the impact of the aging of society. Examination of the current demographic trends and expectations of multigenerational families as well as the future demands and modifications.

SOCY 5151. Pro-seminar: Social Problems and Social Policy. (3) Prerequisite: graduate student in sociology or senior sociology major. Introduction to the discipline of sociology and the UNC Charlotte department; basic skills for graduate school. *Graded on a Pass/Unsatisfactory basis.*

SOCY 5154. Contemporary Social Theory. (3) Elements and process of theory construction; contemporary social theories such as theories of social order and causation, power, class structure and inequality; group process theories; post-modern theories.

SOCY 5156. Quantitative Analysis. (4) Prerequisites: SOCY 4155 or permission of instructor. Concepts and procedures of sociological analysis; data processing; measurement theory; and quantitative models of analysis. Three hours of lecture/discussion and completion of weekly laboratory units.

SOCY 5156L. Quantitative Analysis Laboratory. (0) Corequisite: SOCY 5156. Required weekly laboratory session for Quantitative Analysis.

SOCY 5631. Seminar in Family Violence. (3) Prerequisite: Senior or graduate standing, or permission of instructor. Family violence in the context of a changing society and family system. Principal foci: child abuse, sexual abuse, spouse abuse; other forms of family violence. Investigation of

these topics in terms of sociocultural influences and internal dynamics of families.

SOCY 5632. Changing American Family. (3) Family theories; family system in relation to other social systems; integration of marital, parental and occupational roles in context of changing socioeconomic influences; traditional versus contemporary family roles; breakdown in stable family functioning.

SOCY 6090. Topics in Sociology. (3) Prerequisite: Permission of department. Intensive treatment of a topic or survey of related topics, depending on student needs and interests. *May be repeated for credit with change of topic.*

SOCY 6112. The Sociology of Work. (3) Theoretical and methodological approaches to work; work in a globalized society; work structures; inequalities at work; success at work; gender, race, ethnicity and age differences in the workplace; work-family balance; workplace transformation; historical studies of work; labor markets, employment and unemployment; work rewards; workplace and employment policies.

SOCY 6130. Sociology of Aging: Theories and Research. (3) Application of stratification theories and demography are applied to the older population. Issues of race, gender, socio-economic status, age, and geographic distribution are examined to investigate the diversity of the older age group and their access to resources.

SOCY 6135. Social Context of Schooling. (3) The political economy of schooling; race, class, and gender effects on educational processes and outcomes; the school as a complex organization; the sociology of school reform movements.

SOCY 6136. Qualitative Research Methods. (3) Collection and analysis of qualitative data including use of grounded theory and a variety of qualitative techniques, consideration of ethical issues and the use of data.

SOCY 6137. The Political Economy and School Reform. (3) Prerequisite: SOCY 4135, graduate standing, or permission of instructor. Relationship between the business community's vision for school reform and the school restructuring movement locally and nationally, including social and political processes associated with corporate involvement in defining the problem with schools and shaping solutions, the intersection of education and the economy, and the relationship between schooling and social inequality.

SOCY 6138. Social Organization of Healthcare. (3)

Focuses on the structures and operations of healthcare institutions and providers. The topics covered include the socio-historical development of the existing healthcare system, healthcare occupations and professions, professional power and autonomy, professional socialization, inter-professional and provider-patient relations, healthcare organizations and the delivery of services, and how social change affects the healthcare sector.

SOCY 6614. Self and Society. (3) Examination of theoretical constructs and substantive concerns relevant to the socialization process; comparison of symbolic interactionism, ethnomethodology, phenomenology; emphasis on social construction of reality in various "social worlds" (deviant, work, family).

SOCY 6615. Dilemmas in Organizations. (3)

Examines organizational theory and research focused on organizational behavior, inter-organizational relations, relations with external stakeholders and organizational culture. Case study analysis, group-problem solving and the study of concrete organizational dilemmas.

SOCY 6616. Stratification and Inequality. (3)

Examination of theories of stratification and the causes, processes and social consequences of economic and political inequality; assumptions behind, mechanisms for, and consequences of government and private sector strategies to address problems associated with inequality.

SOCY 6617. Data Utilization. (3) Methodological and statistical strategies for applied sociological research within organizational settings; selecting the best strategies consistent with budgetary, manpower and organizational constraints; interpreting and communicating research results in ways understandable to and useful for organizational decision-makers.

SOCY 6630. Investigating Health and Health Services. (3)

Prerequisites: SOCY 4130, or graduate standing, or permission of instructor. Useful to those seeking research careers, to administrators in healthcare, and to primary care providers. How to conduct and evaluate research in healthcare settings, emphasizing both quantitative and qualitative methodologies as well as the utilization of secondary data.

SOCY 6635. The Social Context of Mental Health. (3)

Cross-listed as SOWK 6635, PSYC 8636, and PPOL 8636. Prerequisite: Admission to graduate program or permission of instructor. This course draws upon contributions from the field of psychiatry,

psychology, social work, and anthropology. The focus is on mental health and illness in its social context, with an emphasis on the relationship between social structure and mental health/disorder. We will examine the social factors which shape psychiatric diagnosis, the effects of socio-demographic variables on mental health, and the role of social support and stress for different groups. The course also examines the organization, delivery, and evaluation of mental health services, and mental healthcare policy.

SOCY 6640. Evaluation Research for Applied Sociology. (3)

Prerequisites: SOCY 6652 and introductory statistics. Evaluation research from an applied sociological perspective, including incorporation of social theory, substantive social science knowledge, and research techniques into the evaluation of a variety of programs, interventions, and policies.

SOCY 6651. Social Theory. (3) Analysis of contemporary social theories, with emphasis on their implications for planned change.

SOCY 6652. Issues in Social Research. (3)

Examination of epistemology of social research; assumptions and methods of specific research strategies; ethical and policy issues of applied and academic research.

SOCY 6895. Tutorial in Sociology. (1-4)

Prerequisite: Permission of instructor. Directed reading and/or research; development of expertise in substantive area. *May be repeated for credit.*

SOCY 6897. Research Practicum. (1-6)

Prerequisite: SOCY 6651 and 6652. Preparation of research paper based upon research completed within a community organization or agency. The student will develop a consultant-client relationship with the agency or organization and conduct a research/evaluation project on behalf of the agency or organization (such as a needs assessment, program evaluation, social impact assessment or policy analysis).

SOCY 6996. Thesis. (1-6)

Prerequisites: completion of all other coursework and admission to candidacy by Graduate Committee. Applied, academic, or theoretical research project, defended before graduate faculty. *May be repeated for credit up to 6 credits.*



The Graduate Center

graduatecenter.uncc.edu

Director: Joshua Hertel

Associate Director: Jennifer Harkey

The Graduate Center, housed within the Graduate School at UNC Charlotte, hosts graduate programs from partner Universities across the state and throughout the UNC system on our campus.

Since the 1980s, the Graduate Center at UNC Charlotte has served as host to a variety of graduate programs from across the state and throughout the UNC system. The mission of the Graduate Center is to identify unique programs within the UNC system to meet the growing demands of the Charlotte community. Graduate Centers were first authorized by the General Assembly and established by the UNC General Administration to facilitate inter-institutional graduate programs. In Charlotte, this initiative has allowed residents to pursue advanced degrees from other UNC institutions without having to stray far from home. Classes are taught by faculty from our partner institutions on UNC Charlotte's main campus and at Center City campus. Programs are offered on evenings and weekends, making them easily accessible for working professionals.

The Graduate Center is located in Denny 213 and may be contacted at 704-687-7232.

Adult and Community College Education

- **Ed.D. in Adult and Community College Education**

North Carolina State University

ahecohort.ncsu.edu

Program Director

Dr. James Bartlett

North Carolina State University offers a doctorate in Adult and Community College Education through the Graduate Center at UNC Charlotte. The degree is in higher education administration and is designed to foster scholarly practitioners to develop innovative leadership in administration and instruction. It is taught on the UNC Charlotte's main campus by NC State faculty in an executive weekend cohort model. The program offers access to both resources of Charlotte metro area and the convenience of UNC Charlotte campus.

ED.D. IN ADULT AND COMMUNITY COLLEGE EDUCATION

The Charlotte Cohort's Doctor of Education (Ed.D.) in Adult and Community College Education degree is designed to prepare practitioners for leadership and teaching positions in their work with educating adults. The focus is on the study and practice of teaching, learning, leading, and education-planning for individuals, groups, and society. The cohort meets on the main campus of UNC Charlotte and provides a unique opportunity for working professionals to complete a doctoral program.

Program Structure

Doctoral students are admitted as a cohort in four-year intervals. Cohort members enroll in a set curriculum and participate in 3½ years of coursework. Students participate in 7 credit hours of coursework each Fall and Spring semester, and 6 credit hours during the Summer session. Courses meet on Friday evenings and Saturdays throughout the year. Courses are taught face-to-face, online, and in a hybrid format.

During the dissertation process, each student has a specific NC State faculty member who guides the student in the development, research effort, and defense of the dissertation.

Admission Requirements

Applicants must apply through the NC State Graduate School Admissions website. The following steps are required:

- 1) Complete the online admissions form, including a personal statement of goals for seeking a doctoral programs and participation in this executive cohort program.
- 2) Submit a transcript from all previous undergraduate and master's coursework.
- 3) Submit Graduate Record Examination (GRE) or Millers Analogies Test (MAT) scores, taken within the last five years.
- 4) Submit a résumé and three references.
- 5) Complete the online North Carolina Residency Form if claiming NC residence for tuition purposes.

Complete discussion of admissions procedures are noted on the Department of Adult and Higher Education at NC State's admissions website at <http://ahecohort.ncsu.edu/apply>.

Admissions questions should be directed to Dr. James E. Bartlett at james_bartlett@ncsu.edu. Admissions process questions should be directed to Shana Scott, Graduate Services Coordinator, at shana_scott@ncsu.edu or 919-515-6238.

Program Requirements

This is a tentative listing for the 2016-2019 Charlotte Cohort, subject to change based upon availability of faculty and of related needs of the cohort program.

YEAR 1

Summer 2016 (6 credit hours)

Reflective Practices
The Change Process

Fall 2016 (7 credit hours)

Leadership
Organizational Issues
Dissertation Chapter 1

Spring 2017 (7 credit hours)

Administrative Issues
Improvement Science
Dissertation Chapter 1

YEAR 2

Summer 2017 (7 credit hours)

Interdisciplinary Internship
Qualitative Research Methods
Dissertation Chapter 2

Fall 2017 (7 credit hours)

Community College
Quantitative Research Methods I
Dissertation Chapter 2

Spring 2017 (7 credit hours)

Workforce Education & Development
Quantitative Research Methods II
Dissertation Chapter 3

YEAR 3

Summer 2018 (7 credit hours)

Proposal Writing
Programing Process/Evaluation
Dissertation Chapter 3

Fall 2018 (6 credit hours)

Dissertation Hours
Proposal Defense

Spring 2019 (3 credit hours)

Dissertation Hours
Dissertation Defense



The University of North Carolina at Charlotte provides a comfortable and enjoyable environment for students that is conducive to learning. The services, facilities, and programs of the University promote individual student development and foster a community which promotes the involvement of students in their intellectual, cultural, spiritual, emotional, and physical development.

Students at UNC Charlotte are encouraged to participate in extracurricular activities. Athletics, the Student Government Association, the Campus Activities Board, and Student Media are a few of the available activities that can play a significant role in each student's development and total education. Participation in activities, ranging in type from service and religious to athletic and social, and from creative arts and crafts to wilderness experiences, increases a student's opportunities to acquire leadership skills, to experience the responsibilities involved in functioning within a self-governmental process, and to develop personal talents and interests.

Note: Students are entitled to participate in several student groups and organizations as long as they are academically eligible to continue their enrollment. However, participation in some activities requires students to be in good standing with the University, both academically and in accordance with The Code of Student Responsibility (located in the "University Regulation of Student Conduct" section of the Catalog).

Campus Life and Student Resources

Academic Services

<http://academicservices.uncc.edu>

The **Academic Services** unit at UNC Charlotte enriches the academic community by offering a broad range of initiatives promoting student success, ensuring access, and enhancing the educational experience of all students. Through transition programs, learning communities, support for student-athletes, career services, experiential learning, honors education, disability services, tutorial programs, and initiatives for underrepresented students, Academic Services cultivates life skills critical to successful graduation and global citizenship. Addressing the needs of a diverse student population, Academic Services utilizes an integrated student-centered approach which reinforces rigorous academic expectations and encourages student engagement from the time of enrollment through graduation.

Athletic Academic Center

The Charlotte 49ers Athletic Academic Center provides assistance to all Charlotte varsity student-athletes to achieve academic and personal success at the University by providing support services designed to meet their unique needs and ensuring the student athlete's compliance with all National Collegiate Athletic Association, Conference, and University regulations. Academic advisors provide academic

advising services, priority registration, tutorial services, supervised study sessions, a computer lab, résumé writing assistance, a life skills program, and academic recognition. Contact information is available online at charlotte49ers.com.

Disability Services

The Office of Disability Services works with departments across UNC Charlotte to ensure that educational programs and campus facilities are accessible to individuals with disabilities. Students with disabilities who wish to receive accommodations must provide documentation from their healthcare provider to Disability Services. After a determination of eligibility is made, students schedule a registration appointment with a Disability Services counselor to determine appropriate and reasonable accommodations. Disability Services offers a wide range of accommodations based on specific, documented disability needs.

It is the mission of the Office of Disability Services to provide access to education and campus life and to support a culturally rich, inclusive, and accessible campus environment. The Office recognizes that services and accommodations can be different in college than in high school, and can even vary from college to college. Students are encouraged to contact Disability Services with questions they might have about eligibility, services, and accommodations. Learn more at ds.uncc.edu.

Honors College

The Honors College offers academically talented and highly motivated students opportunities for intellectual breadth, undergraduate research, service learning, and a community feeling within the context of a large public research university. Comprised of several distinct honors programs, each with its own standards for admission and requirements for graduation, the Honors College is a campus hub for undergraduate honors courses, enrichment opportunities, scholarships, study abroad, community service, faculty lectures, and advising for pre-health professions and prestigious award nominations. Please see the individual “Honors College” section of this *Catalog* for complete details.

Learning Community Program

UNC Charlotte’s Learning Community Program is transforming the way students live, learn, and succeed in their academic endeavors. Learning communities help new students transition through academic and social challenges by providing small, supportive living and learning environments. Students interact closely with UNC Charlotte faculty, staff and peer mentors

through areas of common interest, enroll in 2 or 3 of the same courses and in many cases live together in the same residence hall. Through the year-long learning communities, students make friends and develop close relationships.

While most learning communities are residentially based, some do not require living on campus. Most learning communities designed for freshmen; some are specifically designed for new transfer students.

Whether students are interested in business, communication studies, computing, criminal justice, engineering, English, gender studies, health, history, international relations, leadership, liberal arts and sciences, politics, psychology, teaching, or are not sure yet, they are likely to find a community of interest.

Contact and application information for UNC Charlotte’s Learning Communities can be found online at lc.uncc.edu.

Multicultural Academic Services

The Office of Multicultural Academic Services, while open to all students, emphasizes academic support to students from the following populations: African American, Asian American, Hispanic/Latino, Pacific Islander, Native American, multi-racial, LGBTQ, first generation, students from rural communities, and students who have a reported disability.

Services, for individuals and groups, include: secondary academic advising; tutoring in math, science and engineering; weekly study halls; mentoring; workshops; monitoring of academic progress; recognition of academic achievement; personal, cultural and leadership development; resources and referrals for students, faculty and staff; academic support for undergraduate and graduate students. Programs include:

University Transition Opportunities Program (UTOP)

UTOP is a summer academic bridge program designed to facilitate the transition from high school for first-time freshmen. In UTOP, a limited number of incoming freshmen participate in a structured collegiate experience prior to fall semester enrollment. Seven hours of credit are awarded for the successful completion of UTOP coursework, which consists of English Composition, Supplemental English, Liberal Studies, Intro to Chemistry, Geography, or a subject-specific Freshman Seminar. Participants also have the option of participating in a one-year Learning Community in which students are engaged in coursework and activities that emphasize

growth and development in liberal arts education, diversity, and campus connections. Learning Community participants continue to enroll in courses together and share living/learning environments during the fall and spring semesters. UTOP is designed to help build a solid foundation for students from traditionally underrepresented populations and first generation college students.

Student Advising For Freshman Excellence (SAFE)

Co-sponsored by the Office of the Dean of Students, SAFE is a peer mentoring program designed to facilitate the transition from high school to college for all incoming freshmen. SAFE combines academic support with personal development programming to encourage academic achievement, positive self-concept, and increased personal growth. SAFE is structured on three pillars of success: mentoring, academic support, and social networking. The SAFE program has proven to be highly beneficial for students from traditionally underrepresented populations and first generation college students.

Producing Readiness Of Diverse University Cohorts in Education (PRODUCE)

UNC Charlotte is one of the eight schools in the University of North Carolina system participating in the Louis Stokes Alliance for Minority Participation (LSAMP) National Science Foundation Grant to: (1) improve the quality of the learning environment for underrepresented students in science, mathematics, engineering and engineering technology; (2) increase the number of underrepresented students graduating with degrees in science, mathematics, engineering and engineering technology; and (3) develop and implement effective techniques of attracting talented underrepresented students who would otherwise not choose science or engineering as a career. PRODUCE participants receive faculty and peer mentoring, peer tutoring, opportunities to attend professional meetings/conference, internships, and scholarships.

Building Better Brothers (B3)

B3 is an academic and social support program designed to increase the retention and graduation rates of male students from traditionally underrepresented populations. B3 assists program participants in becoming graduates with high academic achievement and preparedness for post-graduation life. Students complete an application of interest and select a variety of educational and social programs in which to participate throughout the year.

For more information about Multicultural Academic Services, visit mas.uncc.edu.

University Career Center

The University Career Center (UCC) offers comprehensive career services designed to assist undergraduate and graduate students in all stages of career development. Each student has a specific career advisor (based on the student's major and including undeclared majors). Career advisors assist students with exploring majors and careers, gaining experience, conducting job and internship searches, and transitioning after graduation. In addition to individual appointments and group workshops, the UCC hosts career fairs and events throughout the year and provides a host of resources online at career.uncc.edu. UCC staff collaborate with academic colleges to coordinate experiential learning, and career advisors teach career-related sections of freshman and transfer seminars. The UCC offers the following programs.

Part-Time Employment Off-Campus

The UCC's Job Location and Development (JLD) Program assists students in obtaining off-campus jobs including part-time, summer, temporary/seasonal, and full-time (non-degree). Job listings may be viewed online in Hire-A-Niner and often include career-related positions in various fields.

Experiential Learning Programs

The majority of UNC Charlotte students (over 90%) are expected to and do participate in University-sanctioned experiential learning programs. Opportunities are available for both undergraduate and graduate students to receive course credit, or other recognition for supervised experiences in public and private agencies within the community, nationally, and internationally. These opportunities are offered through experiential learning programs including over 670 courses involving clinical rotations, cooperative education, internships, and practicums. For full description of related courses, see the Course Descriptions section of this *Catalog*.

Cooperative Education

This career-related professional program is available to students in the Colleges of Liberal Arts & Sciences, Business, Computing & Informatics, and Engineering. Participants must be enrolled full-time in an undergraduate degree program, and have a cumulative GPA of at least 2.5, and complete course requirements specified by their department. Transfer students must complete 12 hours at UNC Charlotte before applying to the program. Co-op students work two to three semesters either part-time or full-time (depending on college requirements) with an employer in a paid work experience. Participants receive transcript notation, not academic credit.

Academic Internships

Some academic departments award students credit for completing relevant internships. Students are encouraged to check with their academic department for further information and academic eligibility requirements.

Job Shadowing/Networking Experiences

These experiences provide one-on-one and group shadowing experiences that give students the opportunity to “shadow” professionals in a career field of their choice. Students are able to explore career options and academic interests by conducting informational interviews and observing professionals in various fields, many of whom are alumni. The shadowing experience may include a brief visit or can last for one day or longer, depending on the schedules of the students and professionals.

University Professional Internship Program

The University Professional Internship Program (UPIP) offers paid on-campus internships to full-time sophomores, juniors, and seniors. Internships are designed to provide professional knowledge and skill development consistent with the student’s major/career goals. Students work through their home academic department for approval of academic credit for their internship. UNC Charlotte faculty and administrators serve as mentors to interns, with each internship paying \$10 per hour for 10-15 hours per week during the Fall and Spring semesters.

University Center for Academic Excellence

Designed to improve academic performance and foster meaningful learning experiences, the University Center for Academic Excellence (UCAE) provides services, programs, and resources to help students develop and refine critical thinking skills, utilize self-management skills, and learn course material more efficiently while earning higher grades. UCAE collaborates with various colleges and programs on campus to promote the success of undergraduate and graduate students, including teaching the Academic Success Seminar (UCOL 1300). All services are free to enrolled UNC Charlotte students. UCAE offers the following programs and services. For additional information on any of the programs and services offered by the UCAE, visit ucae.uncc.edu.

Learning Commons

The Learning Commons is a place students can come to study in a welcoming environment with academic support help only a few steps away. They can make use of computers and pay-for-print services, as well as a library of resources including books, DVDs, and

printed handouts outlining successful study/learning strategies.

Personal Academic Consultations (PACs)

PACs are one-on-one meetings tailored to the academic needs of the student who is attending. They are designed to help students discover more about themselves and develop personalized strategies for comprehensive collegiate success. Assessments of learning styles and study habits/attitudes can also be administered and interpreted during PACs. Students may sign up for one-time or ongoing appointments to address their academic success goals.

Tutorial Services

Well-trained undergraduate provide free tutoring to University students in a variety of disciplines. Tutoring is primarily in mathematics, sciences, business, and foreign languages and emphasizes both content mastery and learning skills development. Tutors are selected based on their competence in the subject area, faculty endorsements, and their effective interpersonal skills. Tutorial Services at UNC Charlotte has been nationally certified through the College Reading and Learning Association at Level III, Master Tutor.

Supplemental Instruction (SI)

SI assists students in historically difficult courses, among which are biology, chemistry, physics, engineering, mathematics, business, and the social sciences. In weekly scheduled group study sessions, trained student SI Leaders help peer students refine the unique skills necessary for doing well in the target course. Data show that students regularly participating in SI average significantly higher final course grades compared to non-participants. The SI program has been nationally certified through the College Reading and Learning Association at Level I.

