Overview of the Major Tracks

(For forms, transfer policies, and advising details, see the Undergraduate Program main page.)

Mathematics belongs both to liberal arts and to sciences. It is not only the language of science (including social science), but also studied for its own beauty. It is therefore one of the most vital and lively subjects in the University curriculum.

The Undergraduate Program of the Department of Mathematics and Statistics include six major degree options in three major tracks.

The common preliminary lower-level courses required for all math major options are calculus I–III (Math 224/225, Math 226/227 or Math 230, and Math 323), linear algebra (Math 304), and number systems (Math 330). Read the Academic Guide for a very comprehensive and detailed official description about the coursework requirements for each of the six major degree options.

Mathematics Tracks (BA/BS)

The BA in Mathematical Sciences allows students to flexibly design a course of study that fits their individual interests, with options to emphasize either *breadth* or *depth*. Students are encouraged to gain experience in several areas of mathematics. Core areas include Analysis, Algebra, and Geometry/Topology. Additional areas include Actuarial Science, Statistics, Combinatorics, Computer Science, and related fields. Students must complete one upper-level course from each of the three core areas, plus two additional upper-level courses. To obtain a BA degree in mathematical sciences with the mathematics track, a student must complete a minimum of 40 credits of coursework.

The BS degree program is more intensive and provides excellent preparation for graduate study in mathematics and related disciplines. Students considering a BS degree should consult with their academic advisors as early as possible and plan their schedules carefully to meet the demanding requirements. To obtain a BS degree in mathematical sciences with the mathematics track, a student must complete a minimum of 64 credits of coursework

Data Science & Statistics Track (BA)

Data science and statistics focus on turning raw data into reliable insight and decisions in the presence of uncertainty. This field combines statistical modeling, computing, and domain knowledge, with

applications across the natural and social sciences, business, engineering, and the humanities.

The BA track in Data Science & Statistics is designed to provide a strong mathematical and statistical foundation together with modern data-science tools, while leaving room for a second major or minor. Students complete core coursework in calculus, linear algebra, probability, mathematical statistics, regression, and statistical learning, together with a computing-intensive course and a practical experience in data analysis (for example, an internship, research project, or consulting course).

This track works especially well in combination with majors such as computer science, biology, psychology, economics, finance, accounting, management, or other social and natural sciences. To obtain a BA degree in mathematical sciences with the Data Science & Statistics track, students must complete the required core and elective courses described in the University Bulletin and on the departmental planning sheets. Approximate number of credits is 52–56.

Data Science & Statistics Track (BS)

The BS track in Data Science & Statistics is a more intensive program aimed at students who want a deeper mathematical and computational background for graduate study or technically demanding careers in data science, statistics, or related fields.

In addition to the core courses shared with the BA track (calculus, linear algebra, probability, mathematical statistics, regression, statistical learning, and computing), BS students take further upper-level mathematics and statistics, such as real analysis, advanced linear algebra, optimization, stochastic processes, or related topics. They also complete additional advanced electives and a practical experience in data analysis.

Students considering the BS track are strongly encouraged to consult with their academic advisors early and to plan their schedules carefully to meet the more demanding requirements. To obtain a BS degree in mathematical sciences with the Data Science & Statistics track, students must complete all required core and elective coursework specified in the University Bulletin and departmental degree-planning materials. Approximate number of credits is 64–68.

Actuarial Tracks (BA/BS)

The Actuarial Science track is designed to prepare students for an actuarial career. Actuaries use probability models to quantify uncertainty and risk in business problems. They assemble and analyze data related to risks in order to answer questions such as how much to charge policyholders for auto, life, or health insurance, how to design retirement plans, and how to formulate investment strategies in light of future risks. They provide crucial evaluations of risk that inform their companies' strategic decisions.

Because of their central role in decision making, actuaries are well compensated; salaries offered to actuaries are **substantial**, and there is ample opportunity for advancement in the actuarial profession. Moreover, actuarial careers often lead to upper management and executive positions.

Refer to the **Math department section on actuarial sciences** for more detailed information.

Professional advancement results from passing a series of examinations administered by the actuarial societies and by completing specific courses approved by these societies.

To obtain a BA degree in mathematical sciences with an actuarial science track, a student must complete 52 credits of coursework, including 11 courses in Mathematical Sciences and 2 courses in Economics. The BS degree with an actuarial science track requires 76 credits of coursework, including 15 courses in Mathematical Sciences and 4 courses in Economics.

Future Career Paths

In the technology-oriented climate of today, mathematicians and statisticians have excellent employment opportunities. Our graduates are employed not only in mathematics teaching and research, and in the traditional fields of physics, chemistry, computer science, and engineering, but also, and increasingly, in business, economics, environmental sciences, geology, biology and the health sciences among others.

The following websites below provide some resources on the career perspective for math and stats graduates.

- What Do Mathematicians Do?
- What Do Statisticians Do?
- What Do Actuaries Do?

Mathematics Teachers

For students who are interested in becoming math teachers, Binghamton offers:

- An undergraduate minor in Education
- A Master of Arts in Teaching (MAT) in Mathematics Adolescent Education; Either the BA (Mathematics Track) or BS (Mathematics Track) is suitable for preparing this MAT program.
- Here is a list of recommended courses for future math teachers.