

THE GRADUATE PROGRAM

GENERAL INFORMATION

It is the student's responsibility to be familiar with the requirements and policies of the University and the Department, as stated in the Graduate School Bulletin and these **Axioms** respectively. If a student is in doubt about the application of these policies to his or her own case, the matter should be brought to the attention of the student's academic advisor, the Graduate Program Director, or the Graduate Affairs Committee.

The student should be aware of the general structure of the program as explained below, including the required coursework and the system of written qualifying examinations (Basic and Advanced). It is the student's responsibility to initiate each step in his or her degree program. Students must also be aware of the statute of limitations, as explained below and in the Graduate School Bulletin.

Degree Options

The Department of Mathematics and Statistics offers a PhD program in Mathematics and Statistics and MS programs in Applied Mathematics and Statistics. It also grants an MS degree in Mathematics but this is usually a step towards the PhD degree. Both MS programs involve taking coursework, passing two Basic Exams, and completing a project, usually involving some computation — see the section on degree requirements below for more details. Note that neither of the MS programs are primarily meant as preparation for a PhD program; a student who wishes to do a PhD after an MS in applied mathematics or statistics must apply and be accepted to the PhD program like any other student.

There are two options at the Ph.D. level: Mathematics and Statistics. While there is no formal option in Applied Mathematics at the Ph.D. level, there are enough courses and interested faculty to enable a student to design a program with a strongly applied emphasis. This is especially appropriate for students who expect to seek non-academic employment, but may also be suitable for those interested in teaching.

A student who wishes to transfer from one degree option to another (for example, from the Ph.D. track to a terminal M.S. track) should notify the Graduate Program Director as early as possible. Such a transfer requires the approval of the Graduate Admissions Committee, just as in the case of a new applicant, and will usually involve adjustments in the amount and/or duration of financial support.

Statute of Limitations

This is the maximum time allowed for completion of a degree. A Ph.D. student has six calendar years from acceptance into the graduate program, and a Master's student four calendar years, to earn the degree. In exceptional circumstances, these limits may be extended with the approval of the Dean of the Graduate School.

Starting with the class of 2009, all Ph.D. students must

- Choose an official thesis advisor (and notify the GPD about the choice) within one year after the completion of all advanced exam requirements, or the start of the sixth semester, whichever comes last.
- Form a thesis committee and submit a thesis proposal (prospectus) to the Graduate School within 18 months after the completion of all advanced exam requirements, or the start of the seventh semester, whichever comes last.
- If a student fails to satisfy either one of these conditions, at the discretion of the Graduate Affairs Committee (GAC) the student could be granted an extra semester to satisfy these requirements.
- If a student fails to satisfy these requirements within the prescribed time period, the GAC in conjunction with the department chair will review the student's status and future financial support.

Spring Semester Admissions

Occasionally, students may be accepted into the graduate program beginning in the Spring Semester. Normally, time limits for passing the qualifying exams and limits on financial support will be applied as if the student had entered the program in the previous Fall Semester.

Graduate Affairs Committee

This committee (called the GAC for short) oversees the graduate program, dealing with general policies as well as individual student problems. It is chaired by the Graduate Program Director, and consists of 3 or 4 faculty members together with a graduate student representative.

Academic Advisors

The Graduate Program Director coordinates the academic advising of students. New students are assigned to one of several faculty advisors, depending on the student's expressed interests. After the first year, the student may continue to consult with this advisor or may negotiate with another faculty member to serve as his or her Academic Advisor. (The GPD must be notified of any change.) Once the student has chosen a Thesis Advisor, he or she would also serve as the Academic Advisor.

The role of the Academic Advisor is to guide the student through the maze of degree requirements, to help the student organize a reasonable program of courses, and to provide some career guidance. During each semester (November or April) there is a Counseling Week, when students must consult with their Academic Advisors in order to preregister for the following semester. But students should seek advice from their Academic Advisors and other faculty members whenever a problem arises (or even before it arises). Ultimately, of course, it is the student's own responsibility to meet the requirements of the graduate program.

Doctoral students who have completed their Basic and Advanced Exams are encouraged to choose a Dissertation Advisor and to form their Dissertation Committee as soon as possible. They will guide the student and recommend additional courses or areas of study.

Other kinds of advice are also offered to newer students: New students are paired with older students who act as Peer Advisors. Advanced students conduct review sessions in the weeks prior to the August and January Basic and Advanced Exams.

Appointment and Reappointment Procedures

Every year the department admits 8 to 12 new PhD students and 8 to 10 MS students but the number may vary appreciably according to the applicant pool and the availability of funds. With few exceptions, successful applicants into the PhD or MS programs are offered Teaching Assistantships. New TAs are chosen by the Graduate Admissions Committee. After the February 1 deadline for applying, committee members rate each of the applicants on the basis of their transcripts, personal essays, letters of recommendation, and experience. Those applicants whom the committee decides to accept are then sent letters of acceptance and are given until April 15 to decide. If by April 15 not all available TA positions have been filled, then additional applicants whom the committee decides to accept are notified by telephone,

email, and letter. The department is committed to the development of a diverse graduate student body and makes every effort to recruit women and members of underrepresented groups in the Mathematical Sciences.