Students Obtaining Success (SOS)

SOS is a peer mentoring program for students on academic probation at UNC Charlotte. SOS is designed to help students identify strengths and causes for academic difficulty and to develop skills to improve grades and return to good academic standing. Any student on academic probation is eligible to register for the SOS program. Each participant is assigned a well-trained undergraduate peer mentor for support and guidance. The program lasts for one semester and is tailored to help individuals with specific needs and issues. Participants must commit to meeting weekly with a peer mentor. The SOS program has been nationally certified through the College Reading and Learning Association at Level II, Advanced Mentor.

Academic Skill Development

A wide variety of workshops and classroom presentations are offered each semester on topics that help students achieve academic success. These interactive workshops are led by staff and graduate students on-site and across campus. Topics include: *Test Prep, Time Management, Goal Setting, Effective Note Taking, Motivation, Learning Styles*, and more.

Auxiliary Services

<http://aux.uncc.edu>

In support of the University's educational mission, Auxiliary Services is responsible for providing goods and services the campus community needs. This includes:

- multi-function 49er ID Card system
- dining venues and meal plans
- on-campus bookstore
- printers and copiers
- parking and transportation services
- mail delivery
- ATM stations and vending machines

49er ID Card

Every student's 49er ID Card displays a photo, name, and a unique student ID number (different from a Social Security number for privacy reasons). The 49er ID Card proves that the student is a member of the campus community and entitled to certain services.

A 49er ID card allows access to:

- campus housing
- campus activities and programs
- athletic events and recreational facilities (i.e., Student Activity Center, Belk Gym)
- computer labs
- Student Health Center

The 49er ID card also serves as a:

- meal plan card
- library card

And holds funds for:

- Optional Dining Account
- 49er Account

To get a 49er ID card, students need:

- 1) One valid proof of identification such as a driver's license, State Issued ID or Passport
- 2) Proof of university status such as acceptance letter, class schedule, proof of registration or tuition bill

- 3) Student ID number that begins with 800 (assigned at acceptance; appears on the acceptance letter).

Entering freshmen and transfer students will have their 49er Card made during SOAR. A card may also be obtained at:

49er Card Office

Auxiliary Services Building
Hours: Monday –Friday, 8 a.m. – 5 p.m.
704-687-7337 or 1-877-497-4949

OR

ID Card Office

Student Union, Room 127
Hours: Monday – Friday, 8 a.m. – 5 p.m.
704-687-7040

The 49er ID card can only be used by the student to whom it was issued. Misuse of the identification card will result in disciplinary action. There is a \$15 fee to replace lost/stolen identification cards. For additional details, visit aux.uncc.edu/49er.

49er Account

The 49er Account automatically resides on the UNC Charlotte 49er ID Card. Students simply make a deposit and the account is instantly activated. The 49er Account is accepted in campus vending machines, for printing and copying (including services from the Copy Center), residence hall laundry machines, the Barnes & Noble at UNC Charlotte bookstore, and purchases from the campus Post Office, NinerTech computer store, Campus Salon, Union Station, dining venues, campus convenience stores and game/event concessions.

The 49er Account spends like cash for products and services all over campus but can't be used for cash advances or purchases off-campus (although many local businesses offer discounts with proof of UNC Charlotte ID). A 49er Account is safe, secure, can't go into negative balance, and won't incur fees like overdraft charges.

There are four ways to deposit funds onto the 49er account; online at aux.uncc.edu, in person at one of our two locations, the 49er Card Office located in the Auxiliary Services Building or the ID Card office located in the Student Union, by mail, or via one of four campus VTS (value transfer) machines. VTS machines are located on the first and second floors of the Atkins Library, the Barnard Computer Commons, and the Residence Dining Hall.

Bookstore

Located in the Student Union, Barnes & Noble at UNC Charlotte offers: new and used textbooks and textbook rental (with online ordering and pre-pack services); general interest, “best sellers” and children’s books; school supplies; computer software; greeting cards and gifts; and the largest selection of UNC Charlotte apparel, gear and merchandise available. More information is available online at aux.uncc.edu/bookstore and uncc.bncollege.com.

Copy Center

UNC Charlotte has a pay-for-print system in most computer labs and in the Atkins Library. A 49er Account is required to pay for print jobs in these areas. The 49er Account may also be used at the REPROS copy center for other copying services such as binding, wide-format printing and other copying and presentation services. REPROS offers full-service and self-service reprographics, and is located on the lower level of the Prospector building. For details, visit aux.uncc.edu/copy.

Dining on Campus

UNC Charlotte offers a variety of dining locations across campus. Students with meal plans enjoy the all-you-care-to-eat variety of food served in the **South Village Dining Hall and Crown Commons**. SoVi dining is located near high rise residence halls; Crown Commons is on the second level of the Student Union.

Crown Commons and SoVi are designed to serve meal plan students and anyone else who loves a satisfying meal limited only by their appetite. They offer something to please every taste and mood. Made-to-order choices include: pizza, deli, grilling station, and soup and salad stations. International/ethnic dishes, vegan/vegetarian entrées, a “home cooking kitchen,” waffle bar, dessert station, and cereal bar.

Bistro 49 in the Student Union offers a sit-down, table service luncheon experience. Bright ambience, an open-kitchen and a nouvelle cuisine menu are just the beginning. Menu changes seasonally.

Main Street Market in the Cone University Center is a weekday lunchtime spot with Bojangle’s Chicken and Biscuits, Subway, Use Your Noodle (made-to-order noodle bowls), Sushi with Gusto fresh sushi, Au Bon Pain soups, and grab-and-go salads and sandwiches, soft drinks, yogurt, juices, and coffee.

Outtakes in the Student Union offers a deli counter for made-to-order sandwiches and “quick cuisine”

like grab-and-go sandwiches, salads, snacks, beverages and more.

Library Café and Fretwell Café, located in Atkins Library and Fretwell respectively, proudly brew Peet’s Gourmet coffees and teas, serving all your favorite coffee-shop drinks along with fresh bakery goods, sandwiches, smoothies, soups-of-the-day, and a large selection of bottled specialty juices, energy, and soft drinks.

Union Square on the main level of the Student Union features popular, national brands such as Wendy’s, Einstein Bros. Bagels, Starbucks, and Mamma Leone’s.

Prospector (near the McEniry/Friday/Kennedy/Smith academic core) is where you’ll find favorites such as a full menu Chick-fil-A, Feisty’s franks + fries, Salsarita’s, Mamma Leone’s, Grill Nation, Mondo Subs, a salad bar, and large selection of grab-and-go foods like sushi rolls, pre-made salads, yogurt, fresh fruit, and snack foods.

Orbis Grille at PORTAL (CRI campus in PORTAL building) offers an extensive menu of fresh foods and hot, healthy cooking on an Evo grill. Grab-and-go items, snacks, and beverages served also.

For additional details, visit aux.uncc.edu/dining.

Mail and Package Services

Mail and Package Services is a fully operational Postal Contract Station located on the lower level of Prospector, capable of services equivalent to that of a U.S. Post Office. For additional details, visit aux.uncc.edu/mail.

Offers a full range of Mail and Package Services including:

- Express Mail-Domestic & International
- Priority Mail-Domestic & International
- Registered Mail
- Certified Mail
- Certificates of Mailings
- Signature/Confirmation Delivery
- Campus mail box rental
- Post Cards
- Bulk Mail Services
- Delivery to residence halls

Union Station

UNC Charlotte’s address for shipping, U.S. Passport processing, and graphics services. At Union Station, you’ll find:

- Multi-carrier Package Shipping Service
- Shipping Supplies
- Official U.S. Passport Acceptance Station
- Campus Box Rental
- Kodak® Photo Kiosk
- Self-service Copier
- Fax Services
- Graphic Services (*vinyl banners, signs, wide-format printing*)
- Balloons

Parking and Transportation Services

Parking and Transportation Services (PaTS) is charged with the responsibility of providing parking and transportation service for UNC Charlotte students, faculty, staff, and visitors.

Parking Permits

The PaTS office is located in the Facilities Operations/Parking Services Building (#23 on the campus map). All campus parking requires the purchase and display of a University parking permit or payment at meters or in the visitor decks. Parking permits may be purchased online at pats.uncc.edu. Permits do not guarantee proximity parking, nor do they reserve a specific parking space in any lot or deck.

Permit Types

- **Annual Full-time Commuter (C)**, on-campus **Resident (R)**, and **Faculty/Staff (FS)**
- **Two-day permits** are available by the semester to commuters whose class schedule requires them to be on campus just two days per week. Two-day permits are only valid on specified weekdays.
- **Night permits** are valid only after 3 p.m. and are available by the semester

A limited number of reduced fee permits are available for commuter students and staff who are willing to park in a remote lot. Discount Lot 6A (at the corner of John Kirk and Cameron) has a shuttle stop which provides service to center campus and CRI. Discount Lot 27 is a "walk-in lot" with no shuttle stop within 1/10 mile.

Complete permit information including prices, permit types, and where each permit allows you to park; parking rules and regulations; and a PDF of the *Campus Parking Information Guide* are available online at pats.uncc.edu. For information on fees for motor vehicle registration and parking, see the section on "Financial Information" in this *Catalog*.

Campus Shuttle

Shuttle routes operate Monday through Thursday from 7 a.m. to 10 p.m., and Fridays from 7: a.m. to 6 p.m., during Fall and Spring semesters when classes are in session. Shuttle buses are provided by PaTS through an agreement with Charlotte Area Transit System (CATS). Shuttles serve main areas of campus, providing safe, reliable, ADA-compliant transportation. Route maps at pats.uncc.edu.

NextRide

UNCC NextRide is a free smartphone app that provides real-time transportation tracking information for campus shuttle buses and SafeRide vehicles. The app is compatible with Apple, Microsoft, Android, and Blackberry operating systems, phones or tablets and is available nextride.uncc.edu.

SafeRide

SafeRide offers disability transportation service by day and evening safety and disability transportation at night. SafeRide operates whenever the University is open.

Monday through Friday from 7:30 a.m. to 6:00 p.m., SafeRide provides service throughout the inner core of campus for persons with temporary and permanent mobility disabilities. Riders must register for the service through the Office of Disability Services at 704-687-4355. Forms are available on the SafeRide website at saferide.uncc.edu and at the Office of Disability Services or the PaTS Office.

Seven days a week from 6:00 p.m. to 2:30 a.m., SafeRide provides an ADA accessible safety transportation service, in conjunction with the Campus Shuttle Service. SafeRide transports to academic buildings, housing areas, parking lots, and parking decks within the UNC Charlotte Campus. SafeRide evening schedules and route information at saferide.uncc.edu or track SafeRide evening service vans via the UNCC NextRide app or nextride.uncc.edu.

For additional information, contact the PaTS Office at 704-687-0161.

Public Transportation

The **Charlotte Area Transit System (CATS)** provides bus transportation to and from campus via route 11U (from the Uptown transportation center and North Tryon Street and back) and route 29 (with service down to Cotswold and SouthPark malls). Service is provided on a regular schedule, connecting with established routes throughout the city.

CATS transportation passes are available for purchase at the Parking Services office; with a UNC Charlotte ID, and there's a 10% discount. Passes are sold as: Ten Ride Local Pass; Weekly Pass; Local Monthly Pass; Express Monthly Pass. Passes are sold on a cash-only basis.

Brochures containing detailed information regarding routes, schedules, and fees may be obtained in the PaTS Office, or by calling the Charlotte Transit Authority at 704-336-3366. Fees are set by Charlotte Transit and are subject to change. Maps for CATS can be found online at charmack.org/departments/CATS.

Student Union

The Student Union is designed to be the epicenter of campus activity, serving students, faculty, staff, alumni, and visitors. The Union provides services, programs, events, meeting spaces, informal gathering spots and a large variety of convenient services.

UNC Charlotte's Student Union is a 196,000 square ft., three-story "living room" that includes: a retail food court (with Wendy's, Starbucks, Mamma Leone's, Einstein Bagels and Energy Zone; Bistro 49 (table-service restaurant), Crown Commons dining (an all-you-care-to-eat variety-fare venue), Norm's game room lounge; a 210-seat movie theater; a multi-purpose area that converts from several soft-walled meeting rooms to a ballroom to a banquet hall that can seat over 600; the Barnes & Noble at UNC Charlotte bookstore, Outtakes convenience store, NinerTech store (providing educational pricing on Apple products and PC-compatible software); a hair salon; Union Station (shipping, U.S. Passport processing, and graphic services); student organization and activity offices and meeting space; a piano lounge; art gallery and study spaces with Wi-Fi. "Discover the riches within" at studentunion.uncc.edu.

Dean of Students Office

dso.uncc.edu

The Dean of Students Office is a department within the Division of Student Affairs and serves as a key link between students and other areas of campus life. Various programs are sponsored by the Dean of Students Office to promote opportunities for learning and growth during a student's college experience. The staff is responsible for advising and promoting the following programs and services: Fraternity and Sorority Life, Minority Student Services, New Student and Family Services, Off-Campus and Volunteer

Outreach, Latino Student Services, Student Conduct, Veteran Services, and Student Support and Assistance Services. The office also coordinates and assists with the settlement of academic and behavioral misconduct charges against individuals and student organizations, and provides guidance for any student who has a grievance or concern about the University. For more information, visit dso.uncc.edu.

Student Support and Assistance Services (SASS)

Student Assistance and Support Services (SASS) advocates for students experiencing a broad range of issues, concerns, or challenges interfering with a student's ability to be successful academically or personally at UNC Charlotte. SASS can assist students with academic requests such as absence verification for documented medical, psychological, personal crisis, and military reasons as well as withdrawals from the university. Professionals within the office also provide consultation to faculty and staff needing guidance regarding a student issue or concerning student behavior, and guidance and support to parents and family members seeking help on behalf of their students. Visit online at sass.uncc.edu.

New Student and Family Services

New Student Orientation

SOAR (Student Orientation, Advising and Registration) occurs during the summer and immediately prior to the Fall and Spring semesters. This program provides the opportunity for new freshmen and transfer students to begin their transition to UNC Charlotte. Orientation workshops, testing, academic advising, and first semester course registration occur during SOAR. Visit online at soar.uncc.edu.

WOW! (Week Of Welcome)

WOW! (Week of Welcome) is a week-long event welcoming both new and returning students to campus. This program is a University-wide effort to especially welcome new students to campus and acclimate them to the many programs and services offered by the University. All students are invited to participate in WOW activities which include 49er New Year, dances, movies, prizes, cookouts, and other fun events. Visit online at wow.uncc.edu.

Minority Student Services

Minority Student Services is designed to assist and advocate for the needs of UNC Charlotte's under-represented populations. Through collaboration with a variety of offices on campus, the program focuses specifically on academic support, mentoring, social

networking, ethnic and cultural development, leadership development, and personal growth.

Latino Student Services

Latino Student Services provides a safe inclusive space where Latina/o students can build community, strive for academic and social success through peer to peer connections, as well as through staff support and advocacy. Family members of Latina/o students are provided with bi-lingual resources and support. The Latino Student Services office engages with the Charlotte Latina/o community by collaborating with various community organizations to promote college access and awareness. Visit online at latino.uncc.edu.

Student Advising For Freshman Excellence (SAFE)

SAFE is a peer mentoring program designed to help students academically transition through their first year of college. The SAFE program connects new students with upper-class mentors who serve as role models during the first year of college and provide academic and student development programming to address needs in a holistic manner. Visit online at safe.uncc.edu.

Off-Campus Outreach

Off-Campus Outreach supports students by providing informational resources about off-campus living and by working with campus departments to encourage University-wide support systems for off-campus students. Students who decide not to live in the residence halls can choose from a variety of apartment complexes, rental properties, or condominiums located near campus. Off-campus Outreach programs include Vendor Fairs, regular meetings with University-partnered apartment complexes, and safety presentations. Visit online at dso.uncc.edu/offcampus.

Parent and Family Services

Parent and Family Services is designed to provide communication between the University and family members of UNC Charlotte students in order to support student success, generate goodwill for the University, and promote an appropriate role for families within the campus community. Through collaboration with a variety of departments on campus, Parent and Family Services provide resources to keep families connected to the University and equipped to support their student throughout the college experience. Visit online at parents.uncc.edu.

Niner Nation Family

Niner Nation Family is intended to strengthen the relationship with parent and family members, and increase communication to actively involve them in the life of UNC Charlotte. Niner Nation Family

membership is open to all parents and family members of current students. Family members can join by contacting the Niner Nation Family Office at parents@uncc.edu or visiting the website at parents.uncc.edu.

Veteran Services

Veteran Services coordinates support services for military veteran and dependent students such as assistance with University administrative support, collaboration with Veterans Affairs counseling and healthcare services, veteran-friendly employment, mentoring, and veteran service organizations. In addition, the Office of Veteran Services is responsible for administering and certifying veterans benefits through the Veterans Administration Office. Finally, the office plans events on campus in honor of our nation's service-men and women, such as observances for Veterans Day, Memorial Day, POW/MIA Recognition Day, and 9/11 remembrance. Visit online at veterans.uncc.edu.

Volunteer Outreach

Volunteer Outreach helps students find community service opportunities that match their interests and skills through connection with local non-profit agencies. A wide variety of service activities are available including issue-based programs that focus on topics such as education, hunger and homelessness, literacy, animals, alternative spring break, and mentoring. Volunteer Outreach also sponsors special events in which all UNC Charlotte students, faculty, and staff may participate such as American Cancer Society Relay for Life, Food Recycling Program, Volunteer Fairs, and MLK and Homecoming days of service. Visit online at volunteer.uncc.edu.

Student Conduct

Student Conduct promotes personal responsibility and encourages civility, integrity and a sense of community among UNC Charlotte students. The purposes of the student conduct process are to (1) maintain an environment that supports and enhances the educational purpose of the University; (2) protect the health, safety, welfare, and property of all persons in the University community; (3) encourage appropriate standards of individual and group responsibility in the University community; and (4) foster the personal, social, and ethical development of members of the University community.

The desired outcome of the student conduct process is to provide an educational opportunity by which individuals or groups can recognize the consequences of their actions and be held accountable for their choices both in and out of the classroom. As part of

their individual responsibility to the University community, all UNC Charlotte students are expected to be familiar with University Policy 406, The Code of Student Responsibility, and University Policy 407, The Code of Academic Integrity. Visit studentconduct.uncc.edu for more details.

Staff members from the Office of Student Conduct serve as administrative advisors to the Judicial Branch of the Student Government Association (SGA).

Fraternity and Sorority Life

Fraternity and Sorority Life at UNC Charlotte consists of 39 fraternities and sororities founded upon the principles of scholarship, leadership, community service and the formation of lifelong friendships through brotherhood/sisterhood. Fraternities and sororities uphold these fundamental values in their pursuit of collegiate excellence, enabling all members to achieve their personal best. Fraternity and Sorority Life provides students with an opportunity to be a part of a large group with many diverse characteristics while sharing a common goal. The fraternities and sororities work together to provide a quality experience for anyone who joins via service projects, educational programs, and social activities. The experience the student gains from organizing and motivating people, planning and implementing projects and learning to give back what one has received can be an invaluable part of a college education. Membership recruitment for a fraternity or sorority primarily begins with each new semester. However, some organizations hold recruitment meetings throughout the year. Some of the many programs within Fraternity and Sorority Life include: the Greek Leadership Conference, Greek Week, Airband, Stepshow, and New Member Convocation. Visit online at greeklife.uncc.edu.

Educational Resources

Computing Assistance

Information and Technology Services (ITS)

Information and Technology Services manages the campus voice and data networks, centralized servers, University-owned computers, operating systems, and software to support teaching, learning, research, and business processes. The campus has a robust data network that connects over 500 servers and approximately 8000 computers. All educational buildings have wireless coverage and wifi has been expanded to cover many outdoor study areas to

support students bringing their own device. ITS maintains and supports the University's core administrative systems, performs application development, and administers and supports all of the University's central server resources. ITS provides development, consulting, and support services for the University web presence, its portal (My UNC Charlotte), and the learning management system (Moodle). ITS also provides facilities and services in support of the University's research mission. Visit itservices.uncc.edu for more information about the department and resources available.

Client Engagement

Client Engagement, within Information and Technology Services, works to ensure that students and employees have access to computer equipment, software, and information needed to support their general academic and professional efforts at UNC Charlotte. All current students and employees are provided with a NinerNET account that allows access to email, My UNC Charlotte, and the University network for their use while they are enrolled in courses, or employed, at UNC Charlotte. Client Engagement provides technical support through the IT Service Desks in Atkins Library and the Student Union, an online helpdesk tool located at helpdesk.uncc.edu, and via phone at 704-687-5500. Visit itservices.uncc.edu for more information.

Library/Research Assistance

The J. Murrey Atkins Library, the largest academic research library in the Southern Piedmont region, is proud to serve as the center of intellectual life at UNC Charlotte. The Library is a member of ASERL (the Association of Southeastern Research Libraries), with a mission of advancing the scholarly and creative endeavors of the University and the greater Charlotte community by providing exceptional collections, spaces, services, and technologies. It inspires innovation, support research, and cultivate scholarship.

Research

The Library continues to aggressively grow its robust digital collections with access to over 55,000 electronic journals and about 500,000 electronic books, and maintains over 2 million volumes. Expert subject librarians provide a variety of research services: course assignment, project, and paper help, citation assistance, information literacy classes, support for online class software and much more. They can be reached via live chat, email, phone, in person at the Research Help enclosure on the 1st floor, and for one-on-one meetings involving deeper, subject-related study. Rare materials and archives are also accessible for physical and digital research in

Special Collections and University Archives on the 10th floor.

Services

The Library faculty and staff are committed to consistently reinventing library services that meet the changing dynamics of research needs. The Library's Technology and Digital Strategies unit partners with faculty and graduate students in the use of digital and networked research tools to create, disseminate, and store new knowledge. This unit can support the research process and projects through advising, digital tools, and a set of services including data management, digitization and digital imaging, usability, and publication services.

Facilities

The Library features study and collaboration spaces for all needs including 42 reservable group study rooms, Graduate and Quiet Study rooms, and collaborative tables, seating areas, and enclosures throughout the building. The entire building features wireless access as well as more than 400 computers (Macs and PCs). Students can check out laptops for 24 hours from the Circulation Desk and experiment with new technologies (3D printers, etc.) on the 2nd floor. Additionally available are Atkins Café is on the ground floor, as well as vending machines, or students may bring their own food and drink.

