MATHEMATICS, M.A.

The Master of Arts in Mathematics degree has five concentrations: Mathematics, Applied Statistics, Data Analytics, Actuarial Mathematics, and Teaching College Mathematics. Although it is often a terminal degree, the M.A. degree can also be viewed as a natural step towards a Ph.D. degree.

Students who plan to continue to the Ph.D. program in Computational Mathematics (https://catalog.uncg.edu/arts-sciences/mathematics-statistics/computational-mathematics-phd) 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 M.A. 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

Actuarial Mathematics Concentration

Required: 30 credit hours

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. Students will be encouraged to seek internship opportunities during the summer. The concentration requires 30 credit hours and is offered with a 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.

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>STA 631</td>
<td>Introduction to Probability</td>
<td>3</td>
</tr>
<tr>
<td>STA 632</td>
<td>Intro Mathematical Statistics</td>
<td>3</td>
</tr>
<tr>
<td>STA 655</td>
<td>Applied Probability Models</td>
<td>3</td>
</tr>
<tr>
<td>MAT 686</td>
<td>Financial Math for Actuaries</td>
<td>3</td>
</tr>
</tbody>
</table>

Elective Courses (15-18 credits)

Actuarial Exam and Applied Statistics Courses

Select at least 9 credits of Actuarial Exam and Applied Statistics courses:

- STA 642 Statistical Computing
- STA 665 Analysis of Survival Data
- STA 635 Theory Linear Regression
- STA 691 Actuarial Exam Prep Seminar
- STA 671 Categorical Data Analysis
- STA 671 Multivariate Analysis
- STA 682 Theory of Time Series

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

Project (Capstone Experience) (3 credits)

STA 698 Project in Statistics ** 3

Total Credit Hours 30


** Each student is required to 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 30 credits required for the concentration.

Applied Statistics Concentration

Required: 30 credit hours

Undergraduate prerequisites: Baccalaureate degree and the following courses or their equivalents: STA 290 Introduction to Probability and Statistical Inference and STA 301 Statistical Methods; MAT 191 Calculus I and MAT 292 Calculus II; and CSC 130 Introduction to Computer Science or CSC 230 Elementary Data Structures and Algorithms.

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>STA 631</td>
<td>Introduction to Probability</td>
<td>3</td>
</tr>
<tr>
<td>STA 632</td>
<td>Intro Mathematical Statistics</td>
<td>3</td>
</tr>
<tr>
<td>STA 640</td>
<td>SAS System Statistical Analysis</td>
<td>1</td>
</tr>
</tbody>
</table>

Core Courses (8 credits)

- STA 661 Advanced Statistics in the Behavioral and Biological Sciences I 3
- STA 662 Advanced Statistics in the Behavioral and Biological Sciences II 3
- STA 668 Consulting Experience 1
- STA 690 Graduate Seminar 1

Statistics Electives (6-9 credits)

Select at least two courses from the following: 6-9

- 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
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.

Data Analytics Concentration

Required: 30 credit hours

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>STA 631</td>
<td>Introduction to Probability</td>
<td>3</td>
</tr>
<tr>
<td>STA 632</td>
<td>Intro Mathematical Statistics</td>
<td>3</td>
</tr>
<tr>
<td>STA 642</td>
<td>Statistical Computing</td>
<td>3</td>
</tr>
<tr>
<td>STA 673</td>
<td>Statistical Linear Models I</td>
<td>3</td>
</tr>
<tr>
<td>STA 703</td>
<td>Topics in High Dimensional Data Analysis</td>
<td>3</td>
</tr>
</tbody>
</table>

Analytics Applications (9-12 credits)

Select at least two of the following:

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>STA 645</td>
<td>Nonparametric Statistics</td>
<td>6</td>
</tr>
<tr>
<td>STA 661</td>
<td>Advanced Statistics in the Behavioral and Biological Sciences I</td>
<td>3</td>
</tr>
<tr>
<td>STA 662</td>
<td>Advanced Statistics in the Behavioral and Biological Sciences II</td>
<td></td>
</tr>
<tr>
<td>STA 665</td>
<td>Analysis of Survival Data</td>
<td></td>
</tr>
<tr>
<td>STA 670</td>
<td>Categorical Data Analysis</td>
<td></td>
</tr>
<tr>
<td>STA 671</td>
<td>Multivariate Analysis</td>
<td></td>
</tr>
<tr>
<td>STA 674</td>
<td>Statistical Linear Models II</td>
<td></td>
</tr>
<tr>
<td>STA 677</td>
<td>Advanced Topics in Data Analysis and Quantitative Methods</td>
<td></td>
</tr>
</tbody>
</table>

Select at most two of the following:

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>ECO 663</td>
<td>Predictive Data Mining</td>
<td></td>
</tr>
<tr>
<td>ECO 664</td>
<td>Time Series and Forecasting</td>
<td></td>
</tr>
<tr>
<td>ECO 725</td>
<td>Data Methods in Economics</td>
<td></td>
</tr>
<tr>
<td>CSC 605</td>
<td>Data Science</td>
<td>3-6</td>
</tr>
</tbody>
</table>
Comprehensive Exam Option (0 credits)

A student may pass a written comprehensive examination of his/her program. Please consult with the Director of Graduate Study for information concerning the comprehensive examination. Under this option, 30 credits of coursework is required.

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

Each student must elect to complete a thesis, project, or comprehensive exam. Each option requires 30 credits total.

