Mathematics

Mathematics is a tool for understanding our world and trying to solve its problems. Mathematical models are used in such diverse areas as determining the shape of aircraft’s wings for maximum lift, analyzing disease spread and control, and simulating network flows for efficient transportation systems. Mathematics also requires imagination, necessitating abstract and formalized thought on the one hand and creativity and intuition on the other. All people, in every trade and profession, use mathematics in their personal and professional lives. Thus, almost all university students will take formal courses to acquire the use of mathematical tools.

The mathematics major introduces students to the areas of real and complex analysis, number theory, abstract algebra, logic, and other fields. Mathematics study can be designed to support different career goals, such as employment in business and industry, preprofessional education, or preparation for graduate school.

Pursuing Mathematics at Ohio State
All high school students aspiring to college should take the strongest college preparatory program their school offers, including precalculus (analysis). They should also include Advanced Placement math courses if offered in their high school and take the Calculus Advanced Placement Examination, if possible. Note that while taking a probability and statistics class may be beneficial for natural science and social science classes in college, it does not maintain the algebraic skills necessary to pursue further study of mathematics and should not substitute for taking precalculus or AP calculus in the senior year of high school.

Students interested in mathematics as a major generally have an ACT Math score of at least 25, or an SAT Math score of at least 570. Students with less preparation are likely to require additional time to complete a major in mathematics.

Upon acceptance into the college, students may declare mathematics as a major. Students should then contact one of the mathematics advisors to map out an appropriate program of courses. The Department of Mathematics offers both the Bachelor of Science and the Bachelor of Arts.

Mathematics Requirements
The department offers six tracks: Theoretical Math, Math for Educators, Financial Math, Biomath, Applied Math and Honors Math. Students should discuss their long-term goals with their academic advisor to determine the best mathematics track for them.

For more information, check these websites:
Mathematics: math.osu.edu/undergraduate
College of Arts and Sciences: artsandsciences.osu.edu
Ohio State: osu.edu

Admissions: undergrad.osu.edu
Multicultural Center: multiculturalcenter.osu.edu

All tracks require the following courses:
• Calculus sequence (three semesters)
• Calculus-based Statistics
• Foundations of Higher Mathematics
• Linear Algebra
• Probability
• Math major seminar (required only for non-Honors)

In addition to the required courses, students must take other courses as appropriate for their selected track and long term goals. Courses might include:
• History of Mathematics
• Vector Analysis
• Complex Variables
• Partial Differential Equations
• Number Theory
• Geometry
• Discrete Mathematical Models
• Combinatorial Mathematics
• Calculus on Manifolds
• Real Analysis
• Abstract Algebra
• Numerical Analysis
• Introduction to Financial Math
• Beginning Scientific Computing
• Theory of Interest
• Dynamical Systems

Data Analysis Requirement
The Department of Mathematics requires Statistics 4201 or Math 4530 and Statistics 4202 to fulfill the General Education data analysis requirement.

Co-Curricular Opportunities
The Department of Mathematics has an active undergraduate math club, “Radical Pi,” which provides opportunities for students to interact with their peers as well as participate in presentations by faculty and graduate students on topics of interest to an undergraduate. A student chapter of SIAM (Society of Industrial and Applied Mathematics) reinforces interactions between mathematics and other scientific and technological communities through membership activities, publication of journals and books, and conferences.

In addition, the department provides two undergraduate research opportunities:

The Reading Classics Group provides undergraduates with the opportunity to work as part of a research team with other undergraduates/faculty students/faculty on exciting mathematics topics.

Mathematical Biosciences Institute* (MBI) provides undergraduates with a summer research opportunity interfacing with faculty and their peers on the intersection of mathematics and the biosciences. mbi.osu.edu

(*MBI is funded by the National Science Foundation.)
**Honors Program**

The Department of Mathematics offers many Honors courses which comprise a very challenging alternative for highly motivated students. This unified four-year program benefits students by introducing much more mathematical rigor and is especially valuable for students intending to pursue graduate studies in mathematics and other fields. These exceptional courses offer an undergraduate training in mathematics comparable to that at the best universities in the country. Students may be considered for graduation with distinction by completing selected graduate level course work or a research project under the mentorship of a faculty member.

**Career Prospects in Mathematics**

A bachelor’s degree in mathematics is designed to provide students with the analytical and logical training necessary for many diverse professions. These students find that their skills in quantitative reasoning are in demand in many careers and are needed for many different positions, very few of which have mathematics in the job title.

Approximately 50 percent of the mathematics specialists are employed in industry, with the federal government, and in public administration. The opportunities in industry for persons trained in mathematics are many and varied, including operations research, math modeling, actuarial science and data analysis. Computer programming generates a wealth of mathematical problems in logic, combinatorics, number theory, algebra, differential equations and numerical analysis.

Mathematics majors are commonly accepted into medical schools, law schools, and graduate programs in mathematics, physics, economics, business, education, statistics and computer science. Preparation in these graduate programs may lead to careers in academia or in the business, industry or government sectors.

In addition, students who combine an undergraduate degree in mathematics with graduate work in education qualify for teaching positions in high schools.

Beginning salaries for students with a bachelor’s degree in mathematics vary widely based on the candidate’s ability, performance and previous experience, as well as the particular industry, business or government organization in which the candidate is employed. Recent surveys indicate that average starting salaries range from $40,000 to $50,000 annually.

**Teaching Credentials**

Students interested in pursuing high school teaching as a career option need to complete an undergraduate degree in mathematics and then proceed to a master’s degree (MEd) in the College of Education and Human Ecology. Upon completion, students are licensed to teach. In general, students need a 3.0 or better cumulative grade point average, and a 2.7 or better in mathematics courses.

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**Curriculum Sample**

This is a sample list of classes a student will take to pursue the Theoretical Math or Math Education track. Since university students need more than specific education in a narrow field, they also will take classes to complete General Education (GE) requirements. Because GE courses come from a variety of academic areas of study, this course work helps students develop fundamental skills essential to collegiate success and allows them to tailor these courses toward their interests. Visit [math.osu.edu](http://math.osu.edu) for more information.

**Freshman Year:**
- Natural and Mathematical Sciences Survey 1
- Introductory Mathematical Seminar 1
- Freshman Seminar 1
- Calculus I and II 10
- First-Year English Composition (GE) 3
- Foreign language (GE) 8
- History sequence (GE) 6
- Social Sciences (GE) 3
**Total hours** 33

**Sophomore Year:**
- Calculus III 4
- Differential Equations and their Applications 3
- Foundations of Higher Mathematics 3
- Linear Algebra 3
- Foreign language (GE) 4
- Natural sciences (GE) 10
**Total hours** 27

**Junior Year:**
- Abstract Algebra I and II 6
- Math elective courses 6
- Arts and Humanities (GE) 3
- Natural science (GE) 10
- Second writing course (GE) 3
**Total hours** 28

**Senior Year:**
- Computer Science (recommended) 3
- Introduction to Real Analysis I and II 6
- Math elective courses 6
- Statistics and Probability 7–8
- Elective courses 5–6
**Total hours** 27–29

The department also offers a major in actuarial science and a minor in mathematics. The minor consists of the calculus sequence, a course on the foundations of higher mathematics, a post-calculus linear algebra course, and several upper-division elective courses.

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Revised October 2013. Information subject to change. For the most up-to-date information on the mathematics program, please visit [math.osu.edu](http://math.osu.edu).

**Contact Information:**

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