The Library is open 24/5 (Sunday from 11 a.m. until Friday at 10 p.m., and Saturday from 10 a.m. to 10 p.m.) during the regular semester, and 24/7 during finals. For more information, visit library.uncc.edu.

Non-Traditional Academic Programs

Extended Academic Programs

Recognizing that learning must be a lifelong activity, the University provides opportunities for adults to pursue their continuing education through degree-related studies and special non-credit programs. With staff dedicated to Professional Development as well as Corporate Training, Extended Academic Programs responds to the current and emerging workforce needs of companies, organizations, and industries in the region. Please visit ExAP.uncc.edu for specific information about the programs offered.

Continuing Education

Non-credit courses, certificates, and exam prep programs are offered through the Office of Continuing Education. Online and classroom options are provided throughout the year in the fields of accounting, business analysis, business process

management, engineering, healthcare, human resources, learning and development, paralegal, personal development, project management, and a variety of technology and computer software programs. The Office offers a variety of courses to prepare individuals to sit for various exams, including the ACT, SAT, GRE, GMAT, MCAT, LSAT, and professional FE, PE, PHR, SPHR, and PMP® exams. The Office's Corporate Training staff design and deliver programs in-house to serve the employees of specific companies and organizations. The Office also offers academic enrichment camps for youth during the summer. Continuing Education staff are located at UNC Charlotte Center City. Visit continuinged.uncc.edu for more details.

Distance Education

Through Distance Education, courses and programs for academic credit are offered at off-campus sites and online to serve UNC Charlotte students and citizens who live beyond easy commuting distance of the campus and/or need alternatives to on-campus courses to accommodate their busy lives. Options for delivery include sending a UNC Charlotte faculty member to an off-campus location to teach a course in person, delivering courses completely online or via Hybrid delivery combining face-to-face and online delivery of instruction. The Office offers degree programs at the baccalaureate and graduate levels. The Office also has responsibility for the coordination and administration of Summer School, which includes courses offered on the campus, at off-campus sites, and online. Visit distanceed.uncc.edu for more details.

Adult Students and Evening Services

The Office of Adult Students and Evening Services (OASES) serves as a principal resource for nontraditional students, and offers extended hours to serve these students. Services include general education advising, academic success workshops, referrals, parking decal pick-up, and assistance with processing various forms. Students can pick up and/or drop off information to be delivered on campus. Programs include adult student scholarships, adult student orientation, the Adult Mentoring Program for Students (AMPS), the Alpha Sigma Lambda Honor Society, the Pinnacle Honor Society, and the 49er Finish and 49er Readmit programs. Visit oases.uncc.edu for detailed information, including office hours.

Environmental Facilities and Services

Botanical Gardens

The UNC Charlotte Botanical Gardens, located on campus, consist of the McMillan Greenhouse, the 7-acre Van Landingham Glen, and the 3-acre Susie Harwood Garden. The mission of the gardens is to promote the knowledge and appreciation of plants for educational, environmental, and aesthetic purposes. The gardens were begun in 1966 by the late biology professor emeritus, Herbert Hechenbleikner, to serve as a living classroom and have evolved into a multifaceted campus and public resource. Collections include orchids, carnivorous plants, succulents, native plants, tropicals, and hardy outdoor trees, shrubs, wildflowers, and ferns. The outdoor gardens are open seven days a week, and the greenhouse is open Monday through Saturday, 10-3, and Sundays from 1-4. Students and the public are invited to visit, free of charge. More information can be found online at gardens.uncc.edu.

Environmental Health and Safety

It is the mission of the Environmental Health and Safety Office to support the University by working with all University community members to provide a safe and healthy working, teaching, learning and living environment. This is accomplished by providing high-quality, responsive customer-focused environmental health and safety services to the campus community. It is our responsibility to develop environmental health and safety programs, maintain appropriate accident documentation, conduct safety inspections of all facilities and operations, audit safety programs, maintain all regulatory required reports, and generally work to reduce the risks of illness or injury.

All members of the University community share the responsibility to provide and maintain a safe and healthful campus environment and to reduce or eliminate known hazards. Each individual is expected to exercise appropriate care in the conduct of his or her activities to preserve the safety and health of self and others. For more information, please visit safety.uncc.edu.

Recycling

Recycling services are coordinated by the Office of Waste Reduction and Recycling within Facilities Management. The University's recycling program,

initiated by students in 1990, currently recycles 40% of the solid waste generated on campus, including approximately 40 different materials. Residence halls are equipped with recycling containers in trash rooms or lobbies, and a small recycling bin in each room. Aluminum cans, steel cans, glass bottles and jars, plastics (except #6), computer paper, newspapers, magazines, and cardboard can be recycled at the residence halls. In addition to the above materials, Styrofoam peanuts, toner cartridges, transparencies, and hard- and soft-back books can be recycled in the academic and administrative areas.

Note: After students fill the recycling bin provided in their rooms, they should bring the recyclables to the recycling container located in the building's common area.

The recycling program can provide educational sessions for students, faculty, and staff upon request. The program coordinates and sponsors the annual UNC Charlotte Earth Day Environmental Festival, the biannual Campus Clean-Ups, and the Take-It-or-Leave-It Tour. For more information, contact the Office of Waste Reduction and Recycling at 704-687-0607.

For more information about UNC Charlotte's waste reduction and recycling activities, view the website at facilities.uncc.edu/recycling.

Health, Wellness, and Counseling Services

Student Health Center

The Student Health Center's mission is to promote healthy students by providing health care, education and outreach services. It provides primary medical care, disease prevention, health education, wellness promotion, and various specialty services; including allergy injections, immunizations, gynecology, physical therapy, and HIV screening to all enrolled UNC Charlotte students. The Student Health Center is staffed by a team of physicians, physician assistants, and nurse practitioners. The Student Health Center also provides a full-time psychiatrist and a registered dietician. The pharmacy fills prescriptions from outside physicians as well as the Center's own providers.

The Student Health Center functions by appointment; this eliminates long waits and assists students in scheduling medical services around class schedules. However, walk-ins are accommodated for acute care or injuries, and will be seen according to severity.

The Student Health Center also provides nursing advice for students through UNC HealthLink when the Student Health Center is not open, including weekends and holidays. HealthLink is an after-hours nursing phone service provided by UNC Medical Center. Seriously ill students and emergencies may be referred to local hospitals or other appropriate medical facilities. There are a number of urgent care centers and a major hospital within 5 miles of UNC Charlotte. More information about HealthLink, local urgent care centers, and nearby hospitals is available on the Student Health Center website.

The student health fee covers many of the costs for services. Additional fees are charged for x-ray, pharmacy, laboratory, and gynecology services, injections, and special procedures. Fees for service may be paid by cash, check, credit card, or transferred to the student's University account. The Student Health Center only files insurance for those students who have the Student Health Insurance policy. For more information, visit the Student Health Center website or call 704-687-7400.

Students are required to either provide proof of insurance or purchase a University Student Health Insurance Plan. All students will be charged the semester fee for the University Student Health Insurance Plan. However, a waiver process is in place for students to provide documentation of their insurance to refund this fee. The waiver process can be found online and through hyperlinks provided in University emails. Full details may be found online at studenthealth.uncc.edu under the Insurance tab.

North Carolina law requires students to have proof of immunizations. These must be provided to the Student Health Center upon registration. Students whose immunizations records are not complete are subject to being withdrawn from their classes. Please see "Immunization Requirements" in the Admission to the University section of this *Catalog* or visit studenthealth.uncc.edu under the Immunizations tab for more information.

Counseling Center

The Counseling Center at UNC Charlotte supports the academic, personal, and interpersonal development of UNC Charlotte students by providing short-term individual and group counseling; consultation for faculty, staff, parents, and students; and educational programs to the campus community. Consistent with the academic mission of the University, the Center also serves as a training site for graduate students in psychology and counseling and encourages scholarly activity and professional development of staff.

Counseling provides an opportunity for individuals to learn to make better decisions, improve personal skills, develop increased confidence, overcome blocks to personal effectiveness, and acquire a keener awareness and appreciation of their needs and the needs of others. In a personal interaction with a counselor, a student is helped to explore and express feelings, examine beliefs and ways of thinking about the world, reflect on patterns of behavior, and work toward making healthy changes.

For many students, relationship or other developmental issues are central concerns. Others may be experiencing specific psychological problems such as depression, anxiety, eating disorders, use of alcohol and other drugs, or difficulties in adjustment.

All currently enrolled students are eligible for an initial assessment. This first session helps both the student and counselor decide how Counseling Center services might best serve a student's needs. After the first session, follow-up services may consist of individual or group counseling at the Counseling Center and/or a referral to an on-campus or off-campus service. Information shared by student clients is confidential in accordance with ethical guidelines and the laws of the state of North Carolina.

Outreach and consultation are important services provided by the Counseling Center. Staff members are available to consult with faculty, staff, parents, and students who have concerns about a student. Outreach activities, usually focusing on some aspect of personal, interpersonal, or group development, include programs conducted outside the Counseling Center to meet the needs of a class, group, or organization.

Initial counseling appointments may be arranged by visiting the Counseling Center at Atkins 158 or by calling the Center at 704-687-0311. More information about the Counseling Center and its services can be obtained by visiting counselingcenter.uncc.edu.

Housing and Residence Life

<http://housing.uncc.edu>

University towers, suites, and apartments offer students a variety of living arrangements.

Residence Halls

Three tower halls house a combination of either two students in each room or single rooms. Each room is

equipped with dressers, study desks, chairs, and closets or wardrobes. Recently renovated Holshouser Hall also has two bedroom four person suites on each floor. Each of these suites has a den and a bathroom in each unit. Each floor has a central lounge, plus study and seminar rooms. Two elevators service each air-conditioned building. Each building also contains an office for the full-time professional staff (Residence Coordinator), student mail boxes, a vending area, a lounge, and a laundry room. A meal plan is required in the tower halls.

Suites

Dependent upon the building, single bedroom options are available in one-, two-, three-, and four-bedroom units. Double bedroom options allow four residents to live together with two occupants sharing each bedroom. All suites have a shared den area and bathroom in each unit. Levine Hall is a new building scheduled to open late Fall 2016 that will offer both single and double bedroom options. All residents living in suites are required to have a meal plan.

Apartments

On-campus apartments offer students a more private living environment and require a more self-reliant lifestyle. Most apartments are four-bedroom units, with one student assigned to each bedroom. The four students share a bathroom area and kitchen, complete with appliances and a living/dining space. The new Levine Hall will offer four-bedroom apartments in addition to suites. Belk Hall offers a limited number of one-bedroom apartments in addition to the traditional four-bedroom apartment units. A meal plan is optional for upper-class students, allowing students the experience of buying and preparing their own food, if they so desire.

Greek Village

Greek Village houses up to thirteen fraternities, sororities, and, in some cases, independent students. Each house has a chapter/living room and kitchen for common use and holds 28 or 14 students.

Summer Housing

For information about summer housing, please contact the Housing and Residence Life Office.

Applying For Housing

Students who plan to live on campus should apply as soon as possible, as assignments are made according to a combination of factors including: date of completed application, community preferences, roommate requests, space availability, class year, and building/room preferences. Application for housing

may be made online at housing.uncc.edu following the student's admission to the University. For new student applicants, a \$200 deposit is required with the application in order for it to be considered complete.

Accommodations for Students with Disabilities

Housing facilities designed specifically for students in wheelchairs are available. Wheelchair users who receive confirmation of residential space have priority in assignment to these facilities *as long as the University is able to offer space*. It is extremely important that the housing application is received before all space is committed so that this priority for assignment to appropriate facilities can be exercised. Students utilizing wheelchairs may be considered for priority status on the waiting list on the basis of (1) the date of completed application and (2) the degree of utilization of wheelchair-equipped facilities as compared to the proportion of wheelchair students who apply.

Assignment to a disability accessible housing space requires documentation of the disability and special needs in accommodations by the Office of Disability Services. Documentation must be provided to Disability Services when the housing application is submitted and no later than June 1. The University does not assume any responsibility for the provision of attendants for students with disabilities. Such arrangements are entirely the responsibility of the individual student and should be established well in advance of the time the services are to begin.

International Programs

<http://oip.uncc.edu>

Office of International Programs

The Office of International Programs (OIP) strives to strengthen international education at the University of North Carolina at Charlotte, as well as in the Charlotte community. On campus, it seeks to make international understanding and global awareness a fundamental part of the curriculum and an integral part of campus programming.

Campus International and Cultural Programming

Various internationally-focused campus events are sponsored independently by OIP and in cooperation with other departments on campus. Some examples

include the annual International Festival, International Education Week, Study Abroad Fairs, International Women's Day, International Education awards for faculty and students, International Speaker Series, and activities associated with the Mu chapter of Phi Beta Delta Honor Society for International Scholars.

OIP continues to coordinate the International Enrichment Seminar, a first-year student course offered in University College with an emphasis on self and cultural awareness. OIP also oversees an on campus international living community, offering upper-class students the opportunity to live in two different residential environments while participating in intentional cultural learning activities.

Public Services

In addition to campus-based programming, the Office of International Programs seeks to initiate and respond to the international needs and interests of the community. Current programs include: (1) Great Decisions – an annual series of lecture/discussions during the months of February and March on key policy issues; (2) Cross-Cultural training - custom-designed workshops that focus on appreciation for other cultures and development of skills in effective communications across cultures; and (3) International Festival – a “marketplace” style program featuring international foods, music, and dance from more than 70 countries.

OIP Unit Operations

The Office of International Programs serves as a center of leadership and responsibility for the international role and mission of the University. It is comprised of related units that function together towards creating an international perspective in all facets of campus development. OIP includes OIP Administration, the Office of Education Abroad, the International Student and Scholar Office, the English Language Training Institute, and Intercultural Outreach Programs. In addition, OIP is the campus host for the World Affairs Council of Charlotte. Each unit of operation is briefly described below.

OIP Administration

The Office of International Programs Administration unit (OIPA) includes the Assistant Provost for International Programs and other OIP administrative staff. OIPA provides overall leadership and direction for the Office of International Programs and its constituent units; develops, supports, and organizes a wide range of on- and off-campus programming; supports faculty development through various initiatives; guides the development of institutional agreements with foreign universities; and provides leadership and advice to promote campus

internationalization efforts.

Office of Education Abroad

The Office of Education Abroad (OEA) at UNC Charlotte is committed to providing quality, cost-effective educational opportunities for students to enhance their learning in an experiential environment abroad and to supporting faculty initiatives in creating such programs to supplement their curriculum objectives.

Students are encouraged to take advantage of the opportunity to have an educational experience through study or experiential learning abroad. OEA develops and maintains exchange relationships in multiple countries throughout the world and is an active member of the International Student Exchange Program (ISEP) which allows students access to additional programs from a worldwide framework of exchanges. Students have the option of year-long, semester, summer, or short-term programs.

In addition to making progress toward their degree requirements, students have the opportunity to test theoretical principles in real-time, challenge their assumptions about different cultures and explore their own relationship with the global landscape.

International Student and Scholar Office

The International Student and Scholar Office (ISSO) provides information, services, and programs that help international students and visiting scholars achieve their individual educational and personal goals and also fosters an appreciation for a culturally diverse learning environment in the larger UNC Charlotte community.

UNC Charlotte hosts a vibrant international community. Over 1,500 non-immigrant international students representing over eighty countries around the world study at UNC Charlotte. International students are supported through orientation, programming, individual advising, and assistance with immigration document processing. Similarly, international faculty receive one-on-one immigration advising and cultural adjustment support. Various workshops are offered as well for international and/or U.S. domestic faculty who wish to learn more about immigration matters or working with international students.

Programs to encourage international student and U.S. American student interaction are also supported through ISSO. Examples of ISSO programs include the International Coffee Hour, Friendship and Culture Exchange Program, and the International Club at UNC Charlotte.

English Language Training Institute

The English Language Training Institute (ELTI), established in 1978, prepares international students for academic study at UNC Charlotte or other U.S. colleges and universities by introducing and refining the English language and cultural adaptation skills the students will need to succeed in their academic careers.

ELTI offers seven levels of English language instruction to over 200 students from more than 20 countries each semester. In addition to 20-24 hours of class each week, students visit academic classes, meet with U.S. conversation partners, and tour area schools and sites of cultural interest. On average, students stay for at least two semesters.

ELTI also offers the International Instructor Language Support Program (IILSP), a support program for international faculty and teaching assistants at UNC Charlotte.

Intercultural Outreach Programs

Intercultural Outreach Programs (IOP) develops a wide array of academic and professional development programs in conjunction with an intensive and structured immersion experience in U.S. American culture and language for international groups.

IOP also facilitates specialized faculty development programs and practical training for international interns. Each experience is custom-designed and integrated with experiential learning activities; cultural, social and recreational events; as well as opportunities for interaction with the Charlotte and University communities.

World Affairs Council of Charlotte

The World Affairs Council of Charlotte (WACC) was founded in 1983 as an outreach program of the Office of International Programs at UNC Charlotte. By serving as a regional center for education and discussion of world affairs, WACC seeks to provide leadership for global thinking, believing that a broad perspective is necessary for effective competition in the global economy and for responsible citizenship in an increasingly interdependent political world. The WACC recruits internationally renowned speakers to address topics ranging from economics to globalization to foreign policy.

The World Affairs Council of Charlotte also serves as a resource for the local school community, providing educational programming and scholarships. Each year, WACC funds nearly \$35,000 in grants and programs for teachers and students in support of their commitment to international education initiatives. Since 1996, the organization has directly impacted

over 700 teachers and more than 70,000 students.

Performing Arts

Within the College of Arts + Architecture, the Departments of Dance, Music, and Theatre serve the educational needs of students and the cultural needs of Charlotte and the University community. It is the mission of these three departments to prepare students for arts-related fields by integrating excellence in instruction and artistic creativity within a broad professional landscape.

Performance Venues

As UNC Charlotte's primary facility for the arts, **Robinson Hall** is where the weeks and months of planning, programming, and behind-the-scenes work give way to presentation to live audiences. Every production is an opportunity for students and faculty to investigate and understand by doing and a medium through which the arts illuminate, inspire, or confront.

The dynamic between audience and performer assumes a more urgent tone in the higher education setting of Robinson Hall. Public performances reinforce our role as a resource to the arts community in Charlotte. More than a venue, Robinson Hall offers a space to challenge preconceptions and present students, faculty, and audiences with other ways of seeing the world in order to stimulate and amplify community dialogue.

Within Robinson Hall are the **Anne R. Belk Theater** and the **Lab Theater**. The main stage space, the Anne R. Belk Theater, is a proscenium-style house which seats 340. Dozens of performance events take place in the theater over the course of an academic year. The theater's orchestra, mezzanine, and box seating offers patrons an environment that is both intimate and elegant. The flexible Lab Theater space can accommodate 90 to 125 patrons for a unique theatrical experience.

The Rowe Arts building houses the 360-seat **Rowe Recital Hall** and the **White Box Theater**, a classroom and lab theatre space dedicated to the development of student works and projects.

Productions

The Departments of Dance, Music, and Theatre are the headliners at Robinson Hall. The primary role of our two theaters – the 340-seat, proscenium-style Anne R. Belk Theater and the intimate 125-seat, "black box" Lab Theater – is to support the education of our students in the processes of performing arts

production. In the weeks before the performance, the theater space becomes a laboratory as students hang lights, construct sets, work sound and rehearse, learning how to carry out the remarkable technical operations necessary to stage and produce a show.

Police & Public Safety

The UNC Charlotte Police Department proactively patrols and responds to calls from the University community 24 hours a day, 365 days a year. The Department is comprised of over 40 sworn police officers who have successfully completed all of the trainings and certifications required to serve as law enforcement officers in North Carolina. Patrols are conducted in marked and unmarked cars, bicycles, off-road vehicles, and on foot. Non-sworn personnel known as “Rangers” serve as extra sets of eyes and ears by patrolling and/or securing buildings and parking lots. Security personnel from the Housing and Residence Life, Atkins Library, and Halton Arena/Student Activities Center provide additional layers of safety and often work in concert with the Department.

The Department’s Administrative Office is located in the Facilities Management/Police & Public Safety Building located at 9151 Cameron Boulevard across the street from the Student Health Center. This building contains the Department’s 911 Emergency Telecommunication Center which is staffed 24 hours a day that can be reached by dialing 911 from any landline on campus or 704-687-2200 from a cellular phone. Individuals in need of emergency assistance or who simply need police assistance for a non-emergency situation are strongly encouraged to call this number. Individuals who need to pick up a copy of a police report or who are searching for Lost & Found items may stop by the 1st floor lobby of this building or call the Administrative Assistant at 704-687-8300 during normal business hours.

The Department’s website contains a wide variety of information pertaining to what the Department is doing to provide for a safe and secure environment on campus and how the Department is increasing its responsiveness to the needs of the campus community. Some of the items on this website include the Department’s Annual Security Report, information on how individuals can reduce their chances of becoming the victim of a crime, Rape Aggression Defense (R.A.D) training class dates, and links to other community resources that assist the Department in protecting the campus community.

The website also features information about the University’s nearly 300 emergency blue light phones and how individuals can sign up to receive emergency text messages. Finally, the website allows individuals to confidentially report a crime on campus or file a commendation/complaint about a particular member of the Department. For more information about any of the aforementioned items, please visit police.uncc.edu.

Preparation for Professional Schools

An education at UNC Charlotte can prepare students for a number of professional careers. Students who plan to enter a professional school are advised to plan their program of study so that general requirements for their degree are met in addition to the requirements for the professional program being considered. This can begin with a discussion with an academic advisor as soon as a student starts to explore professional schools. Students should become familiar with the requirements of the professional schools of interest. That school, not UNC Charlotte, will determine which UNC Charlotte credits will be accepted.

Professional school entrance requires an extensive commitment and focused career choice. Certain careers require an advanced degree, and the University Career Center (UCC) can help students identify what kind of graduate study will best prepare them for the specific career of interest. In addition, the career resource collection in the UCC contains information on preparing for professional school exams, select fellowships and grants, and in-depth career information. Hire-A-Niner, the UCC’s online job and internship database, includes relevant job shadowing, internship, and work opportunities. Résumé critique sessions, application essay reviews, and mock interviews offered by the UCC can be geared toward professional school admissions, based on student need. Professional programs recruit on campus career fairs that happen throughout the academic year.

