Mathematics PhD

COLLEGE OF SCIENCE AND TECHNOLOGY

Learn more about the Doctor of Philosophy in Mathematics.

About the Program

The PhD program in Mathematics prepares students for careers that depend on advanced mathematics. These include broad directions such as advanced research and development, education, government, industry and national laboratories. For new students, the program offers a repertoire of coursework and research opportunities that eases the transition from undergraduate to advanced graduate studies. Courses provide a sound mathematical background while helping beginning students to mature mathematically. Naturally, individuals with enough maturity and knowledge need not take these more basic courses.

In the Mathematics Department, our philosophy is to participate actively in our students' development as future professionals whose work involves advanced mathematics. We take pride in caring for our students. Our faculty are accessible and willing to talk mathematics with any inquiring student. It is this attitude that most distinguishes our program from other mathematics graduate programs. While requiring excellence, we work hard at providing the environment to achieve it.

Time Limit for Degree Completion: 7 years

Campus Location: Main

Full-Time/Part-Time Status: Students complete the degree program through classes offered before 4:30 p.m. The degree program can be completed on a full- or part-time basis.

Interdisciplinary Study: The program encourages interdisciplinary coursework, research and interactions among faculty and students with interest in computer and information sciences, physical and life sciences, statistics and engineering.

Affiliation(s): The Mathematics program at Temple University is affiliated with the American Mathematical Society and the Mathematical Association of America.

Study Abroad: Department faculty are active internationally and sometimes travel overseas for conferences and extended research visits. In some cases, students may participate in these activities.

Ranking: The PhD program is designed to provide opportunities for education and research that are commensurate with national standards. Faculty are active in professional meetings and initiatives organized by the American Mathematical Society and the Mathematical Association of America.

Accreditation: This program adheres to accepted professional standards of mathematics education and research.

Areas of Specialization: The department offers a great variety of choices for areas of specialization, with a strong research presence in the following areas:

- Algebra
- Algebraic and analytic number theory
- Combinatorics
- Computational mathematics
- Differential and computational geometry and topology
- Global geometry
- Harmonic analysis
- Mathematical physics
- Mathematics of materials
- Numerical analysis
- Partial differential equations
- Related probability and mathematical statistics
- Several complex variables

Both prospective and matriculated students are encouraged to browse faculty webpages and contact faculty directly for more detailed information regarding areas of specialization and opportunities for further research.

Job Prospects: Graduates either continue advanced educational programs or pursue employment in industry, education, or government laboratories and agencies.

Non-Matriculated Student Policy: Non-matriculated students must coordinate coursework with the Graduate Chair.

Financing Opportunities: Teaching Assistants teach basic undergraduate mathematics courses, ranging from remedial courses through calculus. The standard teaching load is 20 hours per term. In determining the load, credit is given for more difficult and challenging teaching assignments. Research Assistantships are sometimes available, typically through special projects and grants. Support generally includes a stipend and tuition of up to 9 credits per term.

Admission Requirements and Deadlines

Application Deadline:

Fall: December 15

For full consideration, applications must be submitted by the deadline. Late applications may be considered on a case-by-case basis.

APPLY ONLINE to this graduate program.

Letters of Reference:
Number Required: 3

From Whom: Letters of recommendation should be obtained from individuals who are well acquainted with the applicant's abilities and achievements in mathematics and related areas, particularly former instructors of mathematics courses and projects. Letters from instructors in related areas such as computation or the physical and life sciences are also appropriate. In certain cases, letters from employment supervisors or project leaders may be appropriate as well.

Coursework Required for Admission Consideration: Applicants must have completed fundamental undergraduate mathematics courses. Prospective students are encouraged to contact the department to discuss their background.

Master's Degree in Discipline/Related Discipline: A master's degree is not required.

Bachelor's Degree in Discipline/Related Discipline: All applicants must hold a baccalaureate degree from an accredited college or university.

Statement of Goals: In 500 to 1,000 words, please describe your academic journey and your educational goals at Temple University. In prior years, successful applications have included discussion of the following topics:

- Motivation for pursuing graduate work in mathematics;
- Prior experience in research and/or rigorous self-study;
- Career goals; and
- How one sees themself fitting into the research profile of the department.

Feel free to add any additional information that might not be fully explained in other parts of your application.

Standardized Test Scores:
GRE General Test or GRE Subject Test in Mathematics: The GRE General Test is not required and will not be considered. The GRE Subject Test in Mathematics is optional.

