

MATHEMATICS, M.A.

The MA in Mathematics is offered in five areas of concentration: Mathematics, Applied Statistics, Actuarial Mathematics, Data Analytics, and Teaching College Mathematics. 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.

Students who plan to continue to the PhD program in computational mathematics are urged to elect the concentration in mathematics. They may then use the doctoral qualifying examinations to satisfy the comprehensive examination requirement in the non-thesis option for the MA degree.

For information regarding deadlines and requirements for admission, please see the Guide to Graduate Admissions.

In addition to the application materials required by The Graduate School, applicants must submit a 500-700 word Personal Statement to be considered for admission.

Degree Program Requirements Mathematics Concentration

Required: 30-33 credit hours

The mathematics concentration offers a 30 credit hour thesis or project option and a 33 credit hour coursework option. At least half the work credited towards the degree must be in 600-level or above courses: 15 credit hours for the 30-credit program, and 18 credit hours for the 33-credit program.

Code	Title	Credit Hours
Algebra or Analysis		3
Select one of the following: *		
MAT 545	Differential Equations and Orthogonal Systems	
MAT 591	Advanced Abstract Algebra	
MAT 592	Advanced Abstract Algebra	
MAT 595	Mathematical Analysis	
MAT 596	Mathematical Analysis	
Core Courses		9
Select at least 9 credits from the following. At least 6 of these credits must constitute a complete year-long sequence:		
MAT 723	Numerical Mathematics	
MAT 724	Numerical Mathematics	
MAT 731	Combinatorics	
MAT 732	Graph Theory	
MAT 727	Linear Algebra and Matrix Theory	
MAT 728	Linear Algebra and Matrix Theory	
CSC 653	Advanced Theory of Computation	
CSC 656	Foundations of Computer Science	
CSC 653	Advanced Theory of Computation	
CSC 656	Foundations of Computer Science	
MAT 688	Mathematical Logic and Axiomatic Set Theory	
MAT 689	Mathematical Logic and Axiomatic Set Theory	
MAT 741	Modern Abstract Algebra	
MAT 742	Computational Number Theory	

MAT 743	Complex Analysis
MAT 744	Complex Analysis
MAT 745	Real Analysis
MAT 746	Real Analysis
MAT 737	General Topology
MAT 738	General Topology
MAT 645	Approximation Theory
MAT 646	Approximation Theory
STA 651	Mathematical Statistics
STA 652	Mathematical Statistics

Electives 12-21

Select 12-21 credits of other 500-, 600-, or 700-level mathematical sciences courses with prior approval of the Director of Graduate Study

Thesis, Project, or Comprehensive Examination (Capstone Experience) 0-6

Each candidate may elect to prepare a thesis or project, or pass a written comprehensive examination on his/her program of course work.

* *Students who have had appropriate algebra or analysis courses as undergraduates may be exempted from this requirement upon approval by the Director of Graduate Study. In this case, these 3 hours must be replaced by 3 hours chosen in consultation with the Director of Graduate Study.*

Thesis, Project, or Comprehensive Examination (Capstone Experience)

The thesis or project option is a 30 credit hour program; the coursework option with a comprehensive exam is a 33 credit hour program.

Thesis (6 credits)

The candidate may prepare a thesis based on the 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. Candidates may include up to 6 credits of thesis (MAT 699 Thesis) in the required 30 credit hours. An oral examination on the thesis is required.

Project in Mathematics (3 credits)

The candidate may prepare a project in mathematics based on in-depth investigation of a topic in mathematics. A project director will be appointed by the Department Head after consultation with the student and the Director of Graduate Study. Candidates may include 3 credits of project (MAT 687 Project in Mathematics) in the required 30 credit hours. A written report and an oral examination on the project are required.

Comprehensive Examination

A candidate who does not prepare a thesis must take 33 credit hours of coursework and pass a written comprehensive examination of his/her program. Please consult with the Director of Graduate Study for information concerning the comprehensive examination.

Applied Statistics Concentration

Required: 33 credit hours

Undergraduate prerequisites: Baccalaureate degree and the following courses or their equivalents: STA 290 Introduction to Probability and Statistical Inference, STA 301 Statistical Methods; MAT 191 Calculus I,

MAT 292 Calculus II; and CSC 130 Introduction to Computer Science or CSC 230 Elementary Data Structures and Algorithms.