It is important to note that there are more application requirements for professional programs than for undergraduate programs. Application is often an extensive and in-depth process. The UCC can help students plan the application and career development processes, which includes career exploration through job shadowing, self-assessment, career research, and internships.

UNC Charlotte’s Extended Academic Programs office

offers fee-based programs that help students prepare to take the GRE, GMAT, and LSAT exams.

Pre-Health

UNC Charlotte offers pre-professional preparation for undergraduate, graduate, and post-baccalaureate students interested in pursuing a career in medicine, dentistry, veterinary medicine, pharmacy, optometry, physician assistant, physical therapy, podiatry, and related healthcare careers. Opportunities and services available to students include:

- Strong academic preparation in the required prerequisite core of science and math courses
- Broad selection of recommended non-science courses
- Pre-Health Professions Advising for academic and nonacademic requirements for professional school admission
- Assistance with the application process, including essay preparation and interviews
- Pre-Professional Faculty Evaluation Committee that prepares composite recommendation letters on the student's behalf
- Opportunities to participate in research
- Student clubs that offer guest speakers, community service, and peer support

Like most universities, UNC Charlotte does not offer a formal pre-health major, minor, or program. Students must select a major and are responsible for completing the prerequisites for their chosen professional school *in addition* to courses for their major. There is no requirement to major in science, but strong preparation in science and math must be demonstrated, regardless of the major. A Pre-Health Advisor will assist the student with identifying the appropriate pre-professional courses and formulating a timeline for their completion.

All pre-health students are encouraged to consult with a Pre-Health Advisor to plan and review their course of study and other requirements necessary for admission into professional schools. Additional information may be found on the Honors College website at honorscollege.uncc.edu, including prerequisite course lists for various professions.

For health-related student organizations, visit studentorgs.uncc.edu.

Prerequisite Core Courses

The basic minimum requirements for entrance to most health professions schools are as follows:

Biology (with labs) 8 credit hours
 General Chemistry (with labs) 8 credit hours
 Organic Chemistry (with labs) 8 credit hours

Physics (with labs) 8 credit hours
 English 6 credit hours

Note: These are the common minimum requirements; additional courses may be required at the discretion of the professional school. Most students will need additional coursework and healthcare-related extracurricular activities to be competitive for admission. Community service is also highly desirable.

Faculty Evaluation Committee for Pre-Health Professions

The UNC Charlotte Pre-Health Professions Faculty Evaluation Committee consists of faculty members from the University and serves as the main recommending body for UNC Charlotte students seeking entrance to medical, dental, veterinary, and optometry schools. Students must have competitive credentials to qualify for a committee letter. In order to obtain a recommendation from the committee, the student must schedule an appointment with the Pre-Health Professions Advising Office during the year in which applications are being submitted.

Pre-Law

Admission to law school is determined mainly by undergraduate grade point average and the score on the Law School Admissions Test (LSAT). Applicants must also submit letters of recommendation and a recitation of extracurricular activities, and personal statement, but those items are secondary to the GPA and LSAT. There is no defined program of pre-law courses, and law schools do not favor or require a specific major. Law schools look for students who have taken courses that are academically rigorous, including writing intensive and research oriented courses.

To learn more about law school, please visit the UNC Charlotte Pre-Law Society website at unccprelaw.com or contact the Department of Criminal Justice and Criminology. For law-related student organizations, please visit the Student Organizations website at studentorgs.uncc.edu.

Research

<http://research.uncc.edu>

Research and Economic Development

Research & Economic Development at UNC Charlotte strives to advance the quality, diversity, and growth of research at UNC Charlotte. A special value is placed on the translation of research results that impact our social, cultural, and economic communities.

Vice Chancellor for Research and Economic Development

The Vice Chancellor for Research and Economic Development provides direction and leadership for the development and translation of research and creative activity at the University and the infrastructure that supports those activities. The Vice Chancellor leads the research and economic development efforts of the Charlotte Research Institute and directs ten support offices: Advancing University Research Administration (AURA), Office of Proposal Development, Office of Research Services & Outreach, Office of Research Compliance, Conflict of Interest Office, Office of Grants & Contracts Administration, Office of Technology Transfer, Lab Animal Resources, Small Business and Technology Development Center, and Ventureprise.

Advancing University Research Administration

Advancing University Research Administration (AURA) is a suite of projects to implement research administration process and system improvements. The objective is to streamline research administration processes to improve effectiveness, efficiencies and customer service, enabling the University research faculty to increase their research endeavors. This project will also assess and improve the systems that support research administration processes. The AURA program is aligned with the University goal to reach at least \$50 million in research funding by 2020. The program is also aligned to the strategic goals of Research and Economic Development, which include improving customer service, increasing collaboration with other universities, and continuing to build the culture of research within the colleges at UNC Charlotte.

Office of Proposal Development

The Office of Proposal Development (OPD) works closely with faculty and funding agencies to identify opportunities for proposal development, facilitate the formation of proposal teams, and provide a wide range of services to help faculty achieve their research goals, including consultation on writing and funding strategies, and proposal editing.

Office of Research Services and Outreach

The Office of Research Services & Outreach (ORSO) provides services for the review and submission of proposals to funding agencies, including the interpretation of guidelines, preparation of budgets, and submission and tracking of proposals. ORSO also coordinates research-support efforts with college research officers and facilitates training opportunities for department and college administrators charged with helping faculty manage their grants.

Office of Research Compliance

The Office of Research Compliance (ORC) facilitates and monitors University-wide compliance with federal and state policies established to ensure ethical conduct in research. Through its work with the Institutional Review Board, the ORC ensures respect, fairness, and safety in human subjects research. Likewise, oversight for the humane care and use of animals used in research and teaching is achieved through its work with the Institutional Animal Care and Use Committee. The ORC works with the Institutional Biosafety Committee and the Environmental Health and Safety Office to oversee biohazardous agents used in research and monitor safety concerns involving chemicals and radiation, and has responsibility for the University's adherence to export control regulations.

Office of Conflict of Interest

The Conflict of Interest (COI) Manager works with faculty and staff to identify potential conflicts of interest and conflicts of commitment; and to ensure compliance with Federal, State, and university-wide regulations and policies. The COI Manager also manages the Activities, Interests & Relationships (AIR) disclosure and COI Training systems, and provides guidance via the COI website.

Office of Grants and Contracts Administration

The Office of Grants and Contracts Administration (GCA) provides sponsored programs accounting, cash management, financial reporting, contract negotiation and approval, post-award management support, and cost analysis services. The Cost Analysis group manages the F&A and fringe benefit rate proposals to the Federal government and oversees effort reporting, cost-share reporting, recharge unit accounting, and research space inventory. The Award Management group works with the college sponsored programs offices to provide comprehensive grant accounting services from award setup through closeout and final reconciliation. The Compliance and Control group oversees billing, invoicing, cash management, sub-recipient monitoring, Federal draw-down, reconciliation, reporting, and year-end closing. The Contracting and Grant Services units are responsible

for initiation of awards including contract negotiation and execution.

Office of Technology Transfer

The Office of Technology Transfer (OTT) provides services for the review, protection, and management of University-based intellectual property, and commercializes intellectual property through licensing services. OTT builds and maintains strategic partnerships with local and state-based economic development agencies; assists and mentors faculty and students with new business start-ups; provides outreach services in the areas of entrepreneurship, new business creation, intellectual property management, and venture capital financing; oversees all aspects of patent filing, prosecution, and maintenance; and acts as a conduit to industry for sponsored research and technology commercialization.

Lab Animal Resources

UNC Charlotte's laboratory animal veterinarians and technical staff provide primary and veterinary care to all animals housed, as well as investigator training, technical assistance and guidance, and access to health status, laboratory, and imaging services. Our goal is the maintenance of an enriched, variable-free, secure, and humane environment for our animal subjects, as well as superb customer service for our research clients.

Small Business and Technology Development Center

The Small Business and Technology Development Center (SBTDC) is one of 17 University-affiliated offices of The University of North Carolina's business and technology extension service and is operated in partnership with the U.S. Small Business Administration. SBTDC specialists provide management counseling and educational services to small and mid-sized businesses and also help business owners and managers, economic and community development organizations, education institutions and not-for-profit organizations develop strategies and action plans to gain competitive advantage. The SBTDC helps clients successfully compete for federal, state, and local government contracts; provides assistance with export financing; and provides research and marketing support services, primary research on small business needs and economic impact, and special projects such as small business incubator feasibility studies.

Ventureprise

Ventureprise Inc. is a non-profit organization that serves as a venture development organization for the university and the Charlotte region. Its programs primarily target innovation-driven entrepreneurs,

university researchers, and university students interested in entrepreneurship.

Ventureprise organizes the annual Charlotte Venture Challenge business competition, supports technology commercialization through customer discovery as a National Science Foundation I-Corps Site, and operates incubators for regional innovation-driven entrepreneurs and UNC Charlotte students.

UNC Charlotte students seeking entrepreneurial experiences and guidance can participate in multiple programs that are summarized at entrepreneurship.uncc.edu. A focal point for students is the 49er Foundry student business incubator operated by Ventureprise in the PORTAL building. Through the 49er Foundry, Ventureprise provides business advisory services, connections, and a learning community that support the launch of successful student-founded ventures. Companies have access to services including wireless internet, conference rooms, and office equipment. The space supports business-oriented social interaction and networking.

Charlotte Research Institute

The Charlotte Research Institute (CRI) is the portal for business-university-government partnerships at UNC Charlotte. The aim of CRI is to develop Partnerships, Research, and Results (PR2) that solve our customers' problems whether they are a business, government agency, or government research laboratory. CRI strives to develop innovative solutions through interdisciplinary and cross-functional teams comprised of industry, government, and academic partners. New business and research ventures; university partnerships with regional, national, and international enterprises; and CRI spin-off companies all draw research and businesses to the region and spur economic growth.

The mission of the Charlotte Research Institute is to accelerate research, partnerships, and business development by promoting, sustaining, and focusing UNC Charlotte research on innovative solutions and emerging opportunities. It generates intellectual capital, collaborative partnerships and economic development, marketing UNC Charlotte and CRI in the Carolinas region, and beyond. As a primary source for intellectual capital and technology partnerships, CRI spans basic and applied research and research across disciplines and organizations.

Science and engineering ventures at CRI are driven by the internationally known results of its research centers in Advanced Manufacturing, Precision Metrology, Visualization, and Optoelectronics. CRI's research vision continues to grow with emerging

research initiatives that include motorsports and automotive engineering, nanoscale science, translational research, and cancer research. Key initiatives related to data science continue to expand in bioinformatics, business analytics, health informatics, defense computing, and cyber security. With facilities on the Charlotte Research Institute Campus and at the North Carolina Research Campus in Kannapolis, CRI helps companies initiate new partnerships at UNC Charlotte and offers a variety of opportunities to engage talented researchers and make use of specialized resources available at UNC Charlotte.

The CRI sector of the UNC Charlotte campus, as defined by North Carolina legislation, offers special opportunities for collaboration with private sector partners. In particular, partner companies may contract the use of research capabilities or facilities on the CRI Campus, contract for sole-use space, and construct and manage privately owned buildings. UNC Charlotte's latest commitment to university-industry partnerships is the PORTAL (Partnership, Outreach, and Research to Accelerate Learning) building which opened in January 2014. Located at the main entrance to the CRI campus, PORTAL offers 96,000 square feet of state-of-the-art office and research lab space for lease where business partners and entrepreneurs have daily exposure to the creative mix of students, faculty, and specialized facilities that the region's premier urban research university has to offer. PORTAL's exceptional convening spaces support business tenants within the facility and provide venues for events and meetings with CRI area business and research partners. The PORTAL industry-university partnership facility is home to the Ventureprise business incubator and accelerator, UNC Charlotte Office of Technology Transfer, and the Charlotte Small Business and Technology Development Center (SBTDC).

More information about the Charlotte Research Institute can be found online at cri.uncc.edu.

Industry/University Collaborative Research Centers

Six centers have been organized using planning funds from the National Science Foundation and the NSF model for industry/university partnership. These centers involve a partnership of multiple universities and industry affiliates who pool resources to pursue research of mutual interest. The centers include: (1) Center for MetaMaterials; (2) Center for Sustainably Integrated Buildings and Sites; (3) Safety, Security, and Rescue Robotics Research Center, (4) Center for Configuration Analytics and Automation, (5) Center for Precision Metrology, and (6) Center for Freeform Optics.

Bioinformatics Research Center

The Bioinformatics Research Center conducts multidisciplinary research involving the physical and life sciences, computer science, and mathematics and statistics with specific focus in the areas of functional genomics, statistical genetics, and proteomics. Projects underway include work in mechanisms of alternative gene splicing, new approaches to the analysis of microarray data, and the use of systems analysis techniques to understand gene-gene interactions. The center has taken a leadership role in developing Bioinformatics programs in collaboration with the developers of the North Carolina Research Campus, a billion-dollar, 350-acre research park that will be home to the research programs of a large number of private biotechnology companies as well as university and medical research programs.

Center for Applied Geographic Information Science (CAGIS)

CAGIS is an interdisciplinary research center that focuses on using advanced space-time theories, methods, and technologies in cutting-edge Geographic Information Science for complex geographical problem-solving. Based on the synergistic coupling of spatiotemporal and computational thinking, major research themes of CAGIS consist of CyberGIS for large-scale geographical problem-solving; land use/cover change and sustainability study; complexity theory and geospatial modeling; big data and space-time analytics; remote sensing, sensor networks, and volunteered geographic information; computational intelligence for geocomputational modeling; cartography and geovisualization driven by the Internet; and open-source GIS software.

Center for Biomedical Engineering and Science (CBES)

The Center for Biomedical Engineering and Science addresses complex problems in healthcare in the Charlotte community and beyond. The center builds research and development collaborations between researchers within UNC Charlotte's Colleges of Engineering, Liberal Arts & Sciences, Health and Human Services, and Computing and Informatics; local healthcare institutions (including Carolinas Medical Center, Charlotte Orthopedic Research Center, and Presbyterian Hospital); and corporations in the Charlotte metropolitan area to solve biomedical engineering problems. The center's research is focused in three primary areas: (1) medical therapies and technologies; (2) molecular engineering and design; and (3) biomechanics and mobility research.

Center for Configuration Analytics and Automation Research (CCAA)

The CCAA vision is to provide research for improved

configuration analytics and automation capabilities and their integration for efficient, accurate and timely operations, management and defense of complex networked information technology (IT) systems and environments.

Center for Freeform Optics (CeFO)

The Center for Freeform Optics (CeFO) aims to advance research and education on the science, engineering and applications of freeform optics through a dedicated, continuing industrial partnership. CeFO constitutes a unique research environment combining the strengths of two top-tier research universities with the experiences, insights, and needs of international industrial talent specialized in building systems supporting the manufacturing, integration, and implementation of advanced optical systems. CeFO provides vertical integration of mathematics, optics, optical science, materials science, optomechanics, precision optical manufacturing and testing, and instrument design in order to transform the optics industry in the 21st century.

Center for Lean Logistics and Engineered Systems

The Center for Lean Logistics and Engineered Systems highlights solution driven projects that emphasize the best practices in Logistics, Supply Chain Management, Lean Manufacturing, and Six-Sigma Quality Management.

Center for Metamaterials (CfM)

The mission of the Center for Metamaterials is to advance fundamental and applied metamaterials research, development, and technology transfer through strong industry/university collaborations. The researchers at the Center focus on industry-relevant, precompetitive research topics jointly identified by university and industry participants, and include metamaterials processing, testing, and device development. The projects advance the knowledge base for metamaterials through precompetitive research that will directly benefit Center members through shared knowledge and intellectual property. The intent is to nurture long-term relationships and collaborations among the university, industry, and government laboratories. Members participating in the Center share in research and development, laboratory infrastructure, and the resulting economic benefits.

Center for Optoelectronics and Optical Communications

The Center for Optoelectronics and Optical Communications includes research areas in: design and fabrication of photonic devices, meta-materials, integrated optical circuitry, assembly and packaging of optical systems, optical materials, methods for

precision optical metrology, and optical imaging and inverse methods for wave front synthesis. The Center has successfully allied with the Massachusetts Institute of Technology (MIT), Duke University, The Carolinas MicroOptics Triangle, and the North Carolina Photonics Consortium. A respected leader in the discipline, the Center has continuing support from the Defense Advancement Research Projects Agency (DARPA).

Center for Precision Metrology

The Center for Precision Metrology is focused on precision engineering and measurement, including research in manufacturing processes and quality assurance for mechanical parts to within a millionth of a meter. New state-of-the-art facilities include clean rooms and multiple metrology labs. Research efforts include picometer scale positioning devices, self-aware manufacturing, large scale metrology, high-speed machining, specialized sensors, adaptive polishing and grinding. Applications have spanned many different industries from microelectronics to aerospace and attracted companies such as Caterpillar, Intel, Mitutoyo, Siemens, General Electric, and Boeing for collaboration. The Center has been recognized as a National Science Foundation Center of Excellence in New Industry Collaboration and in Nanoscale Science and Engineering.

The Center for Sustainably Integrated Buildings and Sites (SIBS)

Sustainably Integrated Buildings and Sites is a collaboration between leading companies, corporations, universities, government agencies, and other organizations renowned for their innovative research capabilities, with the purpose of conducting research that promotes improved energy use, water use, air quality, and productivity in buildings through the integration of appropriate subsystems and technologies. The Center develops students who are knowledgeable in industry-relevant research and prepared to develop innovative products and services that enhance global competitiveness.

Complex Systems Institute

The Complex Systems Institute is a multi-disciplinary research center that provides a home for researchers who cross disciplinary boundaries in search of holistic answers. Current faculty come from areas as diverse as: Computing, Political Science, Sociology, Business, Biology, Communications, Philosophy, Theater, Language, and Health and Human Services. Tools developed by CSI members help analysts model infrastructure and social networks, visualize and understand how individual networks behave, and understand multiple-network interdependency behavior, including second and third order effects and unintended consequences. There are three centers

within the Institute: The Complexity Laboratory, Defense Computing Center, and The Center for Advanced Research in the Humanities.

Cyber Defense and Network Assurability Research Center (CyberDNA)

The CyberDNA Center has been established to be one of the leading national centers in research and education of network and information security. The CyberDNA Center includes strong and diverse expertise as well as state-of-the-art facilities to address critical network security, assurability and privacy problems of high societal-impact. The CyberDNA offers a unique environment to facilitate joint R&D programs (consortium, seminars and workshops) with the industry, financial institutions, utility service providers and government agencies. The main objective of CyberDNA is to enable assurable and usable security and privacy for smart open society by making cyber defense provable, enforceable, measurable, and automated.

CyberDNA has a unique vision and approach among other national centers including: (1) promoting automated analytics and synthesis of designing, configuration and evaluation of mission-oriented security systems; (2) offering leap-ahead research by integrating multidisciplinary research from security, networking, reliability, risk management, economical, behavioral and physical world communities; and (3) developing deployable tools to facilitate technology transfer and workforce (students) education and preparation.

Data Science Initiative

The Data Science Initiative (DSI) is an industry-university-state partnership to broaden and deepen North Carolina's business analytics talent and stimulate strategic innovation. It directly supports high-end job creation and business investment in the Charlotte region and across the state. The lead partners on the DSI, the College of Computing and Informatics and the Belk College of Business, each have a long, successful history of fostering strategic relationships with the business community. The initiative also includes the College of Health and Human Services and its emerging leadership in health informatics. This team provides intellectual capital, academic programs, and outreach activities to meet the needs of employers in the new data-driven economy, both in developing a highly trained workforce and in providing cutting-edge research to address challenges and opportunities in the rapidly changing business environment.

Energy Production and Infrastructure Center (EPIC)

The Energy Production and Infrastructure Center (EPIC) targets innovation in technologies associated

with generation and distribution of reliable, affordable and clean energy sources. UNC Charlotte is partnering with the energy and infrastructure industry to create a scientific and technical resource for the energy industry and a training ground for the energy workforce. EPIC is an interdisciplinary research center with a strong emphasis on collaboration among the disciplines of civil and environmental engineering, computer and electrical engineering, mechanical engineering and engineering science, and systems engineering and engineering management.

Infrastructure, Design, Environment, and Sustainability (IDEAS) Center

The Infrastructure, Design, Environment and Sustainability (IDEAS) Center was created to provide regional leadership to accelerate a cultural and technological shift to more sustainable practices as humans create and live in the built environment. Research topics are broad and include renewable energy, high performance building and renovation, low impact materials, material reuse and recovery, sensor applications, monitoring and long term performance assessments, greenhouse gas inventories, life cycle assessments, and low impact development.

Life Science Research

Life Science Research is now developing strongly in five focus areas. Translational Research is designed to join basic science research with patient care to develop novel treatments and therapies for diseases and healthcare problems. Health Services Research harnesses the power of visual analytics for data warehousing/mining of large scale databases (vital statistics, hospital discharges) for decision support for both clinical and public health research domains. Kinesiology Research is focused on biodynamics and exercise physiology. Nursing and Rehabilitation Research focuses on recovery from severe physical trauma. Ecology and Environmental Biology Research is geared toward toxicology, bacteriology and biotechnology. UNC Charlotte research in cancer diagnostics and treatment continues to expand.

Nanoscale Science Initiative

UNC Charlotte is the first university in the UNC system to offer a Ph.D. in Nanoscale Science. This initiative focuses on the development, manipulation, and use of materials and devices on the scale of roughly 1–100 nanometers in length and the study of phenomena that occur on this size scale. Nanoscale science offers great potential for applications in materials, medicine, optics, electronics, data storage, advanced manufacturing, environment, energy, and national security.

North Carolina Motorsports and Automotive Research Center

The College of Engineering includes a group focused on motorsports and automotive research with collaborative partnerships with area race teams and NASCAR. A new 16,000 square foot building, named in honor of race car driver Alan Kulwicki, opened in November 2011 that more than doubles the space available for motorsports and automotive research. The water tunnel originally erected in the motorsports annex to Duke Centennial Hall has been relocated in the Kulwicki addition to support aerodynamics studies.