Early in the spring semester, each eligible student is asked to indicate whether he or she wishes to be considered for reappointment. Decisions concerning the reappointment of Teaching Assistants will be made by the Graduate Program Director and the faculty members of the GAC in consultation with the Department Head and the Chairperson of the Graduate Admissions Committee. TAs who receive reappointment will be notified in writing by the Department Head in late March or early April.

Teaching assistants whose teaching is satisfactory and who are making satisfactory progress toward their degree, as defined below, can expect that their assistantship will be renewed for the normal period of residence. The normal period of residence of an MS student is two years, for a PhD student with a previous MS degree in a related area is four years, and for PhD students with no previous MS degree is five years.

Satisfactory progress toward the degree

The progress toward the degree is measured differently depending on whether the student is a PhD or an MS student and the number of years the student has spent in the program.

The academic progress of first-year students in either the PhD or MS program is measured by their performance in Fall semester courses and the evaluations from their instructors. If this performance is unsatisfactory (e.g. the student's grade point average is below B, or the student has not taken at least two courses in the Department), the GAC may decide to delay a decision on reappointment until after receiving mid-semester reports from the courses the student is taking in the Spring semester.

Second-year PhD students are expected to have attempted three Basic Exams by August of their first year and have passed all three at the PhD level by January of their second year.

Third-year PhD students are expected to have attempted two Advanced Exams by August of their second year and have passed them by January of their third year.

Students should select a dissertation advisor within six months after passing the Advanced Exams, and in all cases within a year. A dissertation committee should be formed, and a thesis prospectus should be filed, no later than 18 months after passing the Advanced Exam.

The academic progress of PhD students in their fourth and fifth year shall

be measured by their progress in their dissertation research as reported by the dissertation director to the Graduate Program Director.

Research Assistantships

A variable number of Research Assistantships, funded by external grants, are available through some of the faculty members of the Department. Appointments and re-appointments are decided by the Principal Investigator in consultation with the Graduate Program Director and the Department Head. A Research Assistant who is not offered reappointment as an RA is eligible for a TA appointment according to the guidelines detailed above.

Current Information

Students and faculty have mailboxes in the mailroom (1623D). Various important notices are distributed by a mailing list to students' departmental email accounts. Students should make sure to check these accounts regularly, or to have the mail forwarded to an account which they do check regularly. The bulletin boards in the mail room (including one for graduate student information) should be consulted regularly for notices of colloquia and seminars, sign-up sheets for qualifying exams, etc.

The department's Web site: <http://www.math.umass.edu> contains updated information about courses and other activities in the department, as well as links to many sites of interest to students and faculty.

Information on employment opportunities may be found in the Department Head's office (1621E). There is online access to the AMS employment listing and the Chronicle of Higher Education. Students should be on the lookout for notices of internships or summer positions in government or industry. The Campus Career Network can also be consulted.

Seminars and Colloquia

Not everything is learned in regular courses. The Department has several distinguished lectures and colloquia each semester on Thursday afternoons at 4:00. Our location makes it possible to invite a wide variety of well-known mathematicians and statisticians to visit and speak. Graduate students should be able to benefit from many of these lectures, though some are more advanced than others.

The Connecticut Valley Mathematics Colloquium is an old tradition, shared by Amherst College, Mt. Holyoke College, Smith College and the

University. Once a year each of the schools hosts a lecture by an eminent speaker, aimed at a general audience (and followed by a dinner).

Each semester a number of seminars are organized by faculty or graduate students, meeting once or twice a week. In recent years graduate students have organized the Graduate Student Seminar (GRASS) and “The what is...? Graduate Seminar” (TWIGS), featuring talks by students and faculty about basic notions of current mathematical research at a level suitable for graduate students.

Students often have an opportunity to talk in other seminars. Some of these (e.g., Applied Analysis & Computation, Topology & Geometry, Probability & Statistics, Representation Theory) have developed a continuous existence, while others are organized around current research topics. The Valley Geometry Seminar and Five College Number Theory Seminar are ongoing Five College activities. There is usually a Teaching Seminar in the Spring semester for students preparing to teach their own sections.

Centers and Special Facilities

Center for Applied Mathematics

The Center involves faculty members and graduate students who are interested in research and instruction in applied mathematics and scientific computation. The Center supports a research seminar series, “Applied Analysis and Computation”. In addition, the center manages the Master’s Degree Program in Applied Mathematics, a two-year professional degree intended for students who seek industrial employment.

