

# Student Handbook

UNCG Department of Mathematics and Statistics

August 26, 2016

## Introduction

The Department of Mathematics and Statistics at the University of North Carolina at Greensboro offers a Ph.D. in Computational Mathematics, an M.A. in Mathematics with concentrations in Mathematics, Applied Statistics, Data Analytics, or Actuarial Mathematics, and a Post-Baccalaureate Certificate in Statistics. This handbook serves as a resource for students enrolled in these programs. The Graduate School's Bulletin is available at <http://uncg.smartcatalogiq.com/> and contains general policies, calendars and deadlines, course descriptions, and a listing of faculty members.

## Department Administration

### **Department Head**

R. Shivaji  
116 Petty Building  
r.shivaji@uncg.edu

### **Associate Head**

Sat Gupta  
126 Petty Building  
sngupta@uncg.edu

### **Director of Graduate Studies (DGS)**

Greg Bell  
144 Petty Building  
gcbell@uncg.edu

### **MHC Coordinator**

Tracey Howell  
127 Petty Building  
thhowell@uncg.edu

### **University Program Associate**

Haley Childers  
116 Petty Building  
hachilders@uncg.edu

### **Administrative Support Associate**

Carri Richter  
116 Petty Building  
cdrichte@uncg.edu

# Advising and Registration

Entering students are expected to consult with the DGS prior to registering for classes in their first term. Once a student selects a thesis or dissertation committee, the chair of the committee will become the student's academic advisor. Your advisor will provide you with a code that you can use to register for classes. Please register prior to the deadline to avoid late registration fees. Students who receive a Graduate Teaching Assistantship are eligible to receive a tuition waiver and so may not have to pay for tuition. All students are responsible for paying all student fees. All questions regarding assistantships, tuition, and fees can be addressed to the DGS.

All Ph.D. students will be assigned a professional mentor from among the faculty. Professional mentors can help students with aspects of the profession not directly related to research.

# Enrollment Requirements

Students are expected to enroll in graduate-level courses in the Department of Mathematics and Statistics. Registering for courses outside of the Department may be done only in consultation with the Graduate Director and the Thesis/Dissertation Chair. Full-time status is accorded to students enrolled in at least nine graduate hours per semester. Students who have been admitted to candidacy and have indicated one or more semesters taking exactly three hours of dissertation (MAT 799) or thesis (699) on their approved plan of study will be considered full-time students if they are enrolled in the three hours of MAT 699/799 per semester indicated on the plan of study (see <https://grs.uncg.edu/current/faqsfulltime/> for details). Note that students enrolled in thesis extension, dissertation extension, or research extension (MAT 801, 802, 803) are ineligible for full-time status with reduced hours.

## 1 Graduate Teaching Assistants

UNCG requires that all graduate students who receive support of any kind from the department must be full-time students during fall and spring semesters. Graduate support is sometimes available in the summer semester. Students are not required to enroll in classes during the summer semester even if they receive summer support.

## 2 Continuous Enrollment

All graduate students are expected to maintain continuous enrollment. Students who do not enroll in two consecutive semesters – including summer – will be dropped from the

program by the Graduate School and will have to reapply for admission. If you need to leave the program for any length of time, consult with the Graduate Director and fill out a Leave of Absence form: <http://grs.uncg.edu/forms/LeaveofAbsence.pdf>.

### 3 North Carolina Residency

All eligible Graduate Teaching Assistants are requested to apply for in-state residency as soon as possible. Students should apply to change their drivers' license and car registration as soon as possible upon entering the state. Students may apply for residency no sooner than one year after beginning employment/school in the state. Instructions for applying for North Carolina residency for tuition purposes can be found here: <https://reg.uncg.edu/residency-reclassification/>.

### 4 Tuition Waivers

The department has a number of tuition waivers to offer to Graduate Teaching Assistants. Tuition waivers will cover the tuition for up to 12 semester hours, but they do not cover any student fees. All students are responsible for paying student fees. Not all students on assistantships will be awarded tuition waivers; however, tuition waivers can only be awarded to students who are graduate teaching assistants.

### 5 Awards and Scholarships

The department has a number of scholarships available to graduate students. Please see <http://www.uncg.edu/mat/undergraduate/scholarship/> for details.

## Graduate School Requirements and Forms

The Graduate School's website contains links to many forms. All links to these forms can be found here: <http://grs.uncg.edu/forms/> Forms are required to do the following.

- Apply for graduation.
- Take a leave of absence.
- Declare or change a concentration (M.A. students).
- Request permission to take an independent study course.
- Submit a passing score on oral exams or thesis defense.