- Thesis Option (6 credits)
- Project Option (3 credits)
- Comprehensive Exam Option (0 credits)

Total Credit Hours 24-33

NOTE: All students must complete 30 credit hours for the Data Analytics concentration, M.A. in Mathematics. The range of total credit hours that appears in the course list above reflects only a minimum-maximum sum of the credits listed for the program requirements.

1. A student 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. Students will include 6 credits of thesis (STA 699) or 3 credits of STA 698 Project in Statistics and 3 credits of STA 699 in the 30 credits required for the concentration. An oral examination on the thesis is required.

2. A student 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. Three credits of STA 698 Project in Statistics will be included in the 30 credits required for the concentration.

3. A student may pass a written comprehensive examination of his/her program. Please consult with the Director of Graduate Study for information concerning the comprehensive examination. Under this option, 30 credits of coursework is required.

Mathematics Concentration

Required: 30 credit hours

The Mathematics concentration offers a thesis option, a project option and a comprehensive exam option. Each option requires 30 credit hours. At least half the work credited towards the degree must be in 600-level or above courses.

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>MAT 635</td>
<td>Differntl Eqa Orthogonal Syst</td>
<td>3</td>
</tr>
<tr>
<td>MAT 691</td>
<td>Advanced Abstract Algebra</td>
<td></td>
</tr>
<tr>
<td>MAT 692</td>
<td>Advanced Abstract Algebra</td>
<td></td>
</tr>
<tr>
<td>MAT 695</td>
<td>Mathematical Analysis</td>
<td></td>
</tr>
<tr>
<td>MAT 696</td>
<td>Mathematical Analysis</td>
<td></td>
</tr>
</tbody>
</table>

Core Courses (9 credits)

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 727 Linear Algebra and Matrix Theory
- MAT 728 Linear Algebra and Matrix Theory
- MAT 731 Combinatorics
- MAT 732 Graph Theory
- MAT 737 General Topology
- MAT 738 General Topology
- MAT 741 Modern Abstract Algebra
- MAT 742 Computational Number Theory
- MAT 743 Complex Analysis
- MAT 745 Real Analysis
- MAT 746 Real Analysis
- STA 651 Mathematical Statistics
- STA 652 Mathematical Statistics
- CSC 653 Advanced Theory of Computation
- CSC 656 Foundations of Computer Science

Electives (12-21 credits)

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 Exam (Capstone Experience) (0-6 credits)

Each student must elect to complete a thesis or project, or pass a written comprehensive exam on their program of coursework. Each option requires 30 credits total.

- Thesis Option (6 credits)
- Project Option (3 credits)
- Comprehensive Exam Option (0 credits)

Total Credit Hours 24-39

NOTE: All students must complete 30 credit hours for the Mathematics concentration, M.A. in Mathematics. The range of total credit hours that appears in the course list above reflects only a minimum-maximum sum of the credits listed for the program requirements.
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 credits must be replaced by 3 credits chosen in consultation with the Director of Graduate Study.

A student 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. Students may include up to 6 credits of thesis (STA 699) in the 30 credits required for the concentration. An oral examination on the thesis is required.

A student may prepare a project 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. Students may include 3 credits of project (MAT 687) in the 30 credit required for the concentration. A written report and an oral examination on the project are required.

A student who does not prepare a thesis must pass a written comprehensive examination of their program. Please consult with the Director of Graduate Study for information concerning the comprehensive examination.

**Thesis, Project, or Comprehensive Examination (Capstone Experience)**

**Thesis Option (6 credits)**
A student 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. Students may include up to 6 credits of thesis (MAT 699) in the 30 credits required for the concentration. An oral examination on the thesis is required.

**Project Option (3 credits)**
A student may prepare a project 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. Students may include 3 credits of project (MAT 687) in the 30 credits required for the concentration. A written report and an oral examination on the project are required.

**Comprehensive Examination Option (0 credits)**
A student who does not prepare a thesis must take 30 credits of coursework and pass a written comprehensive examination of their program. Please consult with the Director of Graduate Study for information concerning the comprehensive examination.

**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).

---

1. Students 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.

2. A student who does not prepare a project must pass a written comprehensive examination of their program. Please consult with the Director of Graduate Study for information concerning the comprehensive examination.

---

**Accelerated B.A. or B.S. to M.A. in Mathematics**

**Application and Admission**

Qualified UNC Greensboro 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 credits earned at
UNC Greensboro is required. Applicants must have completed at least 60 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 credits 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:

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>MAT 695</td>
<td>Mathematical Analysis</td>
<td>3</td>
</tr>
<tr>
<td>MAT 696</td>
<td>Mathematical Analysis</td>
<td>3</td>
</tr>
<tr>
<td>STA 631</td>
<td>Introduction to Probability</td>
<td>3</td>
</tr>
<tr>
<td>STA 632</td>
<td>Intro Mathematical Statistics</td>
<td>3</td>
</tr>
<tr>
<td>STA 661</td>
<td>Advanced Statistics in the Behavioral and Biological Sciences I</td>
<td>3</td>
</tr>
<tr>
<td>STA 662</td>
<td>Advanced Statistics in the Behavioral and Biological Sciences II</td>
<td>3</td>
</tr>
</tbody>
</table>

**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.

**M.A. Doctoral Track**

The M.A. Doctoral Track offers exceptionally well-qualified applicants the opportunity to gain admission to the master’s and doctoral programs simultaneously. This program is designed for students who would like to obtain their M.A. and then proceed directly to the Ph.D. program. Students accepted into the M.A Doctoral Track must fulfill all requirements for the M.A. and the Ph.D. and will earn both degrees. Students not accepted into the M.A. Doctoral Track may still be accepted into the M.A. only program.