

# Mathematics

## Graduate Student Handbook

This handbook has been prepared for the purpose of orienting new students and providing information and assistance to all students in the Department of Mathematics.

Please refer to this handbook while you are in graduate school here; revisions or additions may be made from time to time. In addition, graduate students should be familiar with the "Information for Graduate Students" section of Rice's [General Announcements](#) and the [Code of Student Conduct](#).

### THE GRADUATE COMMITTEE

The Graduate Committee is responsible for evaluation of the academic progress of the graduate students in the Department of Mathematics. The Graduate Committee is also responsible for counseling, and most other individual academic issues of first or second year graduate students. Normally students with academic problems or concerns will discuss them with their advisor or the Graduate Committee chair. In 2018-19, the members of the committee are Michael Boshernitzan, Gregory Chambers, Robert Hardt, and Shelly Harvey (chair).

### THE HONOR SYSTEM

Graduate students are expected to observe the provisions of the Rice University Honor System. In particular, all written examinations and certain specifically designated assignments are conducted under the honor system. The student body at Rice, through its commitment to the honor system, accepts responsibility for assuring the validity of all examinations and assignments conducted under the system. The Honor Council is responsible for investigation of all reported violations and for trial in those cases where the facts warrant. The Honor Council conducts a continuing program to orient new students and faculty members to the responsibilities and privileges of the system.

### STUDENT RESPONSIBILITIES

#### Requirements for Continued Support

Many students are supported (during the academic year) by university fellowships or research grants. However, continued support is not guaranteed. Unsupported students are responsible for the cost of tuition and fees. Normally, students who are achieving satisfactory progress towards their degrees will be supported for five years. For students who enter our program with previous training, this figure is four years or less (depending on the training). Support beyond this time frame is decided on a case-by-case basis by the Graduate Committee and the principal investigator (in the case of a research grant). No student will be supported beyond the sixth year.

Students who fail to make satisfactory progress in any way may lose their funding. Some examples, any one of which constitutes failure to make satisfactory progress are: Failure to attend required classes, failure to perform TA duties satisfactorily, failure to maintain satisfactory grades, failure to pass the preliminary exams or advanced exams by their deadlines, or failure to proceed satisfactorily on thesis research.

#### Departmental Teaching Assignments

The department considers teaching experience an essential part of training for a graduate degree. As part of the degree program, all students must perform various duties of approximately eight hours per week (on the average) during the academic year. In particular, all students are required to be in residence at Rice, including finals period. Exceptions must be sought in advance from the Graduate Committee chair, in writing.

The Graduate Committee chair makes duty assignments each semester after consultation with one or more graduate student representatives and the department chair. There will be a faculty member in charge of each class. When a student is assigned to duties associated to a particular class, then the faculty member associated with that class becomes his/her teaching supervisor for that semester. The student should then immediately contact that faculty member and inquire as to the precise nature of his/her duties.

Grading final exams is a primary duty of all graduate students, even those teaching their own class, as well as those supported by VIGRE and RTG awards, by various internal Rice fellowships, or by grants of the faculty. It has often been the case that students teaching their own course grade their own final exams. However, when the instructors of the sections of a course arrange for a common final exam, a graduate student instructor should become part of the grading team, doing work comparable to what would be required to grade all the problems of his/her section.

As required by fellowship guidelines, recipients of NSF Graduate Fellowships and Ford Foundation Fellowships will not be required to perform these (teaching and grading) during their years of tenure status. However a minimum of one year of such training is required for the Ph.D. The recipient may choose to teach a class during their tenure status. In some cases, the graduate committee may decide that recipients of other external fellowships are exempt from teaching and grading duties.

## **Duties of TA's**

In general, TA duties include grading exams in lower division classes, running evening help sessions, holding office hours, running review sessions, writing problem solutions, and grading homework in advanced classes. Other duties of an instructional nature may be appropriate. It is very important to communicate frequently with the faculty teaching supervisor to make sure that you understand which duties are expected of you. You should also communicate any special constraints that might affect your ability to handle certain duties. If your duties are averaging more than eight hours per week, speak to your supervisor and then to the chair of the Graduate Committee.

It is your responsibility to understand what is needed and when it is expected, and then to follow through. Do not assume anything-get clarification!

## **Classroom Teaching**

Graduate students are normally expected to teach their own section of a calculus class at least once during their time at Rice. They will also typically have the opportunity to teach in the summer term. Students are expected to acquaint themselves with the relevant guidelines for instructors in the mathematics department and at Rice more generally.