Code	Title	Credit Hours
Foundation Courses *		7
STA 551	Introduction to Probability	
STA 552	Introduction to Mathematical Statistics	
STA 581	SAS System for Statistical Analysis	
Core Courses		8
STA 661	Advanced Statistics in the Behavioral and Biological Sciences I	
STA 662	Advanced Statistics in the Behavioral and Biological Sciences II	
STA 668	Consulting Experience	
STA 690	Graduate Seminar	
Statistics Electives		6-9

Select at least two of the following:

STA 670	Categorical Data Analysis
STA 671	Multivariate Analysis
STA 673	Statistical Linear Models I
STA 674	Statistical Linear Models II
STA 675	Advanced Experimental Design
STA 676	Sample Survey Methods
STA 677	Advanced Topics in Data Analysis and Quantitative Methods
STA 711	Experimental Course

Interdisciplinary Electives 3-6

Select 3-6 credits from any STA course at the 500-level or above or from the following:**

CSC 523	Numerical Analysis and Computing
CSC 526	Bioinformatics
ECO 663	Predictive Data Mining
ECO 664	Time Series and Forecasting
ERM 669	Item Response Theory
ERM 728	Exploratory and Confirmatory Factor Analytic Methods for Scale Construction
ERM 729	Advanced Item Response Theory
ERM 731	Structural Equation Modeling in Education
HEA 602	Epidemiology
MAT 541	Stochastic Processes
MAT 542	Stochastic Processes

Thesis or Project (Capstone Experience) 3-6

Each candidate must elect to prepare a thesis or project. Both options require 33 credit hours total.

* Students who have complete these courses as part of another degree prior to being accepted in the master's program will choose replacement courses.

** Student can earn the remaining credits required for the degree either by taking any STA courses at the 500 level or above (except STA 571 Statistical Methods for Research I) or by taking a maximum of 6 credits of approved graduate courses outside of statistics.

Thesis or Project (Capstone Experience)

Each candidate must elect to prepare a thesis or project. Both options require 33 hours.

Thesis (6 credits)

The candidate may 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. Candidates will include 6 credits of thesis (STA 699 Thesis) or 3 credits of STA 698 Project in Statistics and 3 credits of STA 699 in the required 33 credit hours. An oral examination on the thesis is required.

Project (3 credits)

A candidate who does not prepare a thesis must complete a project under the direction of an advisor chosen by the Director of Graduate Study in consultation with the student. 3 credits of STA 698 Project in Statistics will be included in the 33 credit hour program.

Actuarial Mathematics Concentration

Required: 30 credit hours

The MA 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. Students will be encouraged to seek internship opportunities during the summer. The concentration requires 30 credit hours and is offered with an optional project. At least 15 credits must be at the 600-level or above.

The target student population for this program will be students with a bachelor's degree in mathematics, statistics, economics, finance, or a related field who want to pursue an actuarial industry to advance their career.

Code	Title	Credit Hours
Required Foundations and Methods Courses		12
STA 551	Introduction to Probability	
STA 552	Introduction to Mathematical Statistics	
STA 655	Applied Probability Models	
MAT 586	Financial Mathematics for Actuaries	
Elective Courses		15-18
Select at least 9 credits of Actuarial exam and Applied Statistics:		
STA 686	Actuarial Models I	
STA 687	Actuarial Models II	
STA 591	Actuarial Exam Preparation Seminar	
STA 573	Theory of Linear Regression	
STA 682	Theory of Time Series	
STA 565	Analysis of Survival Data	
Other Applied Statistics Courses		
Select at most 6 credits from any other STA 600-level courses or the following: *		
ECO 641	Microeconomics	
ECO 646	Macroeconomics	
ISM 671	Organizing Data for Analytics	
ISM 645	Principles of Predictive Analytics	
MBA 702	Financial and Managerial Accounting	

MBA 707	Financial Management	
Capstone Course		3
STA 698	Project in Statistics	

* Excluding the STA 600 courses listed above and STA 651 Mathematical Statistics, STA 652 Mathematical Statistics, STA 667 Statistical Consulting, STA 668 Consulting Experience, STA 690 Graduate Seminar, and STA 699 Thesis.

Data Analytics Concentration

Required: 30 credit hours

The 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 for analyzing complex data. 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. The concentration requires a minimum of 30 credit hours including either a project (3 credits) or thesis (6 credits) option.