Research Computing Facility (RCF)

The Research Computing Facility (RCF) provides computing facilities for the department. These facilities may be used by faculty and students as a tool for research and academic purposes. The facility is mainly UNIX and Linux based. All of the systems are networked, and support connections to the campus network and the Internet. A full-time staff and several graduate students provide support and consulting services to the community.

Statistical Consulting Center

This center involves a number of our faculty, and offers a full range of statistical services for clients both inside and outside the University. Among other things, the center provides an opportunity for graduate students to complement traditional studies with exposure to real world problems involving the statistical analysis of data.

COURSEWORK

Normally, a graduate student's program consists of 3 courses (9 credits) per semester. The 9-credit load is **required** of all students supported as Teaching or Research Assistants. Taking fewer courses can be justified only under special circumstances, and requires the prior approval of the student's Academic Advisor as well as the Graduate Program Director. Occasionally a well-prepared student may elect to take four courses, but this should be attempted only after consulting with the Academic Advisor.

Graduate courses are numbered 600 and above: students are generally expected to take at least 2 courses at this level each semester in the Department. Students are encouraged to take courses in other departments, provided the level and content are appropriate: permission to do this must be obtained in advance from the Graduate Program Director.

There are a number of courses at the 500 level, which are open to both undergraduates and graduate students. Some—but not all—of these courses are normally permitted to be used as part of the graduate program (e.g., Math 523, 532, 534, 545, 563), following GAC guidelines. Such courses are typically at a lower level than the introductory graduate courses, and are useful primarily for students seeking a Master's degree. (Please note that the degree requirements below limit the number of 500 level courses which can be used.)

Basic courses in mathematics and statistics are described below. They are offered every year, often as two-semester sequences, and cover much of the material required for the written qualifying exams. A variety of "special topics" courses are offered each semester, reflecting both student requests and faculty research interests. Descriptions of all these courses are available on SPIRE and on the department's web site. (Graduate School Bulletin descriptions are usually shorter and less up to date, and include courses not offered every year.)

Basic Courses

Basic graduate courses and qualifying exams are centered on five areas: Algebra, Analysis, Applied Mathematics, Geometry and Topology, Statistics. The corresponding basic courses are as follows (see course descriptions later in the **Axioms**):

- Algebra: Math 611–612
- Analysis: Math 623–624, Math 621

- Applied Mathematics: Math 645, Math 651, Math 731
- Geometry and Topology: Math 671, Math 703–704
- Statistics: Stat 597A, Stat 605, Stat 607–608, Stat 697R, Stat 705, Stat 725

Independent Study

Students seeking a Master's degree will spend most of their time taking standard courses (with a couple of exceptions noted below). But students seeking a Ph.D. may be permitted, after completing their basic coursework and qualifying exams, to pursue independent study with the guidance of some faculty member (in place of 3 or 6 hours of regular courses). The student should obtain a special form in Room 1521E, to be signed by the supervising faculty member and to be approved by the Academic Advisor and the Graduate Program Director.

Thesis credits

Students in the Ph.D. program must take a total of 18 credits of thesis before they graduate. Thesis credits can be taken at any time after the student has passed the basic and advanced qualifying exams and chosen a thesis adviser. Any number of thesis credits can be taken in a semester, up to a maximum of 9 credits of thesis and regular courses. For example, a student who is taking one 3-credit course can sign up for up to six credits of thesis. Audited courses do not count towards the nine-credit limit.

Grades

The only grades which graduate students may earn are A, A-, B+, B, B-, C+, C, F. Grades below B are generally regarded as indicating substandard performance, as reflected in our degree requirements below. According to Graduate School policy, a student whose average falls below 2.8 (where A=4, A- = 3.7, B+ = 3.3, B=3, C=2) in any two semesters (consecutive or not), is subject to academic dismissal upon recommendation of the Graduate Program Director to the Dean of the Graduate School. But in more down-to-earth terms, a student who is unable to maintain a B average in the first two years of graduate work cannot expect to earn even a Master's degree in our Department. **Only in exceptional circumstances will a student whose average falls below B in any semester receive financial support.**

Language Requirement

English is currently the international language of mathematics and statistics, so all graduate students are expected to have a good mastery of English—both written and spoken. Students whose first language is not English must of course show adequate reading comprehension as measured by the TOEFL exam. But fluency in the spoken language is also essential, for participation in courses and seminars or for employment as a teaching assistant. Students who have difficulty with the spoken language are expected to enroll in a conversation course or the equivalent. Although the department has no formal Foreign Language requirement, students are encouraged to acquire, at least, a reading knowledge of other languages widely used in mathematics and statistics.

Computer Literacy Requirement

The department has no formal computer literacy requirement. However, students are encouraged to take advantage of the computing resources provided for numeric and symbolic computation, statistical data analysis, text processing, etc.