

MATHEMATICS

THE WIESS SCHOOL OF NATURAL SCIENCES

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DEGREES OFFERED: BA, MA, PHD

Mathematics lies at the foundation of many disciplines in the sciences, engineering fields, and the social sciences, and this influence is growing as these subjects become increasingly quantitative. Recognizing this important role in the wide variety of directions available to our degree recipients, the program in mathematics provides undergraduates with a spectrum of choices. These range from nontheoretical treatments of calculus and courses in combinatorics, elementary number theory, and projective geometry to a broad variety of sophisticated mathematics, including real and complex analysis, differential geometry, abstract algebra, algebraic and geometric topology, algebraic geometry, dynamics, and partial differential equations.

Faculty research interests range from differential geometry, ergodic theory, group representations, partial differential equations, and probability to real analysis, mathematical physics, complex variables, algebraic geometry, combinatorics, geometric topology, algebraic topology, and dynamics.

DEGREE REQUIREMENTS FOR BA IN MATHEMATICS

For general university requirements, see Graduation Requirements (Undergraduate Students section, pages 2–5). Students majoring in mathematics may choose between the regular math major and the double major. Regular math majors must complete:

- MATH 101 and 102 *Single Variable Calculus I and II*
- MATH 211 *Ordinary Differential Equations and Linear Algebra* and MATH 212 *Multivariable Calculus* or MATH 221 and 222 *Honors Calculus III and IV*

- At least 24 semester hours (eight courses) in departmental courses at the 300 level or above (in many instances, the math department will waive the 100- and 200-level courses for a math major)

The requirements for the double major are the same except that students may substitute approved mathematics-related courses for up to nine of the 24 hours required at the 300 level or above.

Students receive advanced placement credit for MATH 101 by achieving a score of four or five on the AP AB-level test and for MATH 101 and 102 by achieving a score of four or five on the BC-level test. Students who have had calculus but have not taken the AP test may petition the department for a waiver of the calculus requirements. Entering students should enroll in the most advanced course commensurate with their background; advice is available from the mathematics faculty during Orientation Week and at other times.

DEGREE REQUIREMENTS FOR MA AND PHD IN MATHEMATICS

Admission to graduate study in mathematics is granted to a limited number of students who have indicated an ability for advanced and original work. Normally, students take one or two years after the BA degree to obtain an MA degree, and they take four or five years to obtain a PhD. An MA is not a prerequisite for the PhD. For general university requirements, see Graduate Degrees (Graduate Students section, pages 3–4).

A number of graduate scholarships and fellowships are available, awarded on the basis of merit. As part of the graduate education in mathematics, students also engage in teaching or other instructional duties, generally for no more than six hours a week.

For courses carrying dual undergraduate and graduate numbers, (e.g., MATH 463/563), the 500-level version is intended to prepare students for advanced work in mathematics. In particular, written assignments should be prepared to high professional standards, typically using LaTeX or other mathematical typesetting software. Mathematics graduate students should enroll in the 500-level version.

For general university requirements, see Graduate Degrees (Graduate Students section, pages 3–4).

MA Program—Candidates for the MA in mathematics must:

- Complete with a grade of B or better a course of study approved by the department. (Students may transfer credits from another university only with the approval of both the department and the University Graduate Council.)
- Perform satisfactorily on the general examinations in algebra, analysis, and topology or prepare and present an oral defense of an original thesis acceptable to the department

PhD Program—Candidates for the PhD in mathematics must:

- Complete with a grade of B or better a course of study approved by the department (students may transfer credits from another university only with the approval of both the department and the University Graduate Council)
- Perform satisfactorily on qualifying examinations (see below)
- Perform satisfactorily on examinations in one approved foreign language (French, German, or Russian)

- Write an original thesis acceptable to the department
- Perform satisfactorily on a final oral examination on the thesis

Qualifying Examinations—The qualifying examinations in mathematics consist of the general examinations and the advanced oral examination.

To complete the **general examinations**, students must take exams, one each in algebra, analysis, and topology. Exams are offered every August, January, and May. First-year students may take any combination of exams at any time. After two semesters of study, students must attempt to pass all remaining exams at each offering. Students must perform satisfactorily on all three by the May exams at the end of their fourth semester. The judgment of satisfactory performance on the general examinations for either the MA or PhD degree is the responsibility of the department graduate committee. Students may take an exam several times.

To complete the **advanced oral examination**, students must select a special field (e.g., homotopy theory, several complex variables, or group theory) and submit it to the department graduate committee for approval. The committee schedules an advanced examination in the selected field, normally six to nine months after the student completes the general examinations. While students failing the advanced examination may, with the approval of the committee, retake it on the same or possibly on a different topic, they generally are not allowed to take the advanced examination more than twice.

See MATH in the Courses of Instruction section.