- Form your committee.
- Revise your plan of study.
- Seek dissertation topic approval.
- Submit passing scores on qualifying exams.
- Apply to doctoral candidacy (required in order to register for dissertation hours).
- Deliver results of your dissertation defense.

## Program Requirements

### 6 Post-Baccalaureate Certificate in Statistics

#### 6.1 Description

The purpose of the 12-hour Post-Baccalaureate Certificate in Statistics is to provide statistical training for persons who wish to enhance their knowledge of statistics but do not wish to pursue a formal degree and for professionals whose interests require a knowledge of statistics beyond the undergraduate level. The objective of the certificate is to offer a structured introduction to the basic ideas of graduate level statistical analysis.

#### 6.2 Degree Requirements

##### 6.2.1 Required Courses.

All students are required to take

STA 661	Adv. Statistics in the Behavioral and Biological Sciences I
STA 662	Adv. Statistics in the Behavioral and Biological Sciences II

##### 6.2.2 Electives.

Additionally, all students must complete any two three-hour STA courses at or above the 500-level excluding:

STA 571	Statistical Methods for Research I
STA 571L	Statistical Methods Laboratory I
STA 572	Statistical Methods for Research II
STA 572L	Statistical Methods Laboratory II
STA 580	Biostatistical Methods

## 7 Master of Arts in Mathematics

### 7.1 Description

The M.A. in Mathematics is offered in two areas of concentration: mathematics (30-33 hours) and applied statistics (33 hours). Course work must be approved by the Department of Mathematics and Statistics and must include certain courses as explained in the discussion of the concentrations. At least have the work credited towards the degree must be in 600-level courses.

Students who plan to continue to the Ph.D. program in Computational Mathematics are urged to select the exam option.

### 7.2 Mathematics Concentration

There are two options for the mathematics concentration. At least half of the work credited towards the degree must be in 600- or 700-level courses.

#### 7.2.1 Coursework

Refer to the Graduate Bulletin for details concerning required courses. A brief summary follows.

Each student must register for one course among MAT 517, MAT 545, MAT 591, or MAT 595. Students with exceptionally strong backgrounds may be exempted from this requirement with approval of the Graduate Director. Other required courses must come from the core courses and electives described in the bulletin. All students must complete at least one year-long sequence of core courses.

#### 7.2.2 Thesis Option

The thesis option requires 24 semester hours of coursework and 6 semester hours of MAT 699 (Thesis). Students selecting this option will be required to complete a thesis based on investigation of a topic in mathematics. A thesis director will be appointed by the Department Head after consultation with the student and the Director of Graduate Study. An oral examination of the thesis is required.

#### 7.2.3 Exam Option

The exam option requires 33 semester hours of course work. To satisfy the exam requirement students must earn scores of M.A. Pass or Ph.D. Pass on at least two Ph.D. qualifying exams. M.A. students who apply to the Ph.D. program after completing the M.A. degree may apply any scores of Ph.D. pass on their M.A. exams towards the Ph.D. Qualifying Exam requirement.

### 7.3 Applied Statistics Concentration

The Applied Statistics Concentration is a 33 semester hour program that culminates in a thesis or project.

#### 7.3.1 Coursework

The coursework for the Applied Statistics concentration is specified in the Graduate Bulletin. It consists of foundation courses, core courses, statistics electives, and interdisciplinary electives.

#### 7.3.2 Thesis Option

The thesis option requires 27 semester hours of coursework and 6 hours of STA 699 (Thesis). Students will prepare a thesis based on the investigation of a topic in statistics. A thesis director will be appointed by the Department Head after consultation with the student and the Director of Graduate Study. An oral examination of the thesis is required.

#### 7.3.3 Project

A student who does not prepare a thesis must complete a project under the direction of an advisor appointed by the Department Head after consultation with the student and the Director of Graduate Study. Three hours of STA 698 will be included in the 33-hour program.

### 7.4 Concentration in Data Analytics

The M.A. in Mathematics with concentration in Data Analytics provides students with advanced analytical training to develop their ability to draw insights from big data including data collection, preparation and integration, statistical methods and modeling, and other techniques. The program is highly applied in nature, integrating project-based learning, simulations, case studies, and specific electives addressing the analytical needs of various industry sectors.

This concentration requires 30 hours of coursework, including 15 semester hours of core courses, 9–12 hours of elective courses, and either 3 hours of project or 6 hours of thesis.

