

# Mathematics

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## The Wiess School of Natural Sciences

### Chair

Robin Forman

### Professors

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 Tim D. Cochran  
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 Brendan Hassett  
 John Hempel  
 Frank Jones  
 John C. Polking  
 Stephen W. Semmes

Richard A. Stong

William A. Veech

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### Associate Professor

Zhiyong Gao

### Instructors

Stanley Chang

Richard Evans

Joseph Masters

*Degrees Offered: B.A., M.A., Ph.D.*

The program in mathematics provides undergraduates with a spectrum of choices, from nontheoretical treatments of calculus and courses in modern algebra, elementary number theory, and projective geometry to a broad variety of sophisticated mathematics. These include real and complex analysis, differential geometry, abstract algebra, algebraic and geometric topology, algebraic geometry, and partial differential equations.

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

### Degree Requirements for B.A. in Mathematics

For general university requirements, see Graduation Requirements (pages 16–18). 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 (8 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 9 of the 24 hours required at the 300 level or above.

Students receive advanced placement credit for MATH 101 by achieving a score of 4 or 5 on the AP AB-level test and for MATH 101 and 102 by achieving a score of 4 or 5 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.

## Degree Requirements for M.A. and Ph.D. 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 B.A. degree to obtain an M.A. degree, and they take four or five years to obtain a Ph.D. An M.A. is not a prerequisite for the Ph.D. For general university requirements, see Graduate Degrees (pages 60–65).

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 6 hours a week.

**M.A. Program.** Candidates for the M.A. 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 an examination in at least 1 approved foreign language (French, German, or Russian)
- Either complete all requirements for qualification as a candidate for the Ph.D. (see below) or present, and provide an oral defense of, an original thesis acceptable to the department

**Ph.D. Program.** Candidates for the Ph.D. 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 both qualifying examinations (see below)
- Perform satisfactorily on examinations in 2 approved foreign languages (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 3 exams, 1 each in algebra, analysis, and topology. Exams are offered every August and January. 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 3 by the start of their fifth semester. 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 (pages 428–431) in the Courses of Instruction section.**