

# MATHEMATICS, PHD

**Banner Code:** SC-PHD-MATH

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Website: [science.gmu.edu/academics/departments-units/mathematical-sciences/mathematics-phd](http://science.gmu.edu/academics/departments-units/mathematical-sciences/mathematics-phd)

The doctoral program provides exciting opportunities for students interested in studying advanced mathematics and conducting independent research.

This program begins with graduate coursework and advanced seminars and culminates in a dissertation consisting of original research in mathematics. The PhD is designed to train students as research mathematicians for careers in academia, government, and private industry.

## Fellowships and Assistantships

The Department of Mathematical Sciences (<http://catalog.gmu.edu/colleges-schools/science/mathematical-sciences/>) offers a limited number of merit-based teaching assistantships. Other sources of support, such as research fellowships and assistantships, are available as funding permits. Graduate students also have the opportunity to work in the Math Tutoring Center (<http://math.gmu.edu/tutor-center.php>).

## Admissions & Policies

### Admissions

University-wide admissions policies can be found in the Graduate Admissions Policies (<http://catalog.gmu.edu/admissions/graduate-policies/>) section of this catalog.

To apply for this program, please complete the George Mason University Admissions Application (<https://www2.gmu.edu/admissions-aid/apply-now/>).

### Eligibility

It is expected that all applicants have a recent bachelor's degree in mathematics or an equivalent amount of undergraduate mathematics preparation, with a GPA of at least 3.00 in their last 60 credits of study. Students without this background who have had an upper-division course in linear algebra (equivalent to MATH 322 Advanced Linear Algebra), an upper-division course in advanced calculus (equivalent to MATH 315 Advanced Calculus I), and an upper-division course in group theory (equivalent to MATH 321 Abstract Algebra) are encouraged to apply to the Mathematics, MS (<http://catalog.gmu.edu/colleges-schools/science/mathematical-sciences/mathematics-ms/>). Such students may subsequently apply to the PhD when all background issues have been addressed. It is recommended that all applicants have some familiarity with mathematical software.

### Application Requirements

To apply, prospective students should provide the completed George Mason University Admissions Application (<https://www2.gmu.edu/admissions-aid/apply-now/>), two copies of official transcripts from each college and graduate institution attended, three letters of recommendation, and a goals statement. GRE scores are not required.

TOEFL scores are required for all international applicants; find additional information in the Admission of International Students (<http://catalog.gmu.edu/admissions/international-students/#text>) section of this catalog.

## Policies

For policies governing all graduate programs, see AP6 Graduate Policies (<http://catalog.gmu.edu/policies/academic/graduate-policies/>).

### Reduction of Credits

For students entering the doctoral program with a master's degree in a related field from an institution of higher education accredited by a Mason-recognized U.S. institutional accrediting agency or international equivalent, the number of required credits may be reduced up to 30 credits, subject to approval of the program faculty and the college's associate dean for student affairs. See AP6.5.2 Reduction of Credits (<http://catalog.gmu.edu/policies/academic/graduate-policies/#ap-6-5-2>) for more information.

### Transfer of Credit

Graduate mathematics courses taken elsewhere without being applied to degree conferral may be counted toward the degree as transfer credit. See AP 6.5.3 Transfer of Credit (<http://catalog.gmu.edu/policies/academic/graduate-policies/#ap-6-5-3>) for additional information.

## Requirements

### Degree Requirements

Total credits: 72

Students should refer to the Admissions & Policies tab for specific policies related to this program.

### Core Courses

Students must earn a grade of 'B' or better in each core course that counts toward the core requirement.

Code	Title	Credits
MATH 675	Linear Analysis	3
Select any three of the following:		9
MATH 621	Algebra I	
MATH 631	Topology I: Topology of Metric Spaces	
MATH 677	Ordinary Differential Equations	
MATH 685	Numerical Analysis	

Total Credits 12

### Preliminary Written Exam

Students are required to pass three preliminary written exams and complete four core courses by the end of their second year. Preliminary exams are offered twice a year and students may take each exam up to three times.

### Dissertation Advisor and Examination Committee

After passing the preliminary written exams, the student chooses a dissertation advisor and a three person examination committee. In

consultation with the advisor and committee, the student chooses a major and a minor area of study (the major and minor areas are presumed to be in two different branches of mathematics).

## Seminar

Code	Title	Credits
Students must register for a 1 credit seminar each semester until they advance to candidacy or have acquired at least 6 credits <sup>1</sup>		6
MATH 795	Graduate Seminar	
Total Credits		9

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A student entering without a master's degree in mathematics should expect to take a total of 6 to 9 credits of MATH 795 Graduate Seminar.

## Electives

Code	Title	Credits
Students complete 27-42 credits of approved MATH electives ( <a href="http://catalog.gmu.edu/courses/math/">http://catalog.gmu.edu/courses/math/</a> ) <sup>1</sup>		27-42
Total Credits		27-42

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Courses not designated as MATH courses must be approved by the graduate committee.

Classes at the 500 level, MATH 600 Special Topics in Mathematics - MATH 614 Rational Numbers and Proportional Reasoning for K-8 Teachers, and actuarial classes MATH 653 Construction and Evaluation of Actuarial Models I, MATH 654 Construction and Evaluation of Actuarial Models II and MATH 655 Pension Valuation cannot be used for credit.

## Qualifying Examinations

Students are required to take a qualifying exam after passing the preliminary written exams. The qualifying exam may have oral and written components. In consultation with the advisor and committee, the student chooses a major and a minor area of study (the major and minor areas are presumed to be in two different branches of mathematics). The qualifying exam typically covers the equivalent of approximately four courses of material from the major area and three courses from the minor area.

## Dissertation Proposal and Advancement to Candidacy

After passing the qualifying exam, each doctoral student prepares a written dissertation proposal while taking MATH 998 Doctoral Dissertation Proposal. The proposal must be approved by the dissertation committee, which consists of the three qualifying exam committee members, plus a fourth member from outside the Department of Mathematical Sciences (<http://catalog.gmu.edu/colleges-schools/science/mathematical-sciences/>). After successfully completing this requirement, the student advances to doctoral candidacy.

## Dissertation Research

Code	Title	Credits
Select 12-24 credits from the following:		12-24
MATH 998	Doctoral Dissertation Proposal	
MATH 999	Doctoral Dissertation	
Total Credits		12-24

## Doctoral Dissertation

After advancing to candidacy, the student will work on a doctoral dissertation while enrolled in MATH 999 Doctoral Dissertation. The dissertation is a written piece of original mathematics that demonstrates a doctoral candidate's mastery of the subject matter. A student is expected to produce new and original research worthy of publication in a peer-reviewed journal. After the dissertation is completed, the committee will review the dissertation and examine the student in a public oral thesis defense.