

DEPARTMENT OF MATHEMATICS

Graduate Study

The Mathematics Department offers programs covering a broad range of topics leading to the Doctor of Philosophy or Doctor of Science degree. Candidates are admitted to either the Pure or Applied Mathematics programs but are free to pursue interests in both groups. Of the roughly 120 doctoral students, about two thirds are in Pure Mathematics, one third in Applied Mathematics.

The programs in Pure and Applied Mathematics offer basic and advanced classes in analysis, algebra, geometry, Lie theory, logic, number theory, probability, statistics, topology, astrophysics, combinatorics, fluid dynamics, numerical analysis, theoretical physics, and the theory of computation. In addition, many mathematically oriented subjects are offered by other departments. Students in Applied Mathematics are especially encouraged to take subjects in engineering and scientific subjects related to their research.

All students pursue research under the supervision of the faculty and are encouraged to take advantage of the many seminars and colloquia at MIT and in the Boston area.

Doctor of Philosophy or Doctor of Science

The requirements for the Doctor of Philosophy or Doctor of Science in Mathematics (<https://catalog.mit.edu/degree-charts/phd-mathematics>) degree include completion of a minimum of 96 units (8 graduate subjects), an oral qualifying exam, experience in classroom teaching, a thesis proposal, and a thesis containing original research in mathematics. Additional detail about these requirements can be found on the department's website (<http://math.mit.edu/academics/grad/timeline>).

All students pursue research under the supervision of the faculty (<https://math.mit.edu/directory/faculty>). With the assistance of their faculty advisor, each student follows an individualized program of study encompassing the student's area of interest. Faculty advisors may be members of the Mathematics Department or other MIT departments. Students also are encouraged to take advantage of the many seminars and colloquia (<https://math.mit.edu/news/seminars>) at MIT and in the Boston area.

Students typically receive their degree in five years. The first two years are spent in coursework and research, culminating in an oral examination, which must be attempted by the end of their third term and completed by the end of the second year. Following the oral examination and culmination of their research, the student forms a thesis committee. The thesis committee includes the faculty advisor and at least three other faculty members. The student defends their thesis in a public defense. The thesis must meet high

professional standards and make a significant original contribution to the student's chosen research area.

Coursework must be completed with grades of A or B, and students are expected to maintain at least a B+ average in each semester. At most, one of the eight subjects should be a reading course. Harvard math graduate subjects may occasionally be used if taken for credit. With prior approval of the Graduate Co-chairs, one relevant advanced undergraduate math subject and relevant graduate subjects from other departments may be used. Note that subjects taken under the graduate P/D/F option cannot be used to fulfill this requirement. Students in Applied Mathematics must satisfy an additional breadth requirement (<https://math.mit.edu/academics/grad/timeline/plan.html>) as part of their plan of study.

Teaching is an important part of the academic profession and provides excellent experience in public presentation skills. All graduate students are required to complete at least one semester of classroom teaching as part of their graduate training and are encouraged to do more.

Interdisciplinary Programs

Computational Science and Engineering

Students with primary interest in computational science may also consider applying to the interdisciplinary Computational Science and Engineering (CSE) program, with which the Mathematics Department is affiliated. For more information, see the CSE website (<http://cse.mit.edu/programs>).

Mathematics and Statistics

The Interdisciplinary Doctoral Program in Statistics provides training in statistics, including classical statistics and probability as well as computation and data analysis, to students who wish to integrate these valuable skills into their primary academic program. The program is administered jointly by the departments of Aeronautics and Astronautics, Economics, Mathematics, Mechanical Engineering, Physics, and Political Science, and the Statistics and Data Science Center within the Institute for Data, Systems, and Society. It is open to current doctoral students in participating departments. For more information, including department-specific requirements, see the full program description (<https://catalog.mit.edu/interdisciplinary/graduate-programs/phd-statistics>) under Interdisciplinary Graduate Programs.

Financial Support

Financial support is guaranteed for up to five years to students making satisfactory academic progress. Financial aid after the first year is usually in the form of a teaching or research assistantship.

Inquiries

For further information, see the department's website (<http://math.mit.edu/academics/grad>) or contact Math Academic Services, 617-253-2416.