Project Mosaic

Project Mosaic, is an initiative led by Knight Foundation Distinguished Professor Jean-Claude Thill to enhance the University's social and behavioral science research by supporting interdisciplinary teams. Initially, the work centers on two themes: (1) human and social capital, innovation and quality of life and (2) metropolitan centers, world trade, transportation, and communication. Themes that are collaborative, data-intensive and cross-disciplinary in nature will be added as the project evolves. The project will include social and behavioral science investigators from across the University, including from the College of Liberal Arts & Sciences, College of Education, College of Health and Human Services, and the Belk College of Business. Faculty from other colleges whose interests synergize with this initiative are welcome.

Safety, Security, and Rescue Research Center (SSR-RC)

The UNC Charlotte SSR-RC site mission is to conduct partner-oriented, multi-disciplinary research on computation-driven robotic and sensor systems augmented by data analysis, to improve the safety, capability and well-being of humans. The SSR-RC focuses on research to solve issues related to the physical safety and well-being of humans as workers, patients, and customers.

Visualization Center (VisCenter)

The mission of the VisCenter is to develop and promote the science of visual analytics and to advance interactive visualization as an integrative discipline that is indispensable for attacking key real world applications. The VisCenter is a highly interdisciplinary center that applies interactive visualization and visual analytics to a variety of large scale and complex problems in science, engineering, medicine, business, design, and the arts. It was established in January 2005 and includes over 30 faculty members and over 100 graduate and undergraduate students. The VisCenter faculty is truly interdisciplinary with members from CS, SIS, Engineering, English, Geography and Earth Sciences, Architecture, Ethics, and other departments. The

VisCenter also has one of the deepest programs anywhere in fundamental visualization, visual analytics, and human-computer interaction research with 9 faculty members doing work in these areas. The main VisCenter Lab provides an exciting, state-of-the-art environment for visualization and HCI research and application development with an abundance of advanced displays, interaction devices, and a large, multiscreen stereoscopic projection system. The VisCenter has research funding from the Army, NIH, NSF, the Department of Homeland Security, DOE, U.S. DOT, EPA, Bank of America, and other agencies and companies.

Metropolitan Studies and Extended Academic Programs

Metropolitan Studies and Extended Academic Programs is a unit of Academic Affairs, with a mission to provide community-based research services to local, regional, and state-level clients. Off-campus partners include local governments, non-profit organizations, and community groups. The unit collaborates with research centers and departments across the University to identify graduate student and faculty resources that align with community engaged research requests. Services range from needs assessments and public policy guides to analytical modeling tools. Graduate research assistantships and travel funding are widely available. For additional information, visit mseap.uncc.edu.

UNC Charlotte Urban Institute

The UNC Charlotte Urban Institute is the University's applied research and community outreach center for urban and regional affairs, connecting faculty and students with community organizations and public institutions working on significant public policy issues in the 14-county, two-state region surrounding Charlotte. Founded in 1969, the Institute has provided during its 40-year tenure a wide-range of services, including technical assistance and training related to operations and data management, public opinion surveys, land-use and natural resources consulting, economic development research, and community planning to meet the needs of the region and its citizens. The Institute's continuing focus has been a multidisciplinary social sciences approach to research, outreach, and training to support informed decision-making in the region. Ongoing programs include:

Center for Transportation Policy Studies

The Center for Transportation Policy Studies, founded in 2002, is dedicated to the research and study of transportation issues and transportation-related policy. The Center conducts research and policy analyses that

result in efficient and cost effective investments and sound decisions for developing and maintaining multimodal transportation systems and services.

Charlotte Regional Indicators Project

The Charlotte Regional Indicators Project compiles objective, reliable, and relevant measures for the greater Charlotte region on indicators important to the region's quality of life. Organized in ten theme areas, and measured over time and compared to state or national data, the indicators provide policy-makers, civic leaders, and the public with a solid foundation for engaging in efforts to address the region's social, economic, and environmental challenges.

Institute for Social Capital, Inc.

The *Institute for Social Capital*, founded in 2004, became part of the UNC Charlotte Urban Institute in March 2012. Its mission is to support university research and increase the community's capacity for data-informed decision-making. At its core is a comprehensive set of social and human data gathered from several public and nonprofit organizations in the region. By linking data across agencies, the ISC Community Database allows researchers and community agencies to better describe, understand, and serve members of our most vulnerable populations.

TIMS Project Office for Western N.C.

The TIMS (Transportation Information Management System) project office for Western N.C. provides support for public school districts in 45 of the 100 counties in North Carolina, since the mid-1980s. A major on-going project, the TIMS office for Western N.C. provides software support and training for the statewide computerized school bus routing project, and focuses on planning and technology issues related to school operations, data management and training.

Visit ui.uncc.edu for more information about the UNC Charlotte Urban Institute and its programs.

Sports and Recreation

Charlotte 49ers/Athletics

The Charlotte 49ers Department of Athletics provides competition in 17 intercollegiate varsity sports for men and women. Each sport competes under the governing powers of the National Collegiate Athletic Association (NCAA) at the Division I level, which is the highest competitive level for collegiate varsity sports. Scholarships are available for all varsity sports, male and female.

Male student-athletes compete in nine sports: baseball, basketball, cross-country, football, golf, soccer, tennis, indoor track and field, and outdoor track and field. Female student-athletes compete in eight sports: basketball, cross-country, soccer, softball, tennis, volleyball, indoor track and field, and outdoor track and field.

The Charlotte 49ers are affiliated with the Conference USA with play in the league beginning during the 2013-14 season. Conference USA is comprised of 14 schools: UNC Charlotte, UAB, Florida Atlantic, Florida International, Louisiana Tech, Marshall, Middle Tennessee, North Texas, Old Dominion, Rice, Southern Mississippi, UTEP, UTSA, and Western Kentucky. Conference USA tournament champions in baseball, men's and women's basketball, golf, men's and women's soccer, softball, men's and women's tennis, and volleyball receive automatic bids to the NCAA post-season tournaments. Bowl bids are available to Conference USA schools in football.

Facilities

On-campus facilities play host to Charlotte 49ers athletics, with the exception of golf and cross-country. Sites for home competition for the 49ers include McColl-Richardson Field at Jerry Richardson Stadium for football; Halton Arena for basketball and volleyball; the Irwin Belk Center and Transamerica Field for soccer and track and field; the Halton-Wagner Tennis Complex for tennis; Robert and Mariam Hayes Stadium for baseball, and Phillips Softball Diamond for softball.

For more information about the Charlotte 49ers, please visit Charlotte49ers.com.

UNC Charlotte students receive **FREE ADMISSION** to all regular-season home athletic contests. Football, men's basketball, and baseball tickets are obtained by students via an online process at ticketreturn.com/49ers. For all other events, students gain admission with a valid UNC Charlotte student ID.

Recreational Services

Recreational Services develops and conducts programs and services that provide opportunities for University students and faculty/staff members to participate in recreational activities. Five major program areas offer a variety of structures in which members of the University community may pursue recreational interests. *Intramural Sports and Tournaments* are scheduled throughout the year for individual, dual, and team participation. The leagues and tournaments are organized to provide separate competition among coed, men's, and women's teams.

Sport Clubs provide an opportunity to participate in a single sport on a continuing basis. Approximately forty clubs, ranging from equestrian to lacrosse to tennis, are active each semester. *Fitness and Wellness* opportunities include Group Fitness, mind/body courses and Personal Training. Three major *Special Events* are offered each year: RecFest, 49er Gold Rush 5K Run/Walk, and a Spring Golf Tournament. The Special events are open to the public and may involve food, games, prizes, entertainment, and competition. In addition to structured sports programs, the division promotes the concept of informal use of recreational facilities through the *Open Recreation Program*. Recreational Services hires hundreds of students each year for jobs such as referees, group fitness instructors, personal trainers, lifeguards, office assistants, and more. For additional information, visit recservices.uncc.edu.

Recreational Facilities

Indoor Facilities

Belk Gymnasium

The Belk Gymnasium (renovation completed 2016) features multipurpose courts for basketball, volleyball, and badminton; an indoor swimming pool; racquetball courts; group fitness studio; cycling studio; a state-of-the-art fitness center; multipurpose room; and lockers for students, faculty, and staff. It also houses newly renovated classrooms and an auditorium for meetings and presentations.

Student Activity Center

The James H. Barnhardt Student Activity Center (SAC) is a multi-purpose facility designed to meet the diverse social, cultural, and recreational needs of students at UNC Charlotte. The SAC is home to the Halton Arena, a 9,000 seat venue hosting athletic events, concerts, lectures, and a variety of other university functions.

Retractable seating in the area folds back to reveal four recreational courts that may be used for Intramural Sports, open recreation, sports clubs, or for special events including job fairs, trade shows, etc. Other recreational offerings include a state-of-the-art fitness center, group fitness studio, indoor track, and indoor climbing wall. In addition to the physical fitness and wellness facilities, the SAC also serves as a meeting place for students and the campus community. The third floor of the SAC is comprised of a large and gracious hospitality area that can be sub-divided into five separate meeting salons. Adjacent to the hospitality area is a campus catering kitchen, serving the special events in the SAC as well as other campus events.

Outdoor Facilities

Northeast Recreational Field Complex

A 21-acre complex with lighted synthetic turf fields that can be used for Intramural Sports, Sport Clubs, and open recreation.

Hayes Recreational Field Complex

Located off Phillips Road above the Wells Fargo Field House, these lighted fields combine nearly 5 acres of natural turf with five and one-half acres of synthetic turf for a great outdoor experience. Available for Sport Clubs, Intramural Sports, and open recreational use when not reserved.

Student Activities

<http://studentunion.uncc.edu>

Student Activities creates student learning and development opportunities that inspire campus involvement and civic engagement. Students unsure of how or where to get involved should contact Student Activities at 704-687-7122 or by visiting the above website.

Campus Activities Board

The Campus Activities Board (CAB) is the largest student programming organization on campus and is responsible for planning diverse, quality events for the University community. CAB offers multiple programs a week and works to enhance and unify the University community by planning social, cultural, educational, and recreational events that complement the University's academic mission.

CAB is located on the second floor of the Student Union. For more information, visit cab.uncc.edu. Opportunities for student involvement include the following committees:

CAB Live

As the name implies, this committee is all about live entertainment ranging from comedy, live music, variety acts, poetry slams, showcases, and other entertainment trends. This committee works hard to bring a wide-variety of diverse acts to campus.

T.A.X.I. (Talents, Activities, eXcursions and Interests)

With this committee, anything goes! From talent shows and open mics to trips to Charlotte sporting events, this committee focuses on student talents and interests through programs and trips to explore Charlotte and other destinations.

Daytime Niners

This committee is all about events for Niners throughout the day (8 a.m. - 5 p.m.). Daytime events

consist of interactive activities, musical performances, games, or workshops.

Union Take Over

Our Signature Union Party! A few times each semester, CAB takes over the Student Union with music, games, and lively entertainment!

Niner Media

The Niner Student Media Board is the governing body for Niner Media and is comprised of students and administrative staff members, as well as representatives of the various student media.

Niner Times

Niner Times is the campus newspaper, published every Tuesday, which offers campus news and journalism experience for students. The newspaper provides a vital service to the entire University community by keeping readers informed of issues of common concern and interest. Family members may keep informed about the University's news by locating a copy of each online edition at NinerTimes.com.

NinerTimes.com

NinerTimes.com is the University community's home in cyberspace. UNC Charlotte news, sports, and feature stories are posted several times each week. Students gain experience with Internet publishing and video production by working with NinerTimes.com.

Media Marketing

The sales and promotions branch of Niner Media, this department solicits advertising and coordinates promotion for UNC Charlotte's student publications. Media Marketing offers real world experience and internship opportunities for business, marketing, and communication careers.

Sanskrit

Sanskrit is the nationally recognized literary-arts magazine published by students interested in the arts. Original work in writing, drawing, photography, and other arts is welcomed by the editor. Submissions are professionally juried, and selections are published in the annual edition of the magazine.

Radio Free Charlotte

An online digital radio station that focuses on underground and independent music, as well as sports, news, and local events. Listen online at radiofreecharlotte.uncc.edu.

Practicum

Available to students who participate in one of the Niner Media departments, academic credit is offered through the Department of Communications Studies.

The course in Journalism Practicum (JOUR 3401) is offered each semester.

Internships

Niner Media interns can earn academic credit and receive "hands on" media experience in writing, design, photography, advertising, desktop publishing, and management.

For more information about how to get involved with Niner Media, contact the office at 704-687-7140 or visit media.uncc.edu. Niner Media is located in the Student Union.

Center for Leadership Development

The UNC Charlotte Center for Leadership Development provides students with opportunities to develop leadership skills and abilities and provides the University and student organizations with more effective leadership. The Center provides a comprehensive and diverse program of leadership development activities for current and potential student leaders.

The program consists of group and self-paced leadership workshops, retreats, and conferences, as well as academic courses. Individual and group consultation is also available.

Academic Certificate in Leadership Studies

An 18-credit hour concentration in interdisciplinary leadership studies is offered, leading to an academic certificate awarded at graduation from UNC Charlotte.

Conferences

The Center co-sponsors leadership conferences such as the Greek Leadership Symposium and the Multicultural Leadership Conference.

Emerging Leaders

The Emerging Leaders program provides a cohort leadership experience for freshmen (applications available early Fall semester).

Individual and Group Consultation

Assistance with applications, interviewing, leadership issues and programmatic needs are available through the Center.

LEAD Team

Students in the LEAD team are trained and available to make presentations on a wide variety of leadership topics.

Leadershape Institute

The Institute is a leadership program for established leaders with a focus on vision and leading with integrity.

Leadership Fellows

The Center offers a Fall semester cohort leadership experience for upper classmen (applications available Spring semester).

Leadership Journey Learning Community

A one-year residential program is offered to first-year students who have an interest in developing or building leadership skills and abilities.

Leadership, Communication, and Group Dynamics

A 3-hour leadership theory course (COMM 3135) is taught on leadership, communication, and group dynamics.

Leadership, Service and Ethics

A 3-hour course in communication studies (COMM 3136) is offered for students interested in developing a leadership framework and obtaining academic credit.

PILOT (Programs In Leadership and Organizational Training)

The Center offers an individualized leadership program that provides an opportunity for leadership certification through this self-paced program.

Women's Leadership Development Program

This cohort-based women's leadership conversation series is for women who are currently acting as leaders. It provides the opportunity for interaction with and learning from women who are leaders in our community.

Visit leadership.uncc.edu for more information about the Center for Leadership Development.

Multicultural Resource Center

The Multicultural Resource Center (MRC) offers an environment for students, faculty and staff to learn about and to further explore personal identity and diversity while making connections with individuals who represent a vast array of heritages, backgrounds, interests, and experiences. The Center is available to assist students individually in their own explorations of identity and/or the exploration of the heritage and culture of others. The MRC can also assist student organizations in their operations and programmatic efforts.

The MRC is located in the Student Union and houses a resource area with information regarding both University and community support sources, a multimedia library that covers a variety of topics, and an assortment of multicultural publications

(magazines, newspapers, and newsletters). To supplement these resources, the Center offers ongoing education and training exploring the many facets of diversity and human relations.

Programming supported by the MRC includes the annual International Festival, Martin Luther King, Jr. Celebration, cultural heritage months (Black History Month, Hispanic/Latino Heritage Month, Asian/Pacific Islander Heritage Month, etc.), and LGBTQ outreach and education, as well as other special events. Along with these efforts, the MRC provides support to 100+ multicultural student organizations, as well as support for student/student organizations that support its mission and purpose. Visit mrc.uncc.edu for more information.

Multicultural Student Council (MSC)

The Multicultural Student Council is a diverse body of students organized to assist the MRC in its efforts to promote multiculturalism. Along with the Center, the MSC works closely and collaboratively with students, student organizations, and departments to support the unique diversity present at UNC Charlotte and in the Charlotte community.

Safe Zone Program

The purpose of the Safe Zone Program at UNC Charlotte is to create an affirming and supportive campus climate through identifying and educating members of our campus community who are open to and supportive of all individuals regardless of sexual orientation, gender identity, or gender expression. The Safe Zone Program is an umbrella for all educational LGBTQ programming, including the Safe Zone Ally Program, Friendly Peer Training, and the Safe Brother/Safe Sister Program. Visit online at safezone.uncc.edu.

Religious and Spiritual Life (RSL)

RSL serves as a liaison for faith-related matters within the University community. Additionally, RSL assists in the holistic development of UNC Charlotte students by providing avenues to explore religious and spiritual identity and expression. Through dialogues, workshops, programming, and student organizational support, RSL promotes personal growth, mutual understanding, and a healthy, engaged community. Visit online at rsl.uncc.edu.

Venture

Venture offers a variety of outdoor adventure and experiential learning trips, programs and workshops. Activities include day trips as well as weekend trips in a variety of outdoor endeavors from backpacking to rock climbing to kayaking (to name only a few). Venture also hosts and facilitates many programs on its on-campus Team Challenge Course, High Team

Challenge Course, and indoor climbing wall. Venture programs are modeled on the Outward Bound philosophy and are designed to facilitate individual growth through physical challenge, group interaction, and personal reflection - all while having fun. Students involved in VOLTAGE (Venture Outdoor Leadership Training and Group Experience) have the opportunity to be trained as student leaders on Venture's trips and programs. Venture also houses a resource library to help individuals plan their own adventure trips. Outdoor camping gear can be rented. Venture's newest initiative is SOAR Outdoor, an opportunity for students to connect with the University and other students in meaningful ways prior to their first semester.

Venture offers courses for academic credit through the Department of Kinesiology. Each semester, a variety of one-, two-, and three-credit outdoor activity courses are offered including: Introduction to Outdoor Adventures, Rock Climbing, Challenge Course Activities, Raft Guiding, Wilderness Experience, Wilderness Trip Leading, and Challenge Course Facilitation for the low and high challenge course. For additional details and to see the descriptions for KNES courses, visit venture.uncc.edu/academics.

For more information about Venture, please visit venture.uncc.edu.

Student Government Association

The Student Government Association (SGA) provides students with an early experience in governmental affairs. Many students find their work in student government a useful background for later public service and others want to make their campus a better place while they are here. The University encourages student participation in its affairs and has student representatives on many faculty and administrative committees. The leaders of student government are committed to representing the student body and to developing students' awareness of the many facets of campus life. All regularly enrolled students, both full and part-time, are eligible to participate in student government. Visit online at sga.uncc.edu.

The Student Government Association is comprised of:

Executive Branch

The Executive Branch is comprised of the Student Body President, the Vice President, Chief of Staff, the four class presidents, and the Executive Cabinet, who are appointed by the President. The Student Body President serves as a member of the UNC Charlotte Board of Trustees.

Student Senate

The Student Senate is comprised of the President Pro Tempore and representatives from each academic college who are elected by the students with majors in the college. The Vice President of the Student Body conducts all meetings and serves as liaison between the Senate and the Student Body President's office.

Judicial Branch

The Judicial Branch is composed of panel members of the Judicial Board, including leadership in the offices of Student Attorney General, Chief Justice of the Hearing Panel, and Student Counsel. Members of the Judicial Board are responsible for hearing cases of alleged violations of the UNC Charlotte Code of Student Responsibility and determining appropriate sanctioning if the accused is found responsible for a violation. The Judicial Branch is advised by the Dean of Students Office.

Student Involvement

Student Involvement supports students' engagement with campus through organizations and special events. UNC Charlotte has over 350 student organizations that enhance the academic experience of UNC Charlotte students and provide opportunities to get involved. The categories of student organizations include: academic (pre-professional), fraternities and sororities, graduate organizations, honor societies, interest, performance, service, political, religious, multicultural, international, sport clubs, and media/publication. There are many benefits to joining a student organization, including making new friends, developing new skills and abilities, working collaboratively as part of a team, learning to set and achieve goals, leadership opportunities, as well as having fun. Students may also start a new student organization if there is not one already on campus that matches their interests. Contact Student Involvement with questions about resources available and how to get connected. Contact information and a current listing of all registered student organizations is available online at studentorgs.uncc.edu.

Student Involvement also hosts special events such as Homecoming, Haunted Union, and Late Night Breakfast that build spirit and tradition for the Niner Nation.

University Advancement

<http://advancement.uncc.edu>

UNC Charlotte recognizes that its mission reaches beyond the borders of the campus to the surrounding region and the state. The University touches many facets of community life and serves as a catalyst for development of a regional approach to solving problems in education, economic development, transportation, the environment, cultural amenities, and the quality of life. Faculty, staff, and students have made a significant impact on the region through research, historic preservation, planning, the arts and literature, and the delivery of government and social services.

Alumni Affairs

Alumni Affairs, located in the Harris Alumni Center at Johnson Glen, strengthens and maintains the relationship between the University and its alumni through the management of the Alumni Association. Some of the most rewarding experiences of University life begin at graduation when former students enter the Alumni Association. Alumni are an essential part of our University and are among the University's most valued supporters.

Programs of the Alumni Association include: the regional, local, special interest, and collegiate chapters; homecoming activities; networking socials; athletic support; and sponsorship of the Student Alumni Ambassadors.

Alumni Affairs seeks to maintain lifelong contact with all graduates. Graduates are encouraged to become active in the Alumni Association and to notify Alumni Affairs of address changes, employment information, and other significant events, such as marriages, births and honors. Today, UNC Charlotte boasts more than 100,000 living alumni and adds 4,500 to 5,000 new alumni each year. The Alumni Association is a non-dues paying organization, and the only requirement for membership is to be an alumnus of the University.

For more information about the Alumni Association, please visit alumni.uncc.edu.

Community Relations

As North Carolina's urban research university and the largest in the region, UNC Charlotte strives to address the cultural, economic, educational, environmental, health and social needs of the greater Charlotte Region. The mission of Community Relations is to

extend and strengthen the University's presence in the region by building collaborative relationships between UNC Charlotte and key community constituencies and organizations.

Events and Special Projects

Events and Special Projects staff members plan, produce, and coordinate logistics of events hosted at the Chancellor's residence along with a variety of strategic University events, including Commencement and welcome and recognition receptions.

Giving and Donor Relations

Though UNC Charlotte is a state-supported institution, the University depends on non-state resources for more than half of its operating needs. Philanthropy is critical to the margin of excellence needed for the University to fulfill its mission of education, research, and public service.

Giving and Donor Relations plans and implements the private fundraising and related efforts of the University and the Foundation of The University of North Carolina at Charlotte, Inc. Its functions include annual giving, gift planning, major gifts, corporate and foundation relations, gift processing, alumni/donor records, research, donor stewardship, prospect coordination and clearance, and campus-wide development services.

