# Graduate Handbook of <br> Department of Mathematical Sciences <br> Binghamton University, State University of New York 

January 25, 2017

## Contents

1 About this handbook ..... 1
2 Core Topics ..... 2
2.1 Advisors ..... 2
2.2 Areas within mathematics ..... 3
2.3 Grades ..... 5
2.4 Graduate courses taken while an undergraduate ..... 5
2.5 Undergraduate courses taken while a graduate ..... 5
2.6 Courses taken outside the department ..... 5
2.7 Courses presented for a degree ..... 5
2.8 Deadlines ..... 6
2.9 Oral Examinations ..... 6
2.10 Requirements for the M.A. degree in Mathematics ..... 6
2.11 Requirements for the M.A. degree in Applied Statistics ..... 8
2.12 Requirements for the Ph.D. degree ..... 8
2.13 Admission to candidacy ..... 9
2.13.1 Consequences and timing of admission to candidacy ..... 9
2.13.2 Details of the examination ..... 10
2.13.3 On delaying admission to candidacy ..... 10
2.14 Thesis preparation ..... 11
2.15 Thesis defense ..... 11
2.16 Financial support ..... 12
2.17 Full time status ..... 14
3 The Chronology ..... 14
3.1 Getting the M.A. degree ..... 14
3.1.1 The first year ..... 14
3.1.2 The second year. ..... 15
3.2 Getting the Ph.D. degree ..... 15
3.2.1 Students that enter with master's degrees ..... 15
3.2.2 The third year ..... 15
3.2.3 The fourth year. ..... 16
3.2.4 Dissertation Year Fellowship. ..... 16
3.2.5 After admission to candidacy. ..... 16

## 1 About this handbook

## The purpose of the handbook:

This handbook contains the rules and procedures that govern graduate study in the Department of Mathematical Sciences at Binghamton University leading to the M.A. or Ph.D. degree.

## On the $3 / 2$, MAT and MSEd programs:

The department also offers degrees in cooperation with the Graduate School of Education. This handbook does not cover these degrees.

See the University Bulletin and the Graduate School of Education web pages on teacher education programs for information about the MAT (Master of Arts in Teaching) program, and the MSEd (Master of Science in Education) in Adolescence Education program.

See the department's web page on the $3 / 2$ program for information about that program. This program is also called the Combined Degree Program of Mathematics (BA) and Master of Arts in Teaching (MAT) in Mathematics Adolescence Education.

## Arrangement of the handbook:

Section 2, Core Topics, is on topics that are either not dependent on the length of time that a student has been here, or that are important enough to cover separately. Section 3, Chronology, is arranged chronologically, with subsections describing what the student needs to take into account for each year of graduate study in the department.

## The graduate school rules:

The Graduate School establishes the general rules for graduate study at Binghamton University. These rules are found in two documents:

1. The pages on ACADEMIC POLICIES AND PROCEDURES FOR GRADUATE STUDENTS in the University Bulletin. (See the menu in blue at the left side of the main Bulletin web page.)
2. The Graduate School's web pages for new and current graduate students. The item most relevant to this handbook is the Graduate School Manual.

If there is a discrepancy between this handbook and the rules of the Graduate School, the rules of the Graduate School will take precedence.

## 2 Core Topics

### 2.1 Advisors

## Who the advisors are:

Every graduate student has an advisor, either temporary or permanent. For permanent advisors, both the student and the advisor have to agree with a student-advisor pairing and have the approval of the Graduate Committee in order for it to be official. An advisor must be a tenured or tenure-track member of the faculty: professor, associate professor, or assistant professor not designated as visiting. In spite of the use of the word "permanent", a permanent advisor may be changed on approval of
the new advisor and the Graduate Committee. Given the long term nature of the thesis work, a change of permanent advisor is considered to be an unusual event.

In rare cases, a student will enter the program with an agreement with a faculty member to be the student's permanent advisor. This usually occurs when the student has met the faculty member prior to joining the department.

In all other cases the Coordinator of Graduate Advising will act as a temporary advisor until the student finds a permanent advisor. Since it takes time to get to know the faculty in the department, it is assumed that finding a permanent advisor can take up to three years (six semesters).

If an permanent advisor is not found by the end of the fifth semester, the Chair of the Graduate Committee should be consulted. Note that a student can receive the M.A. degree (usually at the end of four semesters) without ever getting a permanent advisor.

## What the advisors do:

Advisors have two functions.

1. (Performed by either a temporary or permanent advisor): give advices and approvals on course selection. Students must consult with their advisors prior to registering for classes. This will be at the end of the week before classes start for new students, and in the last third of the previous semester for continuing students. The department will not register a student for courses without an advisor's signature on the appropriate form.
2. (Performed only by a permanent advisor): advise and oversee the student's research towards the Ph.D. degree. In addition, the permanent advisor sets and arranges for the admission to candidacy exam (see Section 2.13) and the thesis defense (see Section 2.15) at the appropriate times. For students writing a thesis for the M.A. degree, rather than taking the M.A. examination, a permanent advisor will supervise the writing of the thesis and arrange for the defense of the thesis.

### 2.2 Areas within mathematics

## Definition of five areas in DOMS:

Algebra, Analysis, Combinatorics, Geometry/Topology, and Statistics are the current areas of research and instruction in the Department of Mathematical Sciences. It is not expected that students take courses in all five of these areas, but some breadth is expected. There are thus "Area Distribution Requirements" that are covered here.

## Definition of basic courses within each area:

The following courses are defined as basic courses for each of the five areas above. A student in the M.A. or Ph.D. program must take certain number of basic courses from different areas.
(i) Algebra: 507, 503, 504, 525
(ii) Analysis: 505, 506, 508
(iii) Combinatorics: 510, 511
(iv) Geometry/Topology: 513, 517, 518
(v) Statistics: 501, 502, 571, 579

## Area Distribution Requirements:

For each M.A. or Ph.D. student, all of the distribution requirements 1,2 and 3 below must be satisfied. The word "area" below refers to any one of the five areas (i)-(v) listed above. The phrase "basic courses" refers to the courses listed above for each of the five areas. Courses used to satisfy requirement 1 below may also be used to satisfy requirement 2. For Ph.D. students, the Area Distribution Requirements must be satisfied before the admission to candidacy exam is scheduled.

1. (Distribution requirement) The student must take
(a) at least 3 courses from one area;
(b) at least 2 courses from a second area;
(c) at least 2 courses from a third area, or at least one course each from a third and a fourth area.
2. (Basic course requirement) The student must take
(a) at least 2 basic courses from one area;
(b) at least 2 basic courses from a second area;
(c) at least 2 basic courses from a third area, or at least