## **Annual progress reports**

All graduate students are required to submit to the Graduate Committee by the last day of classes in the Fall term a summary of their progress in the previous year and their goals for the subsequent year. These should be one page in length, and will detail the mathematical topics they are studying, the problems they plan to work on, and techniques they would like to bring to bear. Like proposals to funding agencies (e.g., the National Science Foundation), these should be written so that research mathematicians in other fields can assess them.

The Graduate Committee will forward that summary to the student's academic or thesis advisor for comments. The Committee will consider the progress of each student based on the student's transcript and summary, and the advisor's comments. A summary of the committee's view as to whether the student is making reasonable progress or, in the case of unsatisfactory progress, how and by when the deficit must be repaired, will be provided to the student in writing by the chair of the Graduate Committee no later than 24 hours prior to the Spring semester deadline to add courses.

## **Dismissal, Grievance, and Petition Procedures**

The Office of Graduate and Postdoctoral Studies has developed procedures for grievances and petitions, which are available at <http://graduate.rice.edu/discipline/>. See also [Academic and Judicial Discipline](#) and [Dispute Resolution](#). These govern exceptions to departmental and university requirements, problem resolution, and dismissals. The department has a standing committee to hear graduate student grievances.

## **ACADEMIC REQUIREMENTS**

### **Course Selection**

Courses for the first and second year students will be determined by an interview with their assigned advisor. Thereafter, the research advisor will assume this role.

Some graduate students come to Rice after doing graduate work at other institutions. Such a student may be allowed to count certain courses taken elsewhere towards the departmental requirements.

For foreign students, special English courses are offered by the School of Continuing Studies and the Office for International Scholars and Students. For foreign students admitted with a paper-based TOEFL score less than 600, an internet-based TOEFL score of less than 90, a computer-based TOEFL score of less than 250, or an IELTS test score of less than 7, it is mandatory for them to take one of these courses. Other non-native English-speaking students have found these courses very beneficial, as verbal English is frequently harder to understand and communicate than anticipated. The department will usually pick up the cost of these courses.

Most graduate courses carry numbers at the 500- and 600-level. In some cases, courses below the 500 level may not be applicable toward Masters degree requirements, even though they may be recommended for students lacking a strong undergraduate background in a certain subject. The need for such courses may be determined by the graduate committee during a meeting with each student at the time he/she enters graduate school, or subsequently by the student's advisor. Research, seminar, and teaching courses make up the remaining credit hours needed to meet the university requirement of 90 semester hours for the Ph.D.

All students are expected to register for the Colloquium (MATH 680) and the Current Mathematics Seminar (MATH 590). First and second year students must register for Teaching Seminar (MATH 591).

MATH 690 is intended for MATH graduate students pursuing reading courses with a prospective advisor or other faculty member, at early stages of her/his training. Advanced graduate students doing thesis research should sign up for MATH 800. Typically, students will receive 6 hours of (MATH 800) credit for summer research and 3 to 9 hours per semester for MATH 800, for research during their later years. The advisor will determine the actual amount of credit given. The research course serves two main functions:

(1) It helps to fulfill the number of semester hours of graduate credit that Rice requires for the Ph.D. (60 hours past the Master's).

(2) A student is required to take 9 credit hours per semester in order to establish his/her status as a full time student, enabling Rice to pay a stipend. Full time student status is also a visa requirement for foreign students; see the website of the Office of International Students and Scholars <http://oiss.rice.edu/>.

## **Academic Record**

Graduate students are expected to maintain an overall graduate-career grade average of B or better (see requirements for admission to candidacy for the Ph.D.). This average includes only grades in courses that a student takes as a Rice graduate student; and, it includes only courses that count toward the 30 hour degree requirement, or that are specifically required of the student by the graduate committee or the student's advisor. In practice, almost all Ph.D. candidates have grade point averages of B+ (3.33) or higher.

## **General written qualifying exams**

There are 3 exams on the topics of algebra, analysis, and topology. These are typically offered 3 times a year, in August and January just before classes begin and in May just after finals. Past exams and syllabi are available on the department webpage. Students must perform satisfactorily on all three exams by January at the beginning of the fourth semester. The judgment of satisfactory performance on the examination for either the M.A. or Ph.D. degree is the responsibility of the Graduate Committee. The Graduate Committee prefers complete solutions, with good exposition and clear logic, of fewer questions over partial solutions to more questions.