The Foundation of The University of North Carolina at Charlotte, Inc. is the 501(c)(3) public charity, incorporated in 1965 to benefit UNC Charlotte through asset management and fundraising. The Foundation advances UNC Charlotte as North Carolina's urban research university through active engagement, advocacy, fundraising, and stewardship.

Government Relations

Government Relations fosters, supports, and expands the University's relationships with the state, regional, and local governmental and non-governmental organizations that can strengthen the University in its ability to deliver educational and research programs in support of its mission.

University Communications

University Communications crafts and distributes the messages that shape public perception of the University and the UNC Charlotte brand, position the institution as a local and regional thought leader, inform the campus community, and inspire alumni and friends. The team provides strategic marketing and communications counsel, planning, and support, as well as the creative direction and production of print, web, social media, graphic and broadcast

communication solutions to all academic and administrative units on campus.

University Communications manages, produces, and publishes University content for internal and external audiences through several of its own media channels including:

- *UNC Charlotte*, the University's quarterly print magazine
- *Inside UNC Charlotte*, the University's internal news website at inside.uncc.edu. The monthly television segment that airs on WTVI-TV, the University's Time Warner Cable channel in Charlotte, also bears this name.
- *The Live Wire*, a weekly live streaming webcast on inside.uncc.edu
- Official University Social Media including Facebook, Twitter, YouTube, Flickr, and Blogger

University Communications also garners external media coverage by writing and pitching news, coordinating interviews with experts on campus, and maintaining relationships with local and regional media outlets.

Experts in this unit also script executive communications for the Chancellor and other University administrators and provide crisis communications planning and counsel.

In addition to the work of the central staff, University Communications collaborates with the University's distributed communicators to ensure alignment of all internal and external communications.



Faculty Directory

Faculty

(Note: The year in parentheses represents the year of appointment)

Philip L. Dubois (2005), *Chancellor*, A.B., University of California, Davis; M.S., Ph.D., University of Wisconsin-Madison

Joan F. Lorden (2003), *Provost and Vice Chancellor for Academic Affairs*, B.A., The City College of New York; M.S., Ph.D., Yale University

Jayaraman Raja (1989), *Senior Associate Provost, Academic Affairs*, B.E., M.Sc., University of Madras, India; Ph.D., Indian Institute of Technology

Willie M. Abel (2013), *Assistant Professor, School of Nursing*, B.S.N., University of North Carolina at Charlotte; M.S.N., Ph.D., University of North Carolina at Greensboro

Lyndon P. Abrams (2001), *Associate Professor, Department of Counseling*, B.S., Charleston Southern University; M.Ed., Clemson University; Ph.D., Texas A&M University-Commerce

L. Dean Adams (2013), *Associate Dean for Performing Arts Services, College of Arts + Architecture*, B.A., Tufts University; M.A., University of Maryland; M.F.A., Florida State University

Ryan S. Adams (2007), *Associate Professor, Department of Electrical and Computer Engineering*, B.S., B.S.E.E., M.S., Ph.D., University of Idaho

Kirill Afonin (2015), *Assistant Professor, Department of Chemistry*, M.S., Saint Petersburg State Polytechnic University; Ph.D., Bowling Green State University

Ishwar D. Aggarwal (2011), *Research Professor, Department of Physics and Optical Science*, M.C.E., Ph.D., The Catholic University of America

Rebecca Agosta (2013), *Lecturer, University Writing Program*, B.S.E.D., Appalachian State University; M.A., University of North Carolina at Charlotte

Lynn A. Ahlgrim-Delzell (2008), *Associate Professor, Department of Educational Leadership*, B.S., M.S., Illinois State University; Ph.D., University of North Carolina at Greensboro

Dewan Ahmed (2013), *Teaching Assistant Professor, Department of Computer Science*, B.S., M.S., Bangladesh University of Engineering and Technology; Ph.D., University of Ottawa

Elizabeth Ajazi (2014), *Lecturer, Department of Mathematics and Statistics*, B.S., M.S., University of North Carolina at Charlotte

Srinivas Akella (2009), *Professor, Department of Computer Science*, B.Tech., Indian Institute of Technology; M.S., Ph.D., Carnegie Mellon University

Yildirim M. Aktas (1989), *Associate Professor, Department of Physics and Optical Science*, B.S., Middle East Technical University; Ph.D., University of Missouri at Columbia

Ehab Al-Shaer (2009), *Professor, Department of Software and Information Systems; and Director of the CyberDNA Center*, B.S., King Fahad University; M.S., Northeastern University; Ph.D., Old Dominion University

Robert F. Algozzine (1988), *Professor, Department of Educational Leadership*, B.S., Wagner College; M.S., State University of New York at Albany; Ph.D., Pennsylvania State University

Ana-Isabel Aliaga-Buchenau (2002), *Associate Professor, Department of Languages and Culture Studies*, B.A., Georg-August Universität Göttingen; M.A., Ph.D., University of North Carolina at Chapel Hill

Craig J. Allan (1992), *Chair and Professor, Department of Geography and Earth Sciences*, B.Sc., University of Manitoba; M.Sc., Trent University; Ph.D., York University

John M. Allemeier (2006), *Associate Professor, Department of Music*, B.M., Augustana College; M.M., Northwestern University; Ph.D., University of Iowa

Daniel Alston (2016), *Assistant Professor, Department of Reading and Elementary Education*, B.S., M.A.T., University of South Carolina; Ph.D., Clemson University

Gretchen Alterowitz (2009), *Associate Professor, Department of Dance*, B.A., University of Montana; M.F.A., University of Iowa

Louis (Ted) H. Amato (1980), *Professor, Department of Economics*, A.B., Lenoir-Rhyne College; M.A., University of North Carolina at Greensboro; Ph.D., University of South Carolina

James E. Amburgey (2005), *Associate Professor, Department of Civil and Environmental Engineering*, B.S.C.E., University of North Carolina at Charlotte; M.S., Ph.D., Georgia Institute of Technology

Yawo H. Amengonu (2015), *Visiting Lecturer, Department of Electrical and Computer Engineering*, B.S.E.E., M.S.E.E., University of North Carolina at Charlotte

Allison Amidei (2015), *Assistant Professor, Department of Theatre*, B.A., Knox College; M.F.A., Carnegie Mellon University

Takiyah N. Amin (2011), *Assistant Professor, Department of Dance*, B.A., State University of New York at Buffalo; M.F.A., Virginia Polytechnic Institute and State University; Ph.D., Temple University

Heather T. Anderson (2007), *Lecturer, School of Nursing*, A.A., B.S.N., M.S.N., Gardner-Webb University

Kelly Anderson (2000), *Associate Professor, Department of Special Education and Child Development*, B.S., M.S., Drake University; Ph.D., University of North Carolina at Greensboro

Mary Jo Anderson (2011), *Clinical Assistant Professor and Supervisor of Student Teaching, Office of Field Experiences, College of Education*, B.A., College of St. Scholastica; M.S., Ed.D., Kansas State University

Benny J. Andrés, Jr. (2007), *Associate Professor, Department of History*, B.A., San Diego State University; M.A., Ph.D., University of New Mexico

Ahmed A. Arif (2007), *Associate Professor, Department of Public Health Sciences*, B.S., Sindh Medical College; M.S., Western Kentucky University; Ph.D., University of Texas at Houston

Jake Armour (2005), *Lecturer, Department of Geography and Earth Sciences*, B.S., M.S., University of New Mexico

Laura M. Armstrong (2013), *Assistant Professor, Department of Psychology*, B.S., Brown University; M.S., Ph.D., Pennsylvania State University

Denis G. Arnold (2008), *Surtman Distinguished Scholar in Business Ethics; and Professor, Department of Management*, B.S., Lewis and Clark College; M.A., Ph.D., University of Minnesota

Brian K. Arreola (2009), *Associate Professor, Department of Music*, B.M., St. Olaf College; M.M., Indiana University; Ph.D., Indiana University

Bruce A. Arrigo (2001), *Professor, Department of Criminal Justice and Criminology*, B.A., Saint Joseph's University; M.A., Duquesne University; Ph.D., Pennsylvania State University

Susan T. Arthur (2006), *Associate Professor, Department of Kinesiology*, B.S., M.S., Ph.D., University of Toledo, Ohio

Kathryn Asala (2007), *Undergraduate Coordinator and Lecturer, Department of Chemistry*, B.S., Truman State University; Ph.D., Miami University

Vasily Astratov (2002), *Professor, Department of Physics and Optical Science*, Dipl., St. Petersburg State University; Ph.D., Ioffe Physical-Technical Institute

Anna Athanasopoulou (2013), *Lecturer, Department of Mathematics and Statistics*, B.S., Aristotle University of Thessaloniki; M.A., Ph.D., University of North Carolina at Charlotte

Mary L. Atkinson (2013), *Assistant Professor, Department of Political Science and Public Administration*, B.A., Guilford College; M.A., The American University; Ph.D., University of North Carolina at Chapel Hill

Bruce Auerbach (2002), *Professor, Department of Theatre*, B.A., Auburn University; M.F.A., University of Illinois at Urbana-Champaign

Judy R. Aulette (1986), *Associate Professor, Department of Sociology; and Adjunct Associate Professor, Women's and Gender Studies*, B.A., M.A., Wayne State University; Ph.D., Michigan State University

JuliAnna Avila (2010), *Associate Professor, Department of English*, B.A., University of Redlands; M.A.Ed., Ph.D., University of California at Berkeley

Joel D. Avrin (1984), *Professor, Department of Mathematics and Statistics*, A.B., M.A., Ph.D., University of California, Berkeley

Mona Azarbayjani (2010), *Associate Professor, Department of Art and Art History*, B.S., Iran University of Science and Technology; M.ARCH, Iran University of Science and Technology; Ph.D., University of Illinois at Champaign

Yamilka Baez-Rivera (2014), *Lecturer and Lab Manager, Energy Production and Infrastructure Center*, B.S.E.E., M.S.E.E., University of Puerto Rico at Mayagüez; Ph.D., Mississippi State University

Debra D. Baker (2003), *Lecturer, Department of Communication Studies*, B.A., University of North Carolina at Charlotte; M.A., University of North Carolina at Greensboro

E. E. Balcos (2005), *Associate Professor, Department of Dance*, B.A., The Colorado College, M.F.A., University of Iowa

Defloris (Dee) M. Baldwin (2009), *Associate Dean, Director, and Professor, School of Nursing*, R.N., Ph.D., FAAN

Jeffrey D. Balmer (2006), *Associate Professor, School of Architecture*, B.E.S., B.Arch., University of Waterloo; M.Arch., Iowa State University

Valerie G. Balog (2005), *Clinical Assistant Professor, Department of Counseling*, B.S., M.A., John Carroll University; Ph.D., Kent State University

George C. Banks (2015), *Assistant Professor, Department of Management*, B.A., College of William & Mary; M.A., University of New Haven; Ph.D., Virginia Commonwealth University

Nicole Barclay (2016), *Teaching Assistant Professor, Department of Engineering Technology and Construction Management*, B.S., South Carolina State University; M.S., Ph.D., Clemson University

Saiful Bari (2015), *Visiting Senior Lecturer, Department of Mechanical Engineering*, B.S., M.S., Bangladesh University; M.S., Ph.D., University of Reading

Rachel E. Barker (2015), *Assistant Professor, Department of Dance*, B.F.A., University of Utah; M.A.T., Westminster College; M.F.A., Ohio State University

Thomas J. Barth (2016), *Professor, Department of Political Science and Public Administration*, B.A., University of Notre Dame; M.A., University of Chicago; Ph.D., Virginia Polytechnic Institute and State University

Jeffrey Barto (1992), *Lecturer, Department of Kinesiology*, B.S., Slippery Rock University; M.Ed., Ph.D., University of Pittsburgh

Erin Basinger (2016), *Assistant Professor, Department of Communication Studies*, B.A., Samford University; M.A., University of Georgia; Ph.D., University of Illinois at Urbana-Champaign

Balaka Basu (2013), *Assistant Professor, Department of English*, B.A., Cornell University; Ph.D., City University of New York

Tonya C. Bates (2010), *Lecturer, Department of Biological Sciences*, B.A., B.S., M.S., University of North Carolina at Charlotte

Frederico Batista Pereira (2016), *Assistant Professor, Department of Political Science and Public Administration*, B.A., M.A., Federal University of Minas Gerais; Ph.D., Vanderbilt University

José M. Batista (2003), *Associate Professor, Department of Languages and Culture Studies*, B.A., Manhattan College; M.A., Ph.D., University of Georgia

Cynthia Baughan (2013), *Assistant Professor, Department of Special Education and Child Development*, B.S., Bob Jones University; M.Ed., Ph.D., Clemson University

Janet Baxter (2003), *Clinical Associate Professor, Department of Special Education and Child Development*, B.S., University of Wisconsin-Milwaukee; M.A., University of Southern Mississippi; Ed.D., Indiana University of Pennsylvania

Kristen D. Beach (2014), *Assistant Professor, Department of Child Development and Special Education*, B.A., University of California, Los Angeles; M.A., Loyola Marmount University; Ph.D., University of California, Riverside

Jonathan M. Beaman (2014), *Lecturer, Department of Mechanical Engineering and Engineering Science*, B.S.M.E., M.S.M.E., Ph.D., University of North Carolina at Charlotte

John R. Beattie, Jr. (1983), *Assistant Professor, Department of Special Education and Child Development*, B.A., M.Ed., University of Virginia; Ph.D., University of Florida

Christopher M. Beijger (2015), *Assistant Professor, Department of Chemistry*, B.S., University of Oregon; Ph.D., University of Texas at Austin

Joyce M. Beggs (1989), *Associate Professor, Department of Management*, B.S., Concord College; M.A., Marshall University; M.B.A., West Virginia College of Graduate Studies; Ph.D., University of Tennessee

Christopher M. Beijger (2015), *Assistant Professor, Department of Chemistry*, B.S., University of Oregon; Ph.D., University of Texas at Austin

Zinobia Bennefield (2016), *Assistant Professor, Department of Sociology*, B.A., Salem College; M.S., Ph.D., Texas A& M University

Jeanette M. Bennett (2012), *Assistant Professor, Department of Psychology*, B.A., Gannon University; B.S., Gannon University; M.S., Pennsylvania State University; Ph.D., Pennsylvania State University

Christopher J. Beorkrem (2005), *Associate Professor, School of Architecture*, B.Arch., Iowa State University; M.S., Columbia University

Malena Bergmann (2003), *Lecturer, Department of Art and Art History*, B.F.A., University of North Carolina at Greensboro; M.F.A., University of Florida

Elise Berman (2012), *Assistant Professor, Department of Anthropology*, B.A., Dartmouth College; M.A., University of Chicago; Ph.D., University of Chicago

Marcus Bess (2013), *Assistant Professor and Instruction Librarian, J. Murrey Atkins Library*, B.A., University of North Carolina at Charlotte; M.S., North Carolina Central University

Stephen Billings (2008), *Associate Professor, Department of Political Science and Public Administration*, B.A., Georgetown University; M.A., University of North Carolina at Chapel Hill; M.A., Ph.D., University of Colorado

Amanda H. Binder (2012), *Assistant Professor and Special Sciences and History Librarian, J. Murrey Atkins Library*, B.A., Bard College; M.S., University of Illinois at Urbana—Champaign

Ian Binns (2011), *Assistant Professor, Department of Reading and Elementary Education*, B.S., M.Ed., North Carolina State University; Ph.D., University of Virginia

James J. Bird (2006), *Associate Professor, Department of Educational Leadership*, B.S., University of Wisconsin at LaCrosse; M.A., Ph.D., Ohio State University

Sarah Birdsong (2016), *Visiting Lecturer, Department of Mathematics and Statistics*, B.S., Mars Hill College; M.S., Ph.D., University of North Carolina at Charlotte

Jaya P. Bishwal (2005), *Associate Professor, Department of Mathematics and Statistics*, B.S., M.S., M.Phil., Ph.D., Sambalpur University, India

Michèle Bissière (1990), *Professor, Department of Languages and Culture Studies*, M.A., Ph.D., University of Wisconsin at Madison

Beth E. Bjerregaard (1992), *Chair and Professor, Department of Criminal Justice and Criminology*, B.S., M.S., Kent State University; Ph.D., State University of New York at Albany

Jason E. Black (2016), *Chair and Professor, Department of Communication Studies*, B.A., Florida State University; M.A., Wake Forest University; Ph.D., University of Maryland, College Park

Peter A. Blair (2006), *Lecturer, Department of English*, B.A., Saint Vincent College; M.A., Duquesne University; Ph.D., University of Iowa

Anita Blanchard (2001), *Associate Professor, Department of Psychology*, B.S., M.S., University of North Carolina at Chapel Hill; M.A., Ph.D., Claremont Graduate University

Christopher L. Blanchette (2013), *Associate Dean for Research and Public Engagement, College of Health and Human Services; and Associate Professor, Department of Public Health Sciences, B.A., B.S., M.A., University of North Carolina at Charlotte; M.S., Ph.D., University of Maryland, Baltimore*

Cassandra L. Blandford (2015), *Lecturer, University Writing Program, B.A., Miami University; M.A., University of Louisville*

Jordan R. Bledsoe (2012), *Lecturer, Department of Languages and Culture Studies, B.A., M.A., Brigham Young University*

Lloyd Blenman (1999), *Professor, Department of Finance, B.Soc.Sc., University of Guyana; M.A., University of Western Ontario; Ph.D., Ohio State University*

Pilar G. Blitvich (2005), *Professor, Department of English, B.A., M.A., and Ph.D., University of Valencia, Spain*

Anita N. Blowers (1989), *Associate Professor, Department of Criminal Justice and Criminology; and Faculty Affiliate, Gerontology, B.A., M.A., and Ph.D., State University of New York at Albany*

Danielle N. Boaz (2015), *Assistant Professor, Department of Africana Studies, J.D., University of Toledo; L.L.M., St. Thomas University; M.A., Florida International University; Ph.D., University of Miami*

Andy R. Bobyarchick (1983), *Associate Professor, Department of Geography and Earth Sciences, B.S., Birmingham-Southern College; M.S., Virginia Polytechnic Institute and State University; Ph.D., State University of New York at Albany*

Jamie E. Bochantin (2014), *Assistant Professor, Department of Communication Studies, B.A., M.A., DePaul University; Ph.D., Texas A&M University*

Charles D. Bodkin (1991), *Professor, Department of Marketing, B.B.A., University of Notre Dame; M.B.A., University of North Carolina at Greensboro; Ph.D., Virginia Polytechnic Institute and State University*

Daniel Boisvert (2007), *Senior Lecturer, Department of Philosophy, B.A., Providence College; B.A., University of Central Florida; M.A., Ph.D., University of Florida*

Tracy Bonoffski (2007), *Lecturer, Department of Kinesiology, B.S., Cornell University; M.S., Wake Forest University*

Glenn D. Boreman (2011), *Chair and Professor, Department of Physics and Optical Science, B.S., University of Rochester; M.S., Ph.D., University of Arizona*

Kenneth L. Bost (1998), *Irwin Belk Distinguished Professor, Department of Biological Sciences, B.S., University of North Carolina at Chapel Hill; Ph.D., University of Mississippi Medical Center*

Martha C. Bottia (2011), *Research Assistant Professor, Department of Sociology, B.A., M.A., University of Los Andes; M.A., Ph.D., University of North Carolina at Charlotte*

James D. Bowen (1996), *Associate Professor, Department of Civil and Environmental Engineering, B.A., Duke University; M.S., Vanderbilt University; Ph.D., Massachusetts Institute of Technology*

Jessamyn Bowling (2016), *Assistant Professor, Department of Public Health Sciences, B.A., University of North Carolina at Chapel Hill; M.P.H., University of Arizona; Ph.D., Indiana University Bloomington*

Alice Suzanne Boyd (2002), *Associate Professor, School of Social Work, B.A., University of Virginia; M.S.W., Ph.D., Virginia Commonwealth University*

Robert H. Boyer (2013), *Assistant Professor, Department of Geography and Earth Sciences, B.A., Washington University in St. Louis; M.U.P., University of Illinois at Urbana-Champaign*

Sayde Brais (2013), *Lecturer, Department of Communication Studies, B.A., M.A., University of North Carolina at Charlotte*

Nicole Braxtan (2016), *Assistant Professor, Department of Civil and Environmental Engineering, B.S., Rutgers University; M.S., Princeton University; Ph.D., Lehigh University*

Dale A. Brentrup (1989), *Professor, School of Architecture, B.Arch., Arizona State University; M.Arch., University of California, Berkeley*

Marsha Brigman (2009), *Lecturer, Department of Middle Grades, Secondary and K-12, B.A., M.Ed., University of North Carolina at Charlotte*

Kent Brintnall (2008), *Associate Professor, Department of Religious Studies, B.A., Fort Hays State University; M.A., Pacific School of Religion; J.D., Northeastern University; Ph.D., Emory University*

Anthony L. Brizendine (2002), *Chair and Professor, Department of Engineering Technology and Construction Management, B.S., Bluefield State College; M.S., Virginia Polytechnic Institute and State University; Ph.D., West Virginia University*

David Brodeur (2000), *Associate Professor, Department of Art and Art History, B.S., Southern Connecticut State University; M.F.A., University of Wisconsin*

Cory Brouwer (2010), *Director of Bioinformatics Services; and Research Associate Professor, Department of Bioinformatics and Genomics, B.S., Ph.D., Iowa State University*

Diane Browder (1998), *Lake and Edward J. Snyder Distinguished Professor, Department of Special Education and Child Development, B.A., Duke University; M.Ed., Ph.D., University of Virginia*

Banita W. Brown (1988), *Associate Dean for Academic and Student Success, College of Liberal Arts & Sciences; and Professor, Department of Chemistry, B.S., Furman University; Ph.D., University of Miami*

Cheryl L. Brown (1982), *Associate Professor, Department of Political Science and Public Administration, B.A., University of Florida; M.A., Ph.D., University of Michigan*

Jamie Brown (2010), *Lecturer, Department of Special Education and Child Development, B.S., M.Ed., Pennsylvania State*

Mary M. Brown (2007), *Professor, Department of Political Science and Public Administration, B.S., University of Maryland; M.P.A., University of Oklahoma; D.P.A., The University of Georgia*

Robert A. Brown (2000), *Lecturer, Department of English, B.A., M.A., University of North Carolina at Charlotte*