Applicants who earned their baccalaureate degree from an institution where the language of instruction was other than English, with the exception of those who subsequently earned a master's degree at a U.S. institution, must report scores for a standardized test of English that meet these minimums:

- TOEFL iBT: 79
- IELTS Academic: 6.5
- PTE Academic: 53
- Duolingo: 110

Test Waivers: An applicant who wishes to have certain admission requirements waived must contact the department directly. Requests are considered by the department on a case-by-case basis. In some cases, an additional appeal to the Graduate School may be required. In such a case, the department makes a preliminary determination for the applicant and, if positive, issues a supporting letter to the Graduate School on the applicant's behalf.

Resume: Current resume required.

Advanced Standing: Students who have taken graduate courses at other institutions or at Temple University prior to matriculation may apply for advanced standing credit. All applications for advanced standing credit are reviewed by the Graduate Committee, which has the option to deny credit if the courses involved are deemed substantially inferior to similar courses offered by the Department of Mathematics. The credits must be equivalent to coursework offered at Temple, with a grade of "B" or better having been earned in the course(s). No course completed more than five years before the date of application will be awarded credit, nor will courses substantially similar to courses taken since matriculation earn advanced standing credit.

Advanced standing credit is only available for graduate-level courses in mathematics or those in related fields that have a substantial mathematical content. Applications for advanced standing credit are not considered until the student has completed at least three graduate courses totaling at least 9 credits. The maximum number of advanced standing credits awarded is 30.

Program Requirements

General Program Requirements:
Number of Credits Required Beyond the Baccalaureate: 54

Required Courses:

First-year PhD students are required to take the following one-credit courses:

Code	Title	Credit Hours
MATH 8981	Graduate Development Seminar	1
MATH 8985	Teaching in Higher Education	1

Students in the first three years of study are also required to take 13 *standard graduate courses*. Here, a *standard graduate course* is defined to be any 3-credit Mathematics course numbered 5000 or higher, except for courses cross-listed at the undergraduate level, independent studies (9082), and research courses (999x). Students are required to complete:

- At least 5 standard graduate courses by the end of the second semester of studies,
- At least 10 standard graduate courses by the end of the fourth semester of studies,
- At least 13 standard graduate courses by the end of the sixth semester of studies.

These courses should be selected with the advice of the student's Faculty Oversight Committee, the Graduate Chair, and the student's faculty advisor (once selected).

Exceptions to the above timeline can be granted by the Graduate Committee at its discretion. In cases where a student is not sufficiently prepared to take standard graduate courses, the Graduate Committee may extend the timeline described above. In cases where a student arrives exceptionally well prepared for research, some of the courses in the coursework requirement may be satisfied through transfer credit and/or advanced standing. In all cases, it is understood that exceptions should be rare.

After completing the above coursework, students are required to take six additional credit hours of research courses, as follows:

Code	Title	Credit Hours
MATH 9994	Preliminary Examination Preparation	1-6
MATH 9998	Pre-Dissertation Research / Elevation to Candidacy	1-6
MATH 9999	Dissertation Research	2 minimum

Culminating Events:

Written Qualifying Examination:
The PhD Qualifying Examination (Comprehensive Examination) is a written exam comprised of two separate sections selected from the following areas:

- Algebra (Math 8011-8012)
- Numerical Analysis (Math 5043-44)
- Geometry and Topology (Math 8061-62)
- Real Analysis (Math 8041-42)

Students can choose any two of these sections for their examination. After exams in two different topics have been attempted, an exam in a third topic can only be taken under exceptional circumstances, and only after specific approval by the Graduate Committee. Each section is a three-hour test based primarily on the corresponding year-long graduate course sequence. The separate section tests are given on different days, during a one-week period, twice a year: once in August just before the beginning of the Fall term, and once in January just before the beginning of the Spring term. Students do not have to take both of the section tests during the same one-week period. Each section test may be repeated once to obtain a higher grade.

Each of the three-hour section tests is further divided into two parts. Part I contains four questions, of which the student is asked to answer three. These questions are designed to test mastery of the facts of the subject. Part II contains three questions, of which two are to be answered. These questions test the ability to solve in-depth problems in the subject.

Students should begin taking the components of the Qualifying Exam as soon as possible after finishing the corresponding coursework. Students are expected to complete and pass the Qualifying Examination by August of their second year of study, and are required to pass it no later than the January of their third year of study. Students not making good progress toward completing and passing their Qualifying Examination in a timely fashion will be asked to leave the PhD program.

Incoming students may, with approval of the Graduate Chair, take one or two of the written PhD Qualifying Examination sections once prior to their first term of enrollment. Upon request by the student, any of these pre-enrollment attempts can be removed from the student's record.

Each section is graded independently by two faculty members, using a scale of 0 to 100, with each problem worth 20 points. The grades are compared and reconciled at the level of individual problems. A written account of the grading is returned to the student.