## **Advanced oral exam**

To complete the advanced oral examination, the student, in consultation with a faculty advisor, must select a special field (e.g., homotopy theory, several complex variables, or group theory) and submit it to the Graduate Committee for approval. An advanced examination in the selected field is scheduled normally six to twelve months after the student completes the general examinations. The examination committee consists of a faculty advisor and at least one other faculty member. While a student failing the advanced examination may, with the approval of the committee, retake it on the same or possibly on a different topic, the student generally is not allowed to take the advanced examination more than twice.

## **Thesis advisors**

On passage of the advanced exam, the faculty advisor assumes the role of thesis advisor. Students wishing to change their thesis advisor after the advanced exam (but prior to candidacy) should submit a request to the chair of the Graduate Committee. This should include a letter of support from the new advisor addressing whether the student must retake her/his advanced exam before making the change. The Graduate Committee will decide whether the change of advisor is approved and whether this is contingent on retaking the advanced exam.

## Ph.D. Candidacy

Candidacy requirements are as follows: passing the written qualifying exams, the advanced oral exam, and the language requirement; as well as completing at least 30 hours of coursework (including 6 hours of research MATH 800 and other required courses) approved by the Graduate Committee. Candidates for the Ph.D. are expected to have attained an overall course grade average of B+ (3.33) or better. If the academic course work is of satisfactory quality, the student's oral exam committee will recommend to the chair of the Graduate Committee that the student be admitted to Ph.D. candidacy. In less obvious situations, the decision to recommend candidacy may be postponed pending further consideration.

Applications for approval of candidacy for the Ph.D. degree can be downloaded from the internet and must be filed with the Office of Graduate and Postdoctoral Studies before the start of the 9th semester. In all cases, the final Ph.D. thesis oral examination can be given only after candidacy has been approved. The formal petition for candidacy must include the title of the thesis approved by the thesis committee, an unofficial transcript, and a list of departmental requirements for candidacy from the General Announcements. The petition should be signed by the chair of the Graduate Committee. It is not necessary that all required courses be completed before Ph.D. candidacy is attained. Students are urged to seek Ph.D. candidacy as soon as practicable. A student may apply for a Masters degree upon admission to Ph.D. candidacy.

After the student has been admitted to Ph.D. candidacy, the principal task is to do research.

## Master's Requirements and Procedures

There are two paths to a Masters degree. It is important to distinguish these, as the Office of Graduate and Postdoctoral Studies requires different paperwork in each situation. The relevant forms are available on their website.

The Non-Thesis Master can be awarded prior to doctoral candidacy. The requirements include satisfactory performance on the written qualifying exams in algebra, analysis and topology; 30 semester hours in a program approved by the Graduate Committee, of which at least 15 hours should be at the 500-level or higher and 24 hours should be taken at Rice; an average of B or better; and at least one full semester in residence at Rice University. Students seeking this degree must file a petition for a Non-Thesis Masters with the Office of Graduate and Postdoctoral Studies.

The Thesis Master also requires 30 semesters hours in a program approved by the Graduate Committee, of which 24 hours should be taken at Rice. The written qualifying exams are not required, but a Masters Thesis must be submitted and publicly defended. Students seeking this degree must file a petition for Candidacy for a Master's Degree.

Under normal circumstances, students admitted to the doctoral program receive the Non-Thesis Master.

## Ph.D. Requirements

- 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 the Graduate Committee, in accordance with the [procedures](#) laid out by the Registrar)
- Have completed four semesters of residency at Rice.

- Pass three written qualifying examinations, covering basic material in algebra, analysis, and topology. The judgment of satisfactory performance on the general examinations for either the MA or PhD degree is the responsibility of the Graduate Committee.
- Pass an advanced examination that covers material in the student's chosen field of specialization.
- Pass a reading examination in one foreign language chosen from French, German Russian, or another language chosen with the approval of the Graduate Committee.
- Write an original thesis on a topic chosen in consultation with a Ph.D. advisor, and present an oral defense of the thesis acceptable to the department.
- Spend two years in full time study at Rice.

## **Theses**

The Ph.D. thesis is an exposition of the original and independent work performed by the candidate; this statement is also true of the M.A. thesis or research report, but the latter may constitute a "progress report" on research under way, rather than an exposition of completed work. It is expected that the exposition will not only detail the explicit contribution of the candidate, but in addition, will discuss the relationship of that contribution to the general body of knowledge.

It is the candidate's responsibility to arrange with his/her committee the date of the Final Thesis Oral Examination.