Aidan F. Browne (2012), *Lecturer, Department of Engineering Technology and Construction Management, B.S., Vanderbilt University; M.S., University of Connecticut; Ph.D., University of Connecticut*

Keith Bryant (2000), *Lecturer, Department of Art and Art History, B.F.A., Colorado State University; M.F.A., Cranbrook Academy of Art*

Nishi S. Bryska (1996), *Lecturer, Department of Biological Sciences, B.S., M.A., Western Michigan University*

Kimberly A. Buch (1987), *Professor, Department of Psychology, B.S., M.A., Western Kentucky University; Ph.D., Iowa State University*

Jurgen Buchenau (1998), *Chair and Professor, Department of History, B.A., University of Cologne; M.A., Ph.D., University of North Carolina at Chapel Hill*

Christopher M. Buess (2011), *Lecturer/Production Manager, College of Arts + Architecture, B.A., San Diego State University*

Sharon K. Bullock (2007), *Lecturer, Department of Biological Sciences, B.S., North Carolina State University; Ph.D., University of North Carolina at Chapel Hill*

Thomas Burch (2014), *Assistant Professor, Department of Theatre, B.F.A., University of Kentucky; M.F.A., Northwestern University*

Allison H. Burfield (2009), *Associate Professor, School of Nursing, A.S., Athens Area Technical College; B.S.N., M.S.N., Ph.D., University of Central Florida*

Charles A. Burnap (1982), *Associate Professor, Department of Mathematics and Statistics, B.S., Rensselaer Polytechnic Institute; A.M., Ph.D., Harvard University*

Hughlene A. Burton (1996), *Chair and Associate Professor, Turner School of Accountancy, B.S., Wake Forest University; Ph.D., The University of Alabama*

Bettie Ray Butler (2011), *Assistant Professor, Department of Middle, Secondary, and K-12 Education, B.A., North Carolina A&T State University; M.A., Ph.D., Texas A&M University*

Richard J. Buttimer (2002), *Senior Associate Dean, Belk College of Business; and Professor, Department of Finance, B.B.A., Ph.D., University of Georgia*

Nan A. Byars (1993), *Professor, Department of Engineering Technology and Construction Management, B.S., Clemson University; M.S., West Virginia University*

Erik J. Byker (2014), *Assistant Professor, Department of Reading and Elementary Education, B.A., Dordt College; M.Ed., University of Virginia; Ph.D., Michigan State University*

Jennifer B. Byrd (2016), *Visiting Lecturer, Department of English; B.A., M.A., University of North Carolina at Charlotte*

Faryaneh (Fary) M. Cachelin (2010), *Chair and Professor, Department of Psychology*, B.A., Stanford University; M.A., Ph.D., Harvard University

Wei Cai (1989), *Professor, Department of Mathematics and Statistics*, B.S., M.S., University of Science and Technology of China; M.S., Ph.D., Brown University

Umit Cali (2016), *Assistant Professor, Department of Engineering Technology and Construction Management*, B.S., Yildiz Technical University; M.S., Ph.D., University of Kassel

Christopher A. Cameron (2010), *Associate Professor, Department of History*, B.A., Keene State College; M.A., Ph.D., University of North Carolina at Chapel Hill

Harrison S. Campbell, Jr. (1996), *Associate Professor, Department of Geography and Earth Sciences*, B.A., Clark University; M.A., Ph.D., University of Illinois at Urbana-Champaign

Malcolm W. Campbell (2011), *Lecturer, University Writing Program*, B.A., University of North Carolina at Chapel Hill; M.F.A., Vermont College of Fine Arts

Robert C. Campbell IV (2010), *Associate Professor, Department of Art and Art History*; B.A., Transylvania University; M.F.A., University of Michigan at Ann Arbor

William L. Campbell (2004), *Professor, Department of Music*, B.M., M.M., University of North Texas; D.M.A., University of Illinois at Urbana-Champaign

Gloria Campbell-Whitley (2003), *Associate Professor, Department of Special Education and Child Development*, B.A., Dillard University; M.A., University of Alabama at Birmingham; Ed.D., University of Alabama

Amy B. Canevello (2011), *Assistant Professor, Department of Psychology*, B.S., North Dakota State University; M.A., Ph.D., University of Houston

Jacopo Canello (2016), *Assistant Professor, Department of Geography and Earth Sciences*, B.S., University of Padova; M.D., Ca' Foscari University of Venice; M.S., Trinity College, Dublin; Ph.D., University of Queensland

Tuan Thanh Cao (2013), *Lecturer, Department of Biological Sciences*, B.S., M.S., University of North Carolina at Charlotte; Ph.D., University of Arizona

Yang Cao (2003), *Associate Professor, Department of Sociology*, M.A., Ph.D., Cornell University

Clifford M. Carlin (1990), *Lecturer, Department of Chemistry, Senior Instrument Analyst*, B.S., Ph.D., North Carolina State University

Kelly J. Carlson-Reddig (1992), *Associate Director and Associate Professor, School of Architecture*, B.Arch., Texas Tech University; M.E.Des., Yale University

Joanne G. Carman (2005), *Associate Professor, Department of Political Science and Public Administration*, B.A., Hartwick College; M.A., Ph.D., State University of New York at Albany

Melinda Forthofer Carney (2016), *Chair and Professor, Department of Public Health Sciences*, B.A., Case Western Reserve University; Ph.D., University of Michigan

Elizabeth L. Caruso (2011), *Lecturer, Department of English*, B.A., M.A., University of North Carolina at Charlotte

Justin R. Cary (2014), *Lecturer, University Writing Program*, B.A., Villanova University; M.A., Xavier University

Carlos Cruz Casas (2013), *Assistant Professor, Department of Theatre*, B.A., University of Puerto Rico; M.F.A., Dell'Arte International School of Physical Theatre

Andrew D. Case (2015), *Assistant Professor, Department of Psychology*, B.S., Florida A&M University; M.A., Ph.D., University of Illinois at Urbana—Champaign

Anne H. Cash (2014), *Assistant Professor, Department of Reading and Elementary Education*, B.S., Furman University; Ph.D., University of Virginia

Diane Cassidy (2003), *Senior Lecturer, Department of Computer Science*, B.S., M.S., Pace University

Jack M. Cathey (1988), *Associate Professor, Turner School of Accountancy*, B.S., Wake Forest University; M.Acc., Ph.D., Virginia Polytechnic Institute and State University; C.P.A.

Tara L. Cavalline (2006), *Assistant Professor, Department of Engineering Technology and Construction Management*, B.S., M.S., Pennsylvania State University

Valentina Cecchi (2010), Assistant Professor, Department of Electrical and Computer Engineering, B.S., M.S.E.E., Ph.D., Drexel University

Bryn K. Chancellor (2015), Assistant Professor, Department of English, B.A., Northern Arizona University; M.A., Arizona State University; M.F.A., Vanderbilt University

Marvin W. Chapman II (2003), Clinical Assistant Professor, Department of Reading and Elementary Education, B.A., Wofford College; M.A. Western Carolina University; Ph.D., University of North Carolina at Chapel Hill

Jacqueline Chattopadhyay (2012), Assistant Professor, Department of Political Science and Public Administration, B.A., University of California at Irvine; Ph.D., Harvard University

Dong Chen (2009), Associate Professor, Department of Engineering Technology and Construction Management, B.S., Tongji University; M.S., Ph.D., Iowa State University

Duan Chen (2013), Assistant Professor, Department of Mathematics and Statistics, B.A., M.S., Huazhong University of Science and Technology; Ph.D., Michigan State University

Gang Chen (2012), Assistant Professor, Department of Geography and Earth Sciences, B.Sc., Wuhan University; M.Sc., Wuhan University; Ph.D., University of Calgary

Keh-Hsun (Ken) Chen (1978), Professor, Department of Computer Science, B.S., Taiwan Cheng-Kung University; M.S., National Tsing Hua University; Ph.D., Duke University

Shen-En Chen (2005), Professor, Department of Civil and Environmental Engineering, B.S.C.E., M.S.C.E., Ph.D., West Virginia University

Zitian Chen (2012), Assistant Professor, Department of Management, B.S., Beijing University of Science and Technology; M.A., University of Ottawa; Ph.D., Simon Fraser University

Harry I. Chernotsky (1978), Professor, Department of Global, International, and Area Studies, B.A., M.A., Ph.D., Rutgers University

Ilana Chertok (2015), Professor and Associate Director of the Graduate Division, School of Nursing, B.A., University of Pennsylvania; B.S.N., Rush University; M.S.N., West Virginia University; Ph.D., Ben-Gurion University of the Negev

Harischandra (Harish) P. Cherukuri (1997), Professor, Department of Mechanical Engineering and Engineering Science, M.S., Montana State University, Ph.D., University of Illinois

Calvin Chesson (2013), Lecturer, Department of Finance, B.A., East Carolina University; J.D., University of North Carolina at Chapel Hill

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James H. Woodward (1989), *Chancellor Emeritus and Professor Emeritus, Department of Civil and Environmental Engineering, B.S.A.E., M.S.A.E., Ph.D., Georgia Institute of Technology; M.B.A., University of Alabama at Birmingham*

Hazel Drye Wright (1966), *Assistant Professor Emerita, Department of Mathematics, B.S., Appalachian State Teachers College; M.A. Wake Forest College*

Maria G. Yon (1987), *Associate Professor Emerita, Department of Reading and Elementary Education, and Adjunct Professor Emerita, Women's and Gender Studies, B.S., Concord College; M.A., West Virginia University; Ed.D., Virginia Polytechnic Institute and State University*

Kelly L. Zellars (2000), *Professor Emerita, Department of Management, B.A., M.B.A., University of Notre Dame; M.S., University of Wisconsin-Milwaukee; Ph.D., Florida State University*

You-lan Zhu (1990), *Professor Emeritus, Department of Mathematics and Statistics, Ph.D., Qinghua University, China*

Gerda Anna Maria Zimmermann (1974), *Associate Professor Emeritus, Department of Dance, Diplom-Gymnastiklehrerin Schule fuer Gymnastiklehrerin; License, Schul fuer Theatertanz; License, School of Fine Arts (Germany)*

Richard A. Zuber (1978), *Professor Emeritus, Department of Economics, B.A., Wake Forest University; M.A., Ph.D., University of Kentucky*



Glossary

-123-

49ers – The official name for student athletic teams at UNC Charlotte.

49er Card – The ID Card that proves a student is a member of the campus community and entitled to certain services. It is required to check out materials, obtain services, and utilize facilities across campus. It also allows students to access their residence, obtain meals, and make purchases wherever the 49er Account is accepted.

-A-

Academic advising – A meeting between a student and an advisor to discuss the student's academic plan of study, course selections prior to registration, and/or career plans.

Academic bridge program - A post-secondary school program that helps students transition from high school to a university.

Academic calendar – An official list of dates and deadlines found at the beginning of this *Catalog* and on the website for the Office of the Registrar. The academic calendar specifies the dates for semesters and terms, enrollment periods, examination periods, holidays, periods classes are not in session, and commencement.

Academic career – The period during which a student is working at an institution toward completion of one or more degrees.

Academic discipline – A subject area of study (e.g., English, marketing, psychology).

Academic Petition – A form by which students request to be granted an academic exception because their extenuating circumstances prevent them from following established rules, policies, and procedures.

Academic probation – A status resulting from unsatisfactory academic work; a warning that the student must improve academic performance or be dismissed after a specific period of time.

Academic rank – the rank of a faculty member, such as professor, associate professor, assistant professor, or lecturer. (*See individual listings for details.*)

Academic record – Official transcript.

Academic standing – The scholastic standing of a student based on his/her grade point average (GPA).

Academic year – The period of formal academic instruction, extending from August through May. It is divided into Fall and Spring semesters. Students may also take courses during Summer sessions.

Accreditation – UNC Charlotte is accredited by the Commission on Colleges of the Southern Association of Colleges and Schools (SACS). SACS is the recognized regional accrediting body in the eleven U.S. Southern states (Alabama, Florida, Georgia, Kentucky, Louisiana, Mississippi, North Carolina, South Carolina, Tennessee, Texas and Virginia) and in Latin America for those institutions of higher education that award associate, baccalaureate, master's or doctoral degrees. Accreditation is certification that an institute of higher education meets a set of criteria established by SACS.

Access – Ensuring equal opportunity for education, particularly for students from historically underrepresented populations and students with disabilities.

Accommodations – Disability Services counselors meet with qualified students to determine and provide reasonable and appropriate accommodations that support the student's educational goals.

ACT – A test published by American College Testing which measures a student's aptitude in mathematical and verbal comprehension and problem solving. Many colleges and universities, including UNC Charlotte, require students to take this test and submit their test scores when they apply for admission. While UNC Charlotte accepts the ACT, the SAT is preferred. Most students take the ACT or the SAT during their junior or senior year of high school.

Add/drop – A designated time period at the beginning of each semester when a student may add or drop a course.

Adjunct faculty – Part-time or temporary faculty member. It may also denote a faculty member from another academic department whose research or teaching interests overlap substantially with those of the appointing department.

Admissions counselor – A person working in the Office of Admissions who assists prospective students by providing information and assisting in the preparation of application materials.

Advanced Placement (AP) – Standardized courses administered by The College Board offered in high school, the completion of which may result in credit for some of the courses normally required for an undergraduate degree. Awarding of credit based on AP is granted to a student based on prior study or experience (usually indicated by the student's performance on the AP examination).

Advisor – A department or college-based faculty or staff member who meets with students each semester to discuss curricular choices and progress toward achieving educational goals.

Alma mater – The school from which one has graduated, as in "My alma mater is The University of North Carolina at Charlotte."

Alumna/Alumnus (Alumni) – A female/male (group) who attended or graduated from a particular college or university.

Annotated bibliography – A list of citations of books, articles, and documents followed by a brief descriptive paragraph. The purpose of the annotation or description is to inform the reader of the relevance, accuracy, and quality of the sources cited.

Articulation agreement – A written agreement listing courses at one educational institution that are equivalent to courses at another educational institution. Articulation agreements facilitate the smooth transition of students through the secondary, community college, and university educational systems.

Assessment – The act of evaluation or appraisal.

Assignment – Required reading and course work to be completed outside of the classroom as determined by instructors. Many instructors list assignments on a syllabus, which is distributed at the beginning of the semester. Other instructors give assignments during class.

Assistant Professor – usually the entry-level rank for a faculty member who holds a doctorate, although this depends on the institution and the field.

Associate Professor – the mid-level rank of a faculty member. It usually indicates that the individual has been granted tenure at the institution.

Associate's degree – A degree traditionally awarded by community or junior colleges after two years of study, or completion of 60 to 64 credit hours.

Attempted hours - The credits received from courses completed at UNC Charlotte, regardless of grade earned, courses from which students withdrew (W or WE), and courses that were repeated (even if additional credit was not earned).

Audit – Enrolling in a course on an audit basis means the course will not count for credit or impact GPA. In some cases, the audit fee is less than the tuition rate.

Registration for audit often requires the permission of the instructor.

Auditory learner – Learns through listening; these students learn best through verbal lectures, discussions, talking things through, and listening to what others have to say. Auditory learners interpret the underlying meanings of speech through listening to tone of voice, pitch, speed and other nuances. Written information may have little meaning until it is heard. These learners often benefit from reading text aloud.

-B-

Bachelor's degree or baccalaureate – The degree of bachelor of arts (B.A.), bachelor of science (B.S.), or other similar degree, typically requiring a minimum of 120 hours of specified coursework. A bachelor's degree is comprised of General Education courses, a major program(s), elective courses, and, in some cases, a minor program(s), and, in general, is completed in four years.

Blue book – A booklet (often with a blue cover, where it derives its name) that contains lined paper for writing essay test answers.

Bridge program – See *Academic bridge program*.

-C-

Campus – The area where the main buildings of UNC Charlotte are located.

Cashier – The office (or person) where fees/tuition are paid.

Catalog – A resource of all academic policies and procedures, college and degree requirements, faculty, and course descriptions. UNC Charlotte has both an *Undergraduate Catalog* and *Graduate Catalog*.

Catalog year – The year during which the regulations of a specific edition of the catalog apply.

Certificate – A structured set of professionally oriented courses designed to provide recognition that the student has completed coursework in an applied area of focus. For degree-seeking students, a certificate program may either complement or be concurrent with a traditional program of study. The certificate appears on the official transcript.

CFNC – College Foundation of North Carolina. A comprehensive website used for applying to colleges, exploring career opportunities, and applying for state and federal aid.

Chancellor – The chief administrative officer of UNC Charlotte. At some universities, this position is referred to as *president*. To date, UNC Charlotte has had four chancellors.

Chancellor's List – The top honors list which recognizes undergraduate students with outstanding records of academic performance (a GPA of 3.8 or greater) and who meet all other criteria. For details, see the Degree Requirements and Academic Policies section of this *Catalog*.

Class standing – Refers to an undergraduate student's official year in school - Freshman, Sophomore, Junior, or Senior – and is based on the number of earned credit hours.

Classification – Level of progress toward a degree based on the number of earned semester/credit hours.

Clinical faculty – A part-time teaching position with limited research responsibilities.

College – An academic unit of the University. Each of the seven discipline-based colleges at UNC Charlotte represents an organization of related departments and/or schools.

Colloquium – A gathering of scholars to discuss a given topic over a period of a few hours to a few days.

Commencement (*also known as Graduation*) – A formal ceremony in which the University awards degrees to graduating students at the end of each Fall and Spring semester, pending receipt of satisfactory final grades.

Commencement Marshals – At each commencement ceremony, the University honors the juniors with the highest grade point averages by inviting them to serve as the marshals who lead the processions of graduates, faculty members, and the platform party.

Community college – A two-year traditional school, offering programs leading to an Associate's degree and, typically, many noncredit courses for community members not seeking a degree. Also called *junior college*.

Concentration – A structured plan of study within a major. (*For example, Public Relations is a concentration within the Communication Studies*

undergraduate major; Children's Literature is a concentration within the M.A. in English graduate program.) The number of credit hours for a concentration varies, but is included within the credit hours for the major. The concentration appears on the official transcript.

Contact hours – The number of hours a class meets per week.

Continuing education course – A course outside the regular academic instructional program, for which standard academic fees and tuition are (usually) not charged. While most often these courses do not earn academic credits, they can provide necessary education or experience for professional development, or lead to professional certifications.

Convocation – The University Convocation is a gathering of senior administration, faculty, administrative staff, and students to hear statements about the major long-term goals and values of the campus, as well as the major immediate plans and issues confronting UNC Charlotte for the upcoming year, as perceived by the Chancellor, the Provost, and the Faculty President. It is hoped that these presentations will help build a greater shared understanding of the mission of the University and the challenges confronting it. The University Convocation is held at the beginning of the academic year. See also *Day of Convocation*.

Core courses – Required courses in a major program.

Corequisite – Specific conditions, requirements, or courses that must be completed while taking another course (i.e., a lab).

Course – A specific subject studied within a limited period of time. Courses may utilize lectures, discussion, laboratory, seminar, workshop, studio, independent study, internship, or other similar teaching formats to facilitate learning.

Course load – Number of credit hours for which a student is enrolled during a semester.

Course number – The four-letter and four-digit identification code that identifies each course taught at the University, such as ENGL 2126 or PSYC 8151.

Course overload – Defined at UNC Charlotte as over 18 credit hours for undergraduates and over 12 credit hours for graduates. Approval is required to take an overload.

Course sections – Course numbers may be divided when classes also meet in discussion sections, or when a course number has sections pertaining to different topics under the same heading. For instance, a course called Architecture Topical Studio may have section 001 – Cycloramic Models and section 002 – Building Envelopes.

Course title – The name of a specific course that indicates subject and content. *Introduction to Creative Writing* is the course title of ENGL 2126; *Behavior Disorders* is the course title for PSYC 8151.

Coursework – A specified amount of work undertaken in a course which leads to its completion; also, the courses taken to attain a degree in a specified program.

Credit course – A course with specified learning goals which the student is required to meet in order to receive a grade. The course may be applied toward the fulfillment of degree requirements at the University.

Credit hour – An amount of work represented in intended learning outcomes and verified by evidence of student achievement that is an institutionally established equivalency that reasonably approximates not less than:

- (1) 750 minutes of classroom or direct faculty instruction and a minimum of 1500 minutes of out-of-class student work for one semester hour of credit; or
- (2) At least an equivalent amount of work as required in paragraph (1) of this definition for other academic activities or instructional modes of delivery as established by the institution including distance education, hybrid, and face-to-face instruction; laboratory work; internships; practica; studio work; and other academic work leading to the award of credit hours.

Critical thinking – The practice of thinking things through, in which a student must carefully describe something (an event, a book, a person, etc) and evaluate it according to some relevant criterion, considering significant alternatives. Critical thinking is a core component of *liberal education* and of the *general education curriculum*.

Cross-Listed Course – A single course which is simultaneously listed in the schedule of course offerings by two or more academic departments. They share the same meeting times, room, instructor(s), and curriculum. Students may only

receive credit for the single section of the cross-listed course for which they are registered. Credit will not be awarded for a course where credit has been awarded for a cross-listed course.

Cum Laude – Honorary recognition of the success of a graduating student. Translates to “With Honor.” For UNC Charlotte, it requires a cumulative GPA of at least 3.4, but less than 3.8.

Curriculum – A program of courses that meets the requirements for a degree in a particular field of study.

-D-

Day of Convocation – A day dedicated to welcome and introduce new undergraduate students (freshmen and transfers) to the UNC Charlotte community. Day of Convocation is held the first scheduled day of classes. The day starts with students assembling with the Dean of their colleges for the Dean’s Welcome. Students then walk as a group to participate in the New Student Convocation ceremony. The ceremony is followed by departmental and collegiate activities.

Dean – The highest authority within an academic division of study. An Academic Dean heads each College. In addition to the academic deans, there is also a Dean of Students within the Division of Student Affairs.

Dean's List – An honors list which recognizes undergraduate students who earn a grade point average of at least 3.4 and not more than 3.79 and meet all other criteria. For details, see the Academic Regulations section of this *Catalog*.

Deferment – The postponing of a fee or tuition, which will be paid at a later date.

Degree – Diploma or title awarded to a student who completed a prescribed course of study.

Degree program – An organized sequence of courses that leads to the awarding of a college degree at the undergraduate or graduate level. Sometimes referred to as *Curriculum*.

Degree requirement – A set of requirements, which a student must fulfill before he/she graduates.

