

DEGREE REQUIREMENTS

Formal degree requirements are summarized below. Generally speaking, requirements for the M. S. involve course work and the Basic Exam, as well as a project in the case of the M.S. in Applied Mathematics or the Statistics option. Requirements for the Ph.D. involve coursework, Basic and Advanced Exams, oral presentation, thesis and defense. Coursework requirements may be waived by the GAC, if in its judgment the student has taken acceptable equivalents elsewhere. This should be resolved by the end of the student's first year here. (In doubtful cases, strong performance on one of the written exams might be accepted as a substitute for taking a course.)

Note: One credit seminars may not be used to satisfy the minimum "hours of coursework" below.

Students are reminded that they must complete all degree requirements established by the Graduate School. **Consult the Graduate School Bulletin!**

Degree application forms for an M.S. or Ph.D. can be picked up in the Office of Degree Requirements, Room 534 Goodell Building. The student must fill out the form, pay all fees, and return the form to Room 1521E for verification and signatures of the Graduate Program Director and the Department Head. The Graduate Program secretary will then submit the form and a covering letter to the Office of Degree Requirements.

As a requirement for the Ph.D. degree, a student must gain experience in communicating the subject by participating in the instruction of students. One way to satisfy this requirement is to perform the duties ordinarily assigned to a Teaching Assistant. However, the precise type and extent of activities needed to satisfy the requirement will be determined for each individual Ph.D. candidate by the GAC (or such persons to whom it may delegate this function), taking into account such factors as the student's academic progress and readiness to perform classroom teaching.

M.S. Requirements

M.S. in Mathematics

- 1) The student must complete 30 hours of coursework with grades of C or better, including at least 24 hours with grades of B or better. In addition, the student must have at least an overall B average. (**Note:** Any course outside the Department or numbered less than 600 must have the Graduate Program Director's approval to be counted toward the 30 hours. No more than four courses below the 600 level may be counted, and no more than 3 hours per course may be counted toward the 30 hours.)
- 2) The required 30 hours must include 21 hours of Mathematics and Statistics courses (at least 18 hours numbered above 600), normally including at least four of the courses: Math 611, 621, 623, 645, 651, 671, Stat 607.
- 3) The student must pass the Basic Exam at the Master's level. This exam consists of three parts: Advanced Calculus/Linear Algebra and two out of the following four parts: Complex Analysis, Numerics, Probability, Topology.

M.S. in Applied Mathematics

- 1) The student must complete 30 hours of coursework with grades of C or better, including at least 24 hours with grades of B or better. In addition, the student must have at least an overall B average. (**Note:** Any course outside the Department or numbered less than 600 must have the Graduate Program Director's approval to be counted toward the 30 hours. No more than four courses below the 600 level may be counted, and no more than 3 hours per course may be counted toward the 30 hours.)
- 2) The required 30 hours must include 21 hours of Mathematics and Statistics courses (at least 18 hours numbered above 600), with at least one semester each of numerical analysis, statistics, and mathematics applied to other disciplines.
- 3) The student must complete a project in Applied Mathematics under the guidance of a faculty member. This project must have prior approval of the M.S. Applied Mathematics advisor and normally involves 3 credit hours (the credits earned may be used to satisfy the 18 hour requirement in (2)). The project might involve reading some research papers, analyzing some real data, and doing some computer programming.
- 4) The student must pass the Basic Exam. This exam consists of two parts: Numerics and the Applied Mathematics Option Exam.

M.S. in Mathematics (Statistics Option)

- 1) The student must complete 30 hours of coursework, with grades of C or better, including at least 24 hours with grades of B or better. In addition, the student must have at least an overall B average. (**Note:** Any course outside the Department or numbered less than 600 must have the Graduate Program Director's approval to be counted toward the 30 hours. No more than four courses below the 600 level may be counted, and no more than 3 hours per course may be counted toward the 30 hours.)
- 2) The required 30 hours must include: (a) at least 21 hours of Mathematics and Statistics courses, including Stat 505 (Regression Analysis), Stat 506 (Design of Experiments), Stat 607–608 (Mathematical Statistics I, II), and Stat 705–706 (Linear Models I,II); and (b) at least two other courses which are either Statistics courses numbered above 600, within the Department, or approved courses outside the Department (which must be approved on a case-by-case basis).

Stat 511 may be counted towards the 30 hours. Students may take (and in many cases are encouraged to take) some courses from other departments. In particular, the Biostatistics group in the School of Public Health offers a number of courses that are well suited to those interested in applications. Students should consult with their advisors or other members of the faculty regarding outside courses. Students are expected to have a background in advanced calculus (at the level of Math 425) and in linear algebra. Students with weak background in these areas will be required to take appropriate courses at an early stage of their graduate study here.

