Graduate Program Handbook 2001-02

Mathematics Department
Brandeis University
1. Academic Program

1.1. The First year program

Our first year program is devoted to the basics in algebra, analysis and topology.

The required courses are: 101 a,b (Algebra), 111 a,b (Real and Complex analysis), 121 a,b (Topology) and 110a (Geometric analysis). Syllabi are available from the department office. Each student is responsible for the material in these courses. This responsibility can be fulfilled in one of two ways:

(a) Take the course and earn a satisfactory grade (officially B- to A+; but grades in the B range are often signs of trouble).

(b) Convince the course instructor (usually through an oral examination) that you know the material and should "place out" of the course. This must be done in the first two weeks of classes.

The normal program, which assumes a strong undergraduate preparation, is to take 101, 111, and 121 in the first year and 110a at the beginning of the second year. Most students find the workload heavy. You may find it useful to work together with your classmates.

If you do not do well in the first year courses, you should consider studying in a less demanding department, or taking some other option. In particular, it is department policy that to continue in good standing you must pass at least two out of the required courses each semester during your first year. If you do not, or if your performance in these courses is judged inadequate, you may be asked to leave or not be offered a stipend for the following year.

Students who have successfully completed these required courses, passed one language exam (reading French, German, or Russian), and been in residence for at least 1 year, are eligible for a Master’s degree.

1.2. The second year program; major and minor exams; advanced courses

In general, the second year is the time to finish up the course requirements, begin teaching and find a thesis area (and a minor area).

In addition to taking 110a (if necessary), the second year student should:

(a) Take the "second year seminar" (spring semester). This should not be too demanding in time, and is intended as a vehicle for students to give talks in some matter of interest to them. The material is to be taken from a journal article (and not from
some chapter of a book). The idea is to present material as one would in a research seminar, where the latest word is still in journal or preprint form. The talk should be understandable to the others in the seminar, so you should not assume a background beyond the required courses. You will be asked to present one topic; and to listen to, encourage, and criticize others doing the same.

(b) Start your "major and minor exams". These proceed as follows: you are to choose two advisors, and in cooperation with these advisors decide on a program of reading in two areas. One, the "major area", will in general be the area of your thesis. The other, the "minor area", is to be studied somewhat less intensely, and is intended to provide some breadth. It should be rather distinct from the major area, though it can be something that will be useful to you in studying the major area (example: number theory and K-theory). Normally, the minor examination should consist of material that can be completed in a one semester reading course; the major examination will be more extensive, and will normally contain some current research papers as well as expository material.

At the time that the exam is set up, the student and advisor must agree on how the student will demonstrate command of the material to be covered. In some cases the examiner may judge the student’s progress simply by the progress of the reading course, and by problems solved by the student in the course of the reading. Other common schemes include the student writing a small paper or giving one or several lectures. When the examination is complete, the advisor must fill out a form for the department certifying that this is so.

The advisor of the major examination often becomes the student’s thesis advisor, though this is not necessarily the case. It is possible to start an exam without specifying whether it is "major" or "minor", and to make the choice at the end of the semester.

Students sometimes tend to put off the major and minor exams. It is IMPORTANT not to make this mistake. By the end of the second year, all students should have chosen major and minor examiners and have made an agreement with each on the readings to be studied. In addition, substantial progress should have been made on one of the two examinations; the minor exam should be finished or nearly so, or the major exam should be well under way. The student will normally take one reading course to fulfill this condition.
(c) Take a total of three courses each semester. The second year seminar does NOT
count in this total; but one or two reading courses in connection with the major and
minor exams do count. One or more of the three courses should be a Brandeis lecture
course. The courses beyond the 100-level often do not have exams, though there are
frequently problem sets. The degree of participation expected of a student may vary
considerably from course to course; students considering a particular course are urged
to speak with the course instructor. Evaluation of progress is thus relatively informal:
the faculty meets near the end of each semester to discuss the progress of each student.

1.3. The Third year program

The student should finish the remaining one of the major/minor exams, and start
thesis research by the end of the third year (Department policy is that support cannot
be offered to students in the fourth year if they have not finished the major and minor
exams.) The student is again required to take three courses: one of these should be a
reading course with the major advisor. One of the other two may be a reading course,
but the student must take at least one Brandeis lecture course. It is important not to
narrow one’s field of view and stop taking lecture courses too soon, and it is important
that students continue to sign up for courses, so that advanced courses can be offered in
an adequate range of subjects.