An average score of 75 points per section is required to pass. If a student falls slightly short of this standard, the Graduate Committee may, at its discretion, recommend a grade of pass based on the whole of the student's academic record.

A student who achieves an average score of at least 55 on the two sections of the PhD Qualifying Examination, with no individual section score below 30, has obtained a Master's pass on the examination and has fulfilled the examination requirement for the MS degree. If one of the individual section scores falls below 30 points, that exam may be repeated once, or the exam in a different topic may be attempted once. Such arrangements are subject to approval by the Graduate Committee, based on the student's entire academic record.

Preliminary Examination:
The preliminary examination is a two-hour oral exam. It should be taken by the end of the sixth term and must be passed by the end of the seventh term. The PhD preliminary examination can be repeated, in whole or in part, only once. No student is permitted to take the preliminary examination before passing the written PhD Comprehensive Examination and satisfying the foreign language requirement.

The student chooses a chief examiner with the advice and consent of the Mathematics Graduate Committee and with the consent of the proposed chief examiner. The chief examiner, in accepting their assignment, implicitly offers to be the student's dissertation supervisor if the examination is passed. Approximately one-half of the preliminary examination is conducted by the chief examiner, who asks questions in the area that the student has chosen as a specialty. The other half of the examination is devoted to questions asked by other faculty members on two or more elementary topics related to the area of specialization. The exact description of the elementary topics to be included in the examination is determined by the chief examiner, who is also responsible for assigning examiners to cover the topics. The examination committee consists of the chief examiner, the examiners for the elementary topics, and any other faculty who choose to attend. All faculty in attendance may vote on the outcome of the examination. The examination is considered passed if the chief examiner and at least one-half of the other faculty present vote in favor of passing.

Students who are preparing to write their preliminary examination should confirm a time and date with the chair of their Doctoral Advisory Committee and register with the department. The student and chair receive confirmation of the time, date, room and proctor for the examination.

Dissertation:
The candidate's dissertation must be a distinctive and original contribution to research in mathematics. It must be an individual work, with only one author. Previously published work by the candidate may be included, if it represents research done while the student was enrolled in the PhD program in Mathematics at Temple University and was not used to obtain any other degree. Joint work that cannot be attributed to the candidate alone must not be included in the body of the dissertation, but may be attached as an appendix. All previously published work must be logically connected and integrated into the dissertation, with a common introduction, conclusion and bibliography. Existing copyrights must not be violated.

Preparation of the dissertation is supervised by the student's Doctoral Advisory Committee (DAC). This committee must include at least three Temple graduate faculty, two of whom must be in the Mathematics Department. The chair of the committee must be a member of the Temple University Mathematics Department. The DAC may include members of other Temple University departments. It is also possible for faculty from other universities or expert advisors employed in non-university settings to be included in the DAC.

The first step in preparing the dissertation is to write a dissertation proposal, which must be approved by the candidate's DAC. The proposal is kept on file, and if it becomes necessary to alter the proposal, the changes should be approved by the DAC and filed with the proposal.

The dissertation defense may be attended by faculty and graduate students from Temple University or other institutions, as well as mathematicians or scientists employed in a non-academic setting. The candidate's Dissertation Examining Committee (DEC) must attend the defense. This committee includes the candidate's DAC and at least one additional member, who must be faculty of some Temple University department other than Mathematics or faculty at another university. The DEC meets at the conclusion of the dissertation defense and decides, by majority vote, if the candidate was successful.

If a student needs to change a member of a committee, the new member must be approved by the Mathematics Graduate Committee and registered with the department and the Graduate School.

When the dissertation is deemed complete by the candidate and the DAC, a defense is scheduled. Students who are preparing to defend their dissertation should confirm a date and time with their DAC and register with the department at least 20 days before the defense is to be scheduled. The Graduate Chair arranges the date, time and room. The appropriate forms are forwarded to the student.

This dissertation defense must be announced in writing at least 10 days in advance of its occurrence. Copies of the announcement must be directed to each member of the candidate's DEC, each faculty member of the Mathematics Department, the Dean of the College of Science and Technology, and the Graduate School. Copies of the announcement are to be posted at the Department Office, the College Office, and on the Graduate School website.

Contacts

Program Web Address:

https://www.temple.edu/academics/degree-programs/mathematics-phd-st-math-phd

Department Information:

Dept. of Mathematics
638 Wachman Hall
1805 N. Broad Street
Philadelphia, PA 19122-6094
grad.math@temple.edu
215-204-3928

Submission Address for Application Materials:

https://cst.temple.edu/academics/graduate-programs/apply-now

Department Contacts:

Graduate Chairperson:
David Futer, PhD
dfuter@temple.edu
215-204-7854

Department Chairperson:
Brian Rider, PhD
brian.rider@temple.edu
215-204-7589