Department/School – A unit within a college representing a discipline. For example, the Department of English is in the College of Liberal Arts & Sciences, and the School of Nursing is in the College of Health and Human Services.

Department chair – The faculty member in charge of an academic department of the university.

Directory Information – Information in a student's education record that would not generally be considered harmful or an invasion of privacy if disclosed. At UNC Charlotte, directory information consists of the student's name, major field of study, dates of attendance, enrollment status, and degrees and awards (including scholarships) received. See the Family Educational Rights and Privacy Act (FERPA) section of this Catalog for more details.

Disability – The physical and/or learning challenge -- permanent or temporary -- of a student that may impact their academic plan. Accommodations are provided for students with documented disabilities.

Discipline – An area of study representing a branch of knowledge, such as psychology.

Dissertation – The major research project normally required as part of the work for a doctoral degree. Dissertations are expected to make a new and creative contribution to the field of study, or to demonstrate one's excellence in the field.

Dissertation Chair – A graduate faculty member responsible for directing a doctoral student's dissertation research. This may or may not be the student's academic advisor.

Distance education/learning – Formal learning which occurs when students and instructor are separated by geographic distance or by time. Access to the instructor is gained through communications technology such as the Internet, interactive videoconferencing, TV, and email.

Doctoral degree – The most advanced degree, awarded following additional study, often after completion of a master's degree.

Double major – Studying simultaneously for two majors, fulfilling the course requirements for both majors.

Drop/add – A designated time period at the beginning of each semester when a student may add or drop a course.

Dual/joint degree – Involves a student's working for two different University degrees in parallel, either at the same institution or at different institutions (sometimes in different countries), completing them in less time than it would take to earn them separately.

The two degrees might be in the same subject area (especially when the course is split between countries), or in two different subjects.

-E-

Earned hours - The credits received from courses successfully completed at UNC Charlotte.

Elective course – A course selected at a student's discretion. A *restricted elective course* is a course which must be chosen from a stated group/list of courses to satisfy the program requirements. An *unrestricted elective course* may be in any subject, and may be selected from any course for which the student has the proper prerequisites.

Emeritus faculty – A member of the faculty who has retired but retains the honorary title that corresponds with his/her last held position at the University.

Equivalency examination – An examination designed to demonstrate knowledge in a subject where the learning was acquired outside a traditional classroom. For example, a student who learned management skills while working at a restaurant could take an equivalency exam, if offered, to earn credit in small business management.

Essay – A method of examination, or homework, by which a student presents his/her knowledge of the subject by writing a composition.

Experiential learning – Actively engaging students in a work and/or educational experience where they may make their own discoveries and experiment with knowledge themselves, instead of hearing or reading about the experiences of others.

Extracurricular activities – Activities pertinent to student life, but not part of the regular classroom study (e.g., athletics, publications, and social organizations). Also referred to as *co-curricular activities*.

-F-

Facilitator – The person in an interactive classroom who assists the instructor or students with distribution of handouts, collection of tests and evaluations, technical and troubleshooting issues, etc.

Faculty – The teaching and administrative staff and those members of the administration having academic rank in an educational institution.

FAFSA (Free Application for Federal Student Aid) – A form that all students applying for financial assistance are required to complete in order to determine eligibility for financial aid. This form is available from the Office of Student Financial Aid.

FAQ – Frequently Asked Questions. On the Internet and in print, information sources may provide a list of FAQs to assist newcomers in learning more on their own.

Fees – An amount of money charged by institutions (in addition to tuition) to cover the costs of certain services (health services, athletic center, student activities, registration, parking, use of lab equipment or computers, etc.).

FERPA – The Family Educational Rights and Privacy Act (FERPA) is a Federal law that protects the privacy of student education records. The law applies to all schools that receive funds under an applicable program of the U.S. Department of Education.

Final exam – The last, and often the most comprehensive, examination of the entire semester's course material.

Financial aid/assistance – Money available from various sources to help students pay for college. Students must establish eligibility. Funds can be competitive.

Financial aid package – Total amount of financial aid given to a student. Federal and non-Federal aid such as grants, loans, and work-study are combined to help meet the student's need.

Financial need – In the context of student financial aid, financial need is equal to the cost of education (estimated costs for college attendance and basic living expenses) minus the expected family contribution (the amount a student's family is expected to pay, which varies according to the family's financial resources).

Fraternity – A social organization, most often for male students, with specific objectives, rules and regulations.

Full-time student – An undergraduate student with a course load of at least 12 credit hours, as defined by eligibility for federal financial aid, or a graduate student with a course load of at least 9 credit hours. However, undergraduate students need to average a minimum course load of 15 credit hours per semester to graduate within four years.

-G-

General Education Requirements - These courses provide undergraduate students, regardless of their majors, with the foundations of a *liberal education*. For details, see the General Education Program section of the *Undergraduate Catalog*.

Good Academic Standing – Meeting the cumulative GPA requirements for a semester.

Good Academic Standing Warning – The result of unsatisfactory work during the course of a semester; a warning that the student should improve their performance.

GPA (Grade Point Average) – The grade point average for an undergraduate student is determined by adding all accumulated quality points together, and then dividing by the total number of GPA hours the student has attempted, excluding those for which the student received a grade of I, IP, W, WE, H, P, AU, or N. In computing the grade point average, only those credits attempted at UNC Charlotte are included. Refer to the example below.

Example of Transcript:

Subject	Course	Grade	Credit Hours	Quality Points
AMST	2050	P	3.000	0.00
CHEM	1251	F	3.000	0.00
CHEM	1251L	F	1.000	0.00
UWRT	1101	B	3.000	9.00
ENGR	1201	C	2.000	4.00
LBST	2101	C	3.000	6.00
MATH	1241	C	3.000	6.00

Term Totals (Undergraduate)

	Attempt Hours	Passed Hours	Earned Hours	GPA Hours	Quality Points	GPA
Current Term	18.000	14.000	14.000	15.000	25.00	1.666
Cumulative	18.000	14.000	14.000	15.000	25.00	1.666

Example of GPA Calculation:

GPA = Quality Points/GPA Hours; 25/15=1.666

Grades – Evaluative scores provided for each course, and often for individual assignments, examinations, or papers written for that course. There are letter grades (usually A, B, C, D, F) and number grades (usually percentages from 0% to 100%, or on a scale of 0.0 to 4.0). Some undergraduate courses use a *pass/no credit* system with no grades; some graduate courses use a *pass/unsatisfactory* system with no grades.

Graduate studies – Coursework beyond the bachelor's degree that leads to a master's, professional, or doctoral degree.

Graduation (*also known as Commencement*) – A formal ceremony in which the University awards degrees to graduating students at the end of each Fall

and Spring semester, pending receipt of satisfactory final grades.

Graduation with Distinction – Graduating with honors. To be eligible to graduate with distinction, a student must have a certain grade point average computed on at least 48 credit hours of credit completed in residence at UNC Charlotte. (See *Summa Cum Laude*, *Magna Cum Laude*, and *Cum Laude*)

Grant – A sum of money given to a student for the purposes of paying at least part of the cost of college. Grants and scholarships do not have to be repaid.

GRE (Graduate Record Examination) – A standardized test that is an admissions requirement for many graduate schools. The exam aims to measure verbal reasoning, quantitative reasoning, analytical writing, and critical thinking skills that have been acquired over a long period of time and that are not related to any specific field of study. The GRE General Test is offered as a computer-based exam administered by selected qualified testing centers.

-H-

Hold Flags – See *Registration hold flags*.

Homecoming – An annual event held by the University to honor alumni.

Honors – A special rank or distinction conferred by the University upon a student for excellence in scholarship (based on their GPA). For details, see the Academic Regulations section of this *Catalog*. When referring to a course of study, an honors course is for academically talented, enthusiastic, and motivated students.

-I-

Incomplete grade – An "I" (incomplete grade) may be assigned by a faculty member to a student who carried coursework satisfactorily until near the end of the semester, but who was then unable to complete the course, possibly including the final exam. If the student does not remove the "I" within 12 months, the "I" will be changed to "F," "U," or "N," as appropriate. See the Degree Requirements and Academic Policies section of this *Catalog* for complete details.

Independent study – A method of receiving credit for study or research independent of the assignments of

any specific course, but supervised and graded by a faculty member.

Interdisciplinary – A course or program of study involving two or more major areas/departments. For example, Women's and Gender Studies is an interdisciplinary program offering a minor within the College of Liberal Arts & Sciences.

Internet course – A web-based course completed online. Also called an *online course*. May or may not be self-paced.

Internship – A work experience, paid or non-paid, that provides students with practical experience, most often in their field of study.

Intramural/fitness/sport clubs – Programs designed to encourage students to participate in a variety of competitive, instructional, and recreational organized sports activities.

-J-

Job fair – Also known as a *career fair* or *career expo*, it provides a place for employers and recruiters, to meet with student job seekers, typically for entry-level positions. Fairs usually include company or organization tables or booths where résumés may be collected. Occasionally, it is also where students may perform their first interviews with a prospective employer.

Juris Doctor (J.D.) – A professional doctorate and first professional graduate degree in law.

-K-

Kinesthetic learner – A student who learns best by actually carrying out a physical activity, rather than listening to a lecture or merely watching a demonstration.

-L-

Laboratory (lab) – A classroom where students apply material in small-group situations that include experiments, assignments, and projects. A lab course typically has an "L" after the course number.

Learning communities – Small groups of new students and faculty who share common interests. Students enroll in two or more of the same courses and, in many cases, live together in the same residence hall.

Learning strategies – Activities that help people use their own learning style to best approach new learning.

Learning style – The way a person takes in, understands, expresses and remembers information; the way a person learns best. See *auditory, kinesthetic, and visual learner*.

Leave of Absence – Graduate students only may seek a leave from their studies for up to 12 months. During this time, they may not use any University resources.

Lecture – A teaching method in which the professor presents information to the students who take notes, ask questions, and have dialogue with the professor.

Liberal Education – The foundation of the baccalaureate degree in the United States. *Liberal education* strives to make students liberally educated citizens of the world by emphasizing knowledge across disciplines, critical thinking, and application of content. The *General Education Requirements* work toward this end.

Loan – A type of financial aid that is available to students. An education loan must be repaid. In some cases, payments do not begin until the student finishes school.

Lower division course – A course that is intended for freshman and sophomore level students (typically 1000 and 2000 course numbers) that contains introductory content.

-M-

Magna Cum Laude – High honorary recognition of the success of a graduating student. Translates to "With Great Honor." For UNC Charlotte, it requires a cumulative GPA of at least 3.8, but less than 4.0.

Major – A degree-seeking student's primary field of study. For undergraduate students, a major is a structured plan of study requiring a minimum of 30 credit hours. It must be feasible for undergraduate students to complete degree requirements within 128 credit hours. The major appears on the official transcript.

M.A./M.S. – See *Master's degree*.

Master's degree – An advanced degree (e.g., Master of Arts [M.A.], Master of Science [M.S.]) awarded by a university after completion of studies beyond a bachelor's degree.

Matriculated student – A student who has been accepted for admission to the University, has registered in a curriculum, and is pursuing courses toward a degree or certificate. See also *Non-matriculated student*.

Matriculation – The first enrollment following admission as a student.

Mid-term exam – An (often major) examination given in the middle of the semester that tests the student's knowledge of information taught in the course from the beginning of the course up until the time of examination.

Minor – An undergraduate minor represents an optional, secondary field of study for a degree-seeking undergraduate student; no undergraduate student may declare a major and a minor in the same discipline. An undergraduate minor is a structured plan of study requiring a minimum of 15 credit hours and no more than 29 credit hours exclusive of student teaching. A minor should require significant additional coursework beyond what is already required for the major. The minor appears on the official transcript.

Multiple-choice examination – An examination in which questions are followed by two or more answers, from which a student selects the correct answer.

My UNC Charlotte – One-stop shopping for student services via the Web. It combines various systems, user interfaces, and technical solutions already available to the UNC Charlotte community in a single, consistent web-based interface. Students should use My UNC Charlotte online at my.uncc.edu to access web-enabled student services, course information, e-mail, and calendar scheduling.

-N-

Niner Nation – The collective UNC Charlotte student body.

Niner Nation Family – The collective parent and family members of UNC Charlotte students.

Noble Niner – The honor code created by the Student Government Association which solidifies the high standard of morals, principles, and integrity that all students should strive to uphold in order to bolster the growing reputation of excellence at UNC Charlotte.

Non-credit course – A class that typically meets less frequently than a credit course and that contributes toward personal or occupational development.

Non-matriculated student – A student who has not yet been accepted for admission to the University. See also *Matriculated student*.

-O-

Objective test – An examination in which questions requiring a very short answer are posed. It can be multiple choice, true/false, fill-in-the-blank, etc. The questions are related to facts (thus objective) rather than to opinions (subjective).

Online courses – Courses which are taught and taken either partially or wholly over the Internet.

Open-book examination – A student is permitted to use his/her textbook, and often classroom notes, during the exam.

Oral examination – A student answers questions by speaking rather than by writing.

Orientation – An organized gathering, held at the beginning of every semester, which provides useful information to new students to acclimate them with the college campus and student life.

-P-

Part-time student – An undergraduate student with a course load of less than 12 credit hours, or a graduate student with less than 9 credit hours. See also *Full-time student*.

Pass/no credit course – A course that rates a student's performance on a pass/no credit basis, rather than on grades.

Ph.D. – The highest academic degree awarded by a university to students who have completed studies beyond the bachelor's and/or master's degrees, and who have demonstrated their academic ability in oral and/or written examinations and through original research presented in the form of a dissertation (thesis). Also called a *doctoral degree*.

Placement test – An examination used to test a student's academic ability in a certain subject so he/she can be placed in a course at an appropriate level. In some cases, students may get course credits after scoring high on a placement test.

Plagiarism – Passing off someone else's work as your own or using the intellectual property of someone else without giving proper credit. Students must follow certain guidelines to properly acknowledge the use of other people's ideas or words in their work (unless such information is recognized as common knowledge). This is considered a serious offense at every institution, and is subject to disciplinary action that may include failure in a course and/or dismissal from the University.

Pop-quiz – A quiz that the instructor has not previously informed the students about.

Postsecondary education – Refers to all education for students after high school, including programs at community colleges, technical colleges, and four-year colleges and universities.

Prerequisites – Specific conditions, requirements, or courses that must be completed before enrolling in another course. Course prerequisites (if any) can be found within each course description. For example, Spanish I is a prerequisite for Spanish II.

Proctor – A person who supervises the taking of an examination to be certain there is no cheating, and that other rules are followed.

Professional development courses – Courses offered to improve knowledge and skills in specific professional areas, such as professional certification programs. They are usually not offered for academic credit.

Professor – the highest rank attained by a faculty member. Sometimes also called *Full Professor*. A small fraction of tenured faculty are awarded the title of *Distinguished Professor* to recognize outstanding and broad contributions to the advancement of a field of study.

Provost – Reporting to the Chancellor, the Provost is the chief academic officer who oversees all academic affairs activities, including research and faculty. The Deans of each College report to the Provost.

-Q-

Quiz – A short test, written or oral, usually less formal and usually carries less grade weight than an exam.

-R-

Readmission – Approval of the enrollment or admission of a former student.

Reassignment of Duties – A period of time (usually one semester) when a faculty member is not teaching, but concentrating on his/her own education or research.

Registrar – The official at the University who is responsible for maintaining student records. The Office of the Registrar plans and oversees registration, academic record maintenance, transcript preparation, graduation, a degree audit report system, and curricular records.

Registration – Students select courses to enroll in for the subsequent term.

Registration hold flags – Students may be blocked from registering for courses by “hold flags” that may be placed for various reasons, including College or departmental advising requirements, invalid admissions status, outstanding financial obligations, unreturned equipment or library materials, suspension and disciplinary action, or non-compliance with the North Carolina Immunization Law.

Required courses – Courses that a student must take in order to complete his/her degree. In many cases, these courses must be passed with a grade of C or above.

Research paper – A formal written report that includes research findings and a student's own ideas.

Restricted elective course – See *Elective course*.

ROTC – Reserve Officers Training Corps program; a scholarship program wherein the military covers the cost of tuition, fees, and textbooks, and also provides a monthly allowance. Scholarship recipients participate in summer training while in college and fulfill a military service commitment after college.

-S-

SAT – Scholastic Assessment Test I: Reasoning (SAT Reasoning Test) is a standardized test for college admissions that measures a student's aptitude in math, critical reading, and writing. Many colleges and universities, including UNC Charlotte, require students to take this test and submit their test scores when they apply for admission. UNC Charlotte also accepts the ACT, but the SAT is preferred. Most

students take the SAT or the ACT during their junior or senior year of high school.

Schedule of classes – A list of available courses for a specific period of study (i.e., Fall semester), including course numbers, hours, locations, and other pertinent information.

Scholarship – A sum of money given to a student for the purposes of paying at least part of the cost of college. Scholarships can be awarded to students based on academic achievements, financial need, or on many other factors. Scholarships, like grants, do not have to be repaid.

School – See *Department/School*.

Section – One of several classes of the same course. At UNC Charlotte, a three-digit code is used to identify each section of each course offered. For instance, a course called Architecture Topical Studio may have section 001 – Cycloramic Models and section 002 – Building Envelopes.

Self-directed learning – A process in which students take the initiative to diagnose their learning needs, formulate learning goals, identify resources for learning, select and implement learning strategies, and evaluate learning outcomes. The instructor is available as a guide.

Semester or Term – A period of study of approximately 15 weeks, usually half of the academic year (i.e., Fall and Spring semesters). The Fall semester begins in August and the Spring semester begins in January at UNC Charlotte. There are Summer terms as well: one ten-week and two five-week terms.

Semester hour – See *Credit hour*.

Seminar – Most commonly offered as upper-level and graduate courses, these are small classes of approximately 15 students each, designed to facilitate intensive study of specific subject areas.

Service Learning (SL) – Any course with an SL designation must include the scholarly exploration of the concepts of citizenship, public or community service, social issues, or social justice, and provide learning via direct, hands-on experience outside of the classroom.

SOAR – Student Orientation, Advising, and Registration. It is the official UNC Charlotte orientation for new undergraduate students.

Sorority – A social organization for female students, with specific objectives, rules and regulations.

Student Convocation – See *Day of Convocation*.

Study abroad – Visiting other countries for educational purposes, including earning academic credit, learning about different cultures, and developing a deeper understanding of the global marketplace.

Subjective test – An examination in which the answers are in the form of narrative sentences, or long or short essays, often expressing opinions (thus subjective) rather than reporting facts (objective).

Summa Cum Laude – The highest honorary recognition of the success of a graduating student. Translates to “With Highest Honor.” For UNC Charlotte, it requires a cumulative GPA of 4.0.

Supplemental Instruction – Additional assistance for students in historically difficult courses, including accounting, biology, chemistry, communication studies, engineering, mathematics, and physics.

Surveys – A method for collecting information to improve the experience for future students. Current students are often asked to complete questionnaires or participate in focus groups to provide feedback on the quality of services and impact of educational programs.

Syllabus – A course outline typically provided on the first day of class by the instructor that describes course requirements, topics to be covered, required reading, grading criteria, faculty expectations, deadlines, exam dates, class attendance requirements, and other relevant course information.

-T-

Take-home examination – An examination that may be completed at home. Since students may use additional resources, these exams are usually more difficult than in-class exams.

Term – See *Semester or Term*.

Term paper – A written original work discussing a topic in detail, usually several typed pages in length. Often due at the end of a semester.

Test – An examination, or any other procedure that measures the academic abilities of students.

Thesis – A long essay or dissertation involving personal research, written by a candidate for a graduate degree.

Transcript – A list of all the courses a student has transferred in or taken at UNC Charlotte with the grades that the student earned in each course at UNC Charlotte. A transcript is an exact and complete record of a student's academic history. The University requires a high school transcript when a student applies for admission.

Transferability – The extent to which a course taken from one college or university may be accepted by another. Full or partial transfer of the credit may be available, dependent on factors such as whether the receiving college or university offers an equivalent or similar course at comparable levels of academic expectation for learning. Academic advisors have information about whether and how specific courses will transfer to their institutions and degree programs.

Transfer student – A student who has earned credit in one college or university, and then transfers to another.

Transient study – When credit for courses taken by current UNC Charlotte students at other accredited institutions are transferred to UNC Charlotte, subject to approval. For details, see the Degree Requirements and Academic Regulations section of this *Catalog*.

True/False examination – An examination in which questions are answered by marking "True" or "False."

Tuition – The amount of money that colleges charge for coursework and other instruction. Tuition can vary widely between educational institutions, and does not cover fees, cost of books, and other materials.

Tuition waiver – A form of financial assistance in which the university may charge little or no tuition.

Tutoring – A method of providing help to students through additional instruction outside of class. Advanced students work with individuals or small groups to increase their understanding of the material.

-U-

Undeclared – A student who has not yet declared a major field of study; sometimes referred to as *undecided*.

Undergraduate studies – A two or four-year program in a college or a university, following high school graduation, which leads to an associate or bachelor's degree, respectively.

Unrestricted elective course – See *Elective course*.

Unsatisfactory grade reports – notifications sent to students in the middle of each semester for courses in which the student is performing below average and a grade has been reported.

Upper-division course – A course that is intended for junior and senior level students (typically 3000 and 4000 course numbers) that contains advanced, and typically more specific, topic content.

-V-

Visiting faculty – Faculty members who come to the university from another institution for an appointment of a year or less, sometimes to fill a temporary vacancy.

Visual learner – Learns through seeing; these students prefer to see the instructor's body language and facial expression to fully understand the content of a lesson. They tend to prefer sitting at the front of the classroom to avoid visual obstructions (e.g., people's heads). They may think in pictures and learn best from visual displays including – diagrams, illustrated text books, overhead transparencies, videos, flipcharts, and hand-outs. During a lecture or classroom discussion, visual learners often prefer to take detailed notes to absorb the information.

-W-

Withdrawal – The procedure in which a student officially removes himself/herself from taking a course, or removes himself/herself from all courses. Tuition may or may not be refunded, depending on the date of withdrawal.

W-limit hours – The maximum number of credit hours (currently 16) for which undergraduate students are allowed to receive a grade of W over their academic career at UNC Charlotte.

Work-study program – A program that allows students to work part-time during the school year as part of their financial aid package. The jobs are usually on campus and the money earned is used to pay tuition or other college expenses.



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