Code	Title	Credit Hours
Analytics Methods and Foundations		15
STA 551	Introduction to Probability	
STA 552	Introduction to Mathematical Statistics	
STA 562	Statistical Computing	
STA 673	Statistical Linear Models I	
STA 703	Topics in High Dimensional Data Analysis	
Analytics Applications		9-12
Select at least two of the following:		6
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	
Select at most two of the following:		3-6
ECO 663	Predictive Data Mining	
ECO 664	Time Series and Forecasting	
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 645	Principles of Predictive Analytics	
ISM 646	Visualizing Data to Design Strategy	
ISM 671	Organizing Data for Analytics	
Analytics Capstone		3-6

STA 698	Project in Statistics
or STA 699	Thesis

Teaching College Mathematics Concentration

Required: 30 credit hours

The concentration in Teaching College Mathematics is intended for students wishing to pursue a career in teaching at the community college level. This 30 credit hour concentration is offered with a project option or an exam option. At least half of the required credits (15 out of the 30) must be taken at the 600-level or above. Candidates must complete at least 18 credits of graduate coursework with an MAT prefix. The concentration has three components: The Mathematics and Statistics core courses; Pedagogy, Educational Research, and Higher Education; and the Capstone Experience (Project or Exam).

Code	Title	Credit Hours
Mathematics and Statistics Core Courses		18
Candidates must take at least 18 credits of graduate-level courses with prefixes MAT or STA excluding MAT 503, 513, 601, 603, 699, and STA 699. These 18 credits must include at least one two-semester sequence: MAT 591 and 592, MAT 595 and 596, MAT 727 and 728, or STA 551 and 552.		
Pedagogy, Educational Research, and Higher Education		9-12
MAT 601	Seminar in the Teaching of Mathematics I	
MAT 603	Practicum in the Teaching of Mathematics	
Select 6-9 additional credits in the following courses:		
MAT 503	Problem Solving in Mathematics	
MAT 513	Historical Development of Mathematics	
STA 661	Advanced Statistics in the Behavioral and Biological Sciences I	
STA 662	Advanced Statistics in the Behavioral and Biological Sciences II	
ERM 605	Educational Measurement and Evaluation	
ERM 667	Foundations of Educational Measurement Theory	
HED 602	Student Development Theory in Higher Education	
HED 607	Adult Learning and College Teaching	
HED 661	Higher Education in the U.S.	
TED 667	Technology in Mathematics Education	

Project Option

Candidates who select the project option must prepare a project on the investigation of a topic in mathematics or statistics. A project director will be appointed by the Department Head in consultation with the students the Director of Graduate Study. Candidates may include up to 3 credits of MAT 687 Project in Mathematics or STA 698 Project in Statistics in the required total for the concentration.

Exam Option

A candidate who does not prepare a project must pass a written comprehensive examination of his/her program. Please consult with the Director of Graduate Study for information concerning the comprehensive examination.

Accelerated B.A. to B.S. to M.A.

Application and Admission

Qualified UNCG undergraduate students who are pursuing the B.A. or B.S. in Mathematics may apply for admission to the Accelerated Degree and the M.A. in Mathematics program. A cumulative undergraduate GPA of at least 3.5 based on at least 30 hours earned at UNCG is required. Applicants must have completed at least 60 semester credits and may not apply for admission to the ADP before the first semester of the junior year. Applicants are also required to take the Graduate Record Examination. All applicants must submit the Request for Accelerated Degree Program to the Graduate School and must simultaneously apply for admission to the M.A. program in Mathematics.

Admitted students may apply up to 12 semester hours of graduate-level coursework toward completion of both the undergraduate and graduate degree, provided that they earn a grade of "B" (3.0) or better in the course and fulfill graduate-level requirements. The graduate courses the student will take within the Accelerated Degree Program in Mathematics must be approved by the Director of Graduate Study, must be specified on the Request for Accelerated Degree Program, and must be chosen from among the following courses:

Code	Title	Credit Hours
MAT 595	Mathematical Analysis	3
MAT 596	Mathematical Analysis	3
STA 551	Introduction to Probability	3
STA 552	Introduction to Mathematical Statistics	3
STA 661	Advanced Statistics in the Behavioral and Biological Sciences I	3
STA 662	Advanced Statistics in the Behavioral and Biological Sciences II	3

Degree Program Requirements

Please consult with an advisor to determine how the courses taken at the graduate level will meet requirements in the bachelor's degree program. All degree requirements for the M.A. in Mathematics will remain the same.