- 3) The student must complete a project in Statistics under the guidance of a faculty member. This project must have prior approval of the Statistics advisor and normally involves 3 credit hours (the credits earned may be used to satisfy the 30 hours requirement in (1)).
- 4) The student must pass the Basic Exam. This exam consists of two parts: Probability and Statistics.

Ph.D. Requirements

Oral Presentation

By completing the required coursework and passing the Advanced Exam, a student becomes a Ph.D. candidate. All students are expected to acquire experience in preparing and presenting high-level material. After passing the Advanced Exam but before registering for any dissertation credits, each Ph.D. candidate must give a public presentation of some topic beyond the textbook level which is relevant to the student's proposed area of specialization. This would typically have the format of a one-hour seminar (either regularly scheduled or *ad hoc*). It might be coordinated with the forming of the dissertation committee and preparation of the prospectus. The topic presented is to be chosen in consultation with a faculty advisor and might for example be drawn from a recent research paper.

Dissertation Committee, Prospectus, Dissertation Credits

The Ph.D. candidate must form a **dissertation committee**, consisting of a thesis advisor together with three other graduate faculty members (one of whom must be from another department on campus). A written **prospectus** of the proposed thesis research must be drawn up with the advisor's help and signed by all committee members before the committee is officially appointed by the Dean of the Graduate School. A L^AT_EX form for this purpose may be obtained from the Graduate Program Secretary.

The committee should advise the student about any expected need (in thesis research or later) for reading material in a foreign language such as French or German.

After giving the oral presentation described above and forming the committee, the student may enroll for **dissertation credits**: a minimum of **18** such credits are required.

Ph.D. in Mathematics

- 1) The student must complete successfully 36 hours of coursework, including three of the full year sequences (Math 611–612, 623–624, 645–731, 671–703, Stat 607–608), together with the first semester of the remaining two. (Math 651, Numerical Analysis I, may be substituted for either Math 645 or Stat 607 to fulfill the latter requirement. The Graduate Program Director may allow a student to substitute an advanced course for the basic course in the same area).
- 2) The 36 hours of coursework must include Math 621 (Complex Analysis).
- 3) The student must pass the Basic Exam at the Ph.D. level. This exam consists of three parts: Advanced Calculus/Linear Algebra and two out of the following four parts: Complex Analysis, Numerics, Probability, and Topology.

- 4) The student must pass the Advanced Exam. This exam consists of two parts chosen from among Algebra, Analysis, Differential Equations, and Geometry.
- 5) The student must make an oral presentation as described above.
- 6) The student must write a satisfactory dissertation and pass a final oral examination (primarily a defense of the dissertation), and must satisfy all other requirements of his or her dissertation committee. The student is required to register for a minimum of 18 dissertation credits. The student is also required to submit a bound copy of the dissertation to the Department, as described below.

Ph.D. in Mathematics (Statistics Option)

- 1) The student must complete successfully 36 hours of coursework, including Math 623 and Stat 605, 607, 608, 705, 706, 725.
- 2) The student must also complete two semesters of advanced coursework in Statistics beyond the courses listed above. Further courses (for example, in Mathematics) may also be recommended by faculty advisors.
- 3) The student must pass the Basic Exam at the Ph.D. level. This exam consists of three parts: Advanced Calculus/Linear Algebra, and two other parts, Probability and Statistics, paralleling the material covered in Stat 607 and Stat 608 respectively.
- 4) The student must pass the Advanced Exam, which consists of two parts. The mathematical statistics portion is based on Stat 607–608, Stat 605, and Stat 725, while the linear models portion is based on Stat 705–706 (Linear Models I, II).
- 5) The student must make an oral presentation as described above.
- 6) The student must write a satisfactory dissertation and pass a final oral examination (primarily a defense of the dissertation), and must satisfy all other requirements of his or her dissertation committee. The student is required to register for a minimum of 18 dissertation credits. The student is also required to submit a bound copy of the dissertation to the Department, as described below.

Bound Thesis

It is departmental policy that a Ph.D. candidate must submit a bound copy of the dissertation for retention by the Department, before the degree can be awarded. In some cases the candidate may, with the permission of the Graduate Program Director, arrange with the bindery to have the bound copy mailed to the Department, in which case the student must submit to the Department a receipt from the bindery for binding and postage. Such arrangements are the responsibility of the student.