1.4. Language exams

The second and third years are also good times to pass the language requirements.
These are: Reading knowledge of one of French, German, and Russian and of one additional
language (besides English!), chosen with the consent of the student’s advisor, or, if the
student does not yet have a thesis advisor, with the consent of the Graduate Advisor. It
is the department’s policy that any student who has not passed one language exam by
December of the third year, or who has not passed both language exams by May of the
third year, must register for a language course, or engage in some other formal language
study. Failure to make timely progress toward the language requirement may result in a
lowered stipend. Such a student must also take at least one language exam each semester.

The purpose of the language requirement is to ensure that the student can go into the
library, pick up a journal, and ascertain relatively easily whether a given paper in a foreign
language is interesting to him/her. Thus the exams test for the ability to make a rough
translation, without a dictionary. The graduate advisor designates each year an examiner
for each language, who is responsible for all language exams in that year in that language. The exam is given on demand, and a student may retake it a reasonable number of times without penalty. To prepare, the student should first get some basic skill in the language, and then read some mathematical texts carefully in his/her area of interest to learn the mathematical terms. The language examiner will provide suggestions for the text, if the student desires them.

It is possible to audit Brandeis’ undergraduate language courses. The graduate school also occasionally gives free language courses especially tailored for graduate language exams. Both of these are good ways to prepare for the language exams.

Each language exam can only be given by the designated examiner. In exceptional circumstances (e.g., the examiner is out of town), the department chairman or graduate chairman may designate an alternate examiner.

1.5. Fourth and Fifth year programs

The emphasis in these years should of course be on finishing a thesis. We normally guarantee support to all students in good standing through year four; the advisor to a student who has made good progress toward a thesis by the end of year four can apply to the department on his/her behalf for a fifth year of support, and this is normally granted. We can only support students beyond the fifth year under the most exceptional circumstances.

In the fourth and fifth years the student should take AT LEAST one Brandeis lecture course each semester in addition to a reading course with the thesis advisor.

2. Teaching, ESL, and getting a job after graduation

Most of you will seek academic employment after graduation. Securing a job will depend largely upon your letters of recommendation, which comment upon not only your strength as a mathematician, but also upon your skills as a teacher. Recently, the emphasis on teaching skills has increased dramatically, and no one without at least good, if not excellent, teaching skills and recommendations can expect to get an academic position.

Graduate teaching assistants are also an integral part of our precalculus and calculus programs. The department requires teaching on the part of those receiving financial support, and we strongly suggest some teaching experience for students with their own
financial support. Supported students who are not teaching do other chores for the department, generally grading homework for undergraduate or graduate courses. First year students generally do not teach.

English is not the native language for many of you. We cannot allow you to teach until your English skills reach a sufficient level. The university has a large ESL program (English as a Second Language). Kevin King is in charge of this program, and I am sure that he has contacted those of you who could benefit from the ESL classes. The department expects that those of you who need or could benefit from ESL instruction will contact Kevin King and take the appropriate courses. If you do not sign up for courses or do not attend them, the graduate advisor will be contacted and he will come looking for you. This is something you want to avoid.

During the spring of each year we have an apprenticeship program to train students for teaching. Those of you who have not participated in the program will receive information about it sometime early next semester. In order to teach, you have to be approved by ESL and successfully pass the apprenticeship program. The idea of the apprenticeship program is to give students an opportunity to observe someone teach (their coach) and to teach a few classes in their coach’s section of precalculus or calculus. There is also videotaping and helpful advice from your coach and from Susan Parker, our Undergraduate Teaching Coordinator. Once you are teaching, there is ongoing help and support in teaching from several sources. Good teaching is important. Bad teaching results in complaints by students and serious problems for you and the department. Bad teaching does not get you a job after graduation.

Generally students teach one course a semester for at least four semesters. In order to equitably distribute teaching duties beyond this, we have adopted the following formula: among students who have taught four or more semesters, those with the higher ratio of (number of semesters of support)/(number of semesters taught) will teach first.

Questions of which course/time slots you teach in and who gets to teach summer course are settled democratically amongst yourselves as much as possible, with final approval required by the Graduate Advisor and the Undergraduate Teaching Coordinator.

3. Faculty Evaluation of Graduate Students

The mathematics faculty meets twice a year to evaluate the graduate students; once in early December and again in late April. The academic performance and teaching performance of each student is reviewed. Minor problems are handled informally by the graduate
advisor. Major problems result in a letter to the student and a meeting with the graduate advisor. These letters are usually quite serious and indicate that a student’s funding is in jeopardy. If matters are not cleared up satisfactorily by the next faculty meeting, then action is taken.

Students with poor teaching performance risk having their stipends cut. Students with poor academic performance risk being dismissed from the graduate program. In particular, as stated above, first year graduate students must successfully complete at least two of the required courses each semester. Students must be well along in their thesis work to be eligible for a fifth year of support.