#### 7.4.1 Required Core Courses

All students are required to take

STA 551	Introduction to Probability
STA 552	Introduction to Mathematical Statistics
STA 562	Statistical Consulting
STA 673	Statistical Linear Models I
STA 703	Topics in High Dimensional Data Analysis

#### 7.4.2 Electives.

Additionally, all students must complete 9–12 hours of electives as follows:

**At least two courses chosen from:**

STA 565	Analysis of Survival Data
STA 575	Nonparametric Statistics
STA 661	Advanced Statistics in the Behavioral and Biological Sciences I
STA 662	Advanced Statistics in the Behavioral and Biological Sciences II
STA 670	Categorical Data Analysis
STA 671	Multivariate Analysis
STA 674	Statistical Linear Models II
STA 677	Advanced Topics in Data Analysis and Quantitative Methods

**At most two courses chosen from:**

ECO 722	Time Series and Forecasting
ECO 723	Predictive Data Mining
ECO 725	Data Methods in Economics
CSC 510	Big Data and Machine Learning
CSC 655	Advanced Topics in Algorithms
CSC 671	Advanced Database Systems
CSC 676	Topics in Database Systems
ISM 671	Data Management
ISM 675	Models and Methods in Business Analytics
ISM 685	Business Analytics for Competitive Advantage

#### 7.4.3 Analytics Capstone

**Either:**

STA 698	Project (3 hrs)
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**or**

STA 699	Thesis (6 hrs)
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#### 7.5 Concentration in Actuarial Mathematics

The M.A. in Mathematics with concentration in Actuarial Mathematics provides students wishing to pursue a career in actuarial science a solid foundation in Applied Probability and Statistical Models and their applications in the area of actuarial science. It is designed to

help students pass the preliminary actuarial exams while providing educational experiences related to the actuarial field.

This concentration requires 30 semester hours and is offered with an optional project.

### 7.5.1 Required Core Courses (12 semester hours)

All students are required to take

STA 551	Introduction to Probability
STA 552	Introduction to Mathematical Statistics
MAT 586	Financial Mathematics for Actuaries
STA 655	Applied Probability Models

### 7.5.2 Electives (15–18 semester hours)

Additionally, all students must complete 9–12 hours of electives as follows:

**At least nine semester hours chosen from:**

STA 565	Analysis of Survival Data
STA 573	Theory of Linear Regression
STA 591	Actuarial Exam Preparation Seminar
STA 682	Analysis of Time Series
STA 686	Actuarial Models I
STA 687	Actuarial Models II

**At most six semester hours chosen from:** any other STA 600-level course not listed above, excluding STA 651, 652, 667, 668, 690, and 699.

**At most six semester hours chosen from:**

ECO 641	Microeconomics I
ECO 646	Macroeconomics
ISM 671	Data Management
ISM 675	Models and Methods in Business Analytics
MBA 702	Financial and Managerial Accounting
MBA 707	Financial Management

### 7.5.3 Optional Capstone

STA 698	Project (3 hrs)
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## 8 Ph.D.

### 8.1 Course Requirements

#### 8.1.1 General Requirements

The Ph.D. in Computational Mathematics is a 60 semester-hour program requiring at least 39 hours of coursework and at least 18 hours of dissertation (MAT 799).

The student selects 39-42 hours of coursework in mathematics and related areas with the approval of the Director of Graduate Study. With the approval of the Director of Graduate Study, up to one third of the 39–42 hours may be accepted from UNCG's M.A. in mathematics program or from a comparable master's program.

#### 8.1.2 Graduate School Requirements

The following restrictions on credits are placed on all Ph.D. degrees by the graduate school.

- No more than one quarter of the hours credited toward the Ph.D. may be at the 500-level, exclusive of the dissertation. Thus, students may only use up to 9 semester hours of 500-level credit towards the 39–42 required hours.
- Students may take no more than 15 hours of independent study, exclusive of the dissertation.
- No credit evaluated as B- (2.7) or lower can be counted towards the degree.

#### 8.1.3 Transfer Credit

The Graduate School allows students to transfer work done from other institutions to UNCG to be counted towards the degree. The following conditions apply to transfer credit:

- If the student proposes the transfer of credit from another graduate school, the work for which credit was received must be covered by the preliminary examination, and the transfer must be recommended by the student's dissertation committee before the Graduate School will credit the work to the student's doctoral program.
- In no case will more than one third of non-dissertation course credit hours beyond the master's degree be transferred to doctoral programs. Thus, students may transfer 13–14 hours, depending on their coursework.
- The courses must have been taken at an accredited graduate school and the student must have earned a grade of B (3.0) or better. Such credit must appear on an official transcript that is filed with the graduate school.

- All time limits apply to transferred credit.
- See the Graduate Bulletin for the policy on converting quarter hours to semester hours.

## 8.2 Qualifying and Preliminary Exams

Each Ph.D. student must pass two qualifying exams and a preliminary exam. All students must attempt at least one qualifying exam before the start of their second year. All students must pass both qualifying exams before the start of the sixth semester. Qualifying exams are offered in Analysis, Linear Algebra, and Statistics.

Each exam is created and graded by a committee of three faculty members appointed by the Graduate Director. Three possible scores are available on each exam: Ph.D. Pass, M.A. Pass, and Fail. Each exam committee is responsible for establishing the format and grading criteria that are appropriate for the exam. A grade of Fail on any qualifying exam may jeopardize continued funding.

Old exams and topic lists are available in the Department Library in Petty 116.

The Preliminary Exam is held in two parts: written and oral. The exam is constructed by a committee appointed by the graduate director in consultation with the student's advisor and covers material from at least three courses beyond the qualifying exam courses. Students have at most two attempts to pass the preliminary exam. Students must have unanimous support of the committee to pass the exam.

## 8.3 Choosing a Dissertation Advisor and Committee

Once both qualifying exams have been passed at the level of Ph.D. pass, the student should find a dissertation advisor and form a dissertation committee. The dissertation advisor must be a member of the graduate faculty in the Department of Mathematics and Statistics who holds an endorsement to chair doctoral committees. When the student and advisor have agreed to work together, with the approval of the Graduate Director and Department Head, they form the dissertation committee. At this time the dissertation supervisor will also assume the role of the student's academic advisor. Students work with their supervisor to select topics for the preliminary exam. Once the preliminary exam is passed, students should prepare a dissertation topic defense. After passing the topic defense, students should file a plan of study with the graduate school and apply to Ph.D. candidacy. This allows the student to work exclusively on the dissertation.

### 8.3.1 Topic Defense

Once the student and dissertation advisor have formed the dissertation committee, the student should begin to work towards a topic for the dissertation. At the end of the third year, the student will present an oral topic defense. Unanimous approval by the dissertation

committee is required to pass the preliminary oral exam. If the student does not pass the exam, no more than one re-examination will be allowed. The re-examination will not be permitted in the semester in which the preliminary oral exam was failed. If the student fails to pass the re-examination, the Graduate School will dismiss the student from the program.

In the oral exam the student must demonstrate their capability to begin research on the selected topic. Part of the exam will involve a computational component. The computational component should clearly demonstrate that the student is capable of handling computational aspects of the intended dissertation topic.

### 8.3.2 Computational Component

Each dissertation should have a significant computational component. Students should work with their advisors, committee members, or other experts to include a significant computation in the dissertation.

### 8.3.3 Admission to Candidacy

When the student has completed the qualifying exams, the preliminary exam, and the topic defense, they should submit their dissertation research outline to their committee. Once this has been approved, the student may apply to the graduate school for formal admission to candidacy for the doctoral degree. This status is necessary to register for dissertation hours.

### 8.3.4 Dissertation Defense

The student's research will be prepared in a dissertation, which is defended in a public oral exam. The dissertation must be acceptable to each member of the student's dissertation committee and the Graduate School. The dissertation defense can occur at most twice.

Students must apply to defend their dissertation by filling out the appropriate forms with the graduate school **two weeks** prior to the scheduled defense. The final date for defense of dissertations varies each semester, and is roughly a month before graduation. Students also must apply to graduate. The application is due by the end of the first week of classes.

## 8.4 Example Timeline for Student in Mathematics

Semester	Expectation
1	Enroll in MAT 595, 727, 601, and 603
2	Enroll in MAT 596, 723, and 602 Take at least one Qualifying Exam in the summer after the first year.
3	Enroll in MAT 735, 737, and 748.
4	Enroll in MAT 736, 742, 745. Pass remaining Qualifying Exams; find dissertation supervisor.
5	Enroll in MAT 709, 723, 740; pass preliminary exam.
6	Enroll in 1-3 additional MAT courses; defend dissertation proposal (Oral Exam).
7+	Enroll in three hours of MAT 799 per semester; work on dissertation. Defend dissertation before the end of fifth year (Oral Exam).

## 8.5 Mathematics Course Offerings

In Mathematics, the following courses will be routinely offered. For Statistics Courses, check the current course offerings on UNCGenie. The pattern repeats every other year.

### Academic Year 2016–2017

Fall		Spring	
MAT 595	Mathematical Analysis	MAT 596	Mathematical Analysis
MAT 601/3	Teaching Seminars	MAT 602	Mathematical Software
MAT 737	Topology	MAT 745	Measure Theory
MAT 748	Computational Algebra	MAT 742	Comp. Number Theory
MAT 727	Comp. Linear Algebra	MAT 728	Linear Algebra
MAT 735	ODEs	MAT 736	PDEs

### Academic Year 2017–2018

Fall		Spring	
MAT 595	Mathematical Analysis	MAT 596	Mathematical Analysis
MAT 601/3	Teaching Seminars	MAT 602	Mathematical Software
MAT 740	Groups, Rings, & Fields	MAT 709	Topics
MAT 709	Topics	MAT 747	Comp. Topology
MAT 727	Comp. Linear Algebra	MAT 728	Linear Algebra
MAT 723	Numerical Analysis	MAT 746	Functional Analysis

## 8.6 Plan of Study

All students should submit a plan of study to the Graduate School once they have formed their committee and defended their dissertation topic (usually before the end of their third year).

## 8.7 Residence Requirement

The Graduate School expects doctoral students to satisfy a residence requirement. Students must enroll in two consecutive full-time semesters of graduate coursework on the campus after admission to a program. Undergraduate courses taken in support of a graduate program cannot count towards residence.

# Satisfactory Progress

## 9 Grade Point Average Requirement

### 9.1 Continued Departmental Support

Continuing students on graduate assistantships who are making good progress towards the degree can expect priority for continued funding for up to five years (Ph.D.) or two years (MA); the department will make every effort to continue its support, subject to budget constraints. Continuing students must maintain a grade point average of 3.5 or higher (on a 4.0 scale) to satisfy the GPA requirement. Students whose GPA falls below 3.5 will not be guaranteed continued support by the department, but may receive funding on a competitive basis.

### 9.2 Dismissal From the Program

The graduate school requires all credit applied to the degree to be evaluated as B (3.0) or better. Graduate students earning grades of U, F, or WF in any 6 semester hours or grades of C, C-, U, F or WF in any 9 semester hours will be deemed academically ineligible to continue by the Graduate School and will be dismissed from the program. Students who are dismissed from a graduate program may apply for readmission by submitting a new application after two semesters and may be readmitted only with the approval of the department head or the director of graduate study and with the approval of the Dean of the Graduate School.

## 10 Enrollment Expectations

All supported Graduate Teaching Assistants are expected to enroll in at least 9 semester hours in fall and spring semesters. Any graduate teaching assistant who drops below 9 hours in a semester may have their position and assistantship immediately revoked. Such students will be ineligible for future funding.

## 11 Qualifying and Preliminary Exams

Students are expected to pass two qualifying exams prior to the start of their fifth semester. Students must pass the preliminary exam prior to the start of their seventh semester. A grade of Fail on an exam may put funding in jeopardy. Ph.D. students who receive grades below Ph.D. Pass on more than two exams will be dismissed from the program.

## 12 Teaching and Tutoring Evaluations

Each Graduate Teaching Assistant will be evaluated each semester by a member of the Graduate Studies Committee. Satisfactory faculty evaluations are necessary for reappointment. If applicable, satisfactory reports from the director of the Math Help Center are necessary for reappointment.

## 13 Progress on Research

The dissertation supervisor will provide a report to the Graduate Director and the Department Head. All students must continue to make progress towards the degree.

## 14 Colloquia and Lecture Series Talks

All graduate students are expected to attend all colloquia and lecture series talks. Students should also attend seminars in their discipline. Unexcused absences from colloquia and lecture series talks may result in loss of funding. Students should also take every available opportunity to give talks, both at UNCG and at regional conferences. There is usually funding to support graduate student attendance at most conferences.

## 15 Time Limits

Two sets of time constraints are enforced for Ph.D. students. The first deadline concerns Graduate Teaching Assistants and continuation of funding. The second set of deadlines concerns Graduate School limits. While failure to adhere to the departmental timelines

may result in discontinuation of funding, the Graduate School's deadlines cannot be circumvented and failure to adhere to these guidelines will result in inability to graduate.

### 15.1 Continued Departmental Support

Students seeking funding beyond the fifth year of enrollment in the program must have their dissertation supervisor submit an application to extend funding to the Graduate Director and the Department Head. Funding beyond the fifth year will be granted only in cases when the dissertation is nearing completion and sufficient funding is available.

### 15.2 Graduate School Time Limits

The Graduate School requires that all courses that appear on the student's Plan of Study must have been completed within seven years of the granting of the degree. For students admitted to the Ph.D. program directly from a baccalaureate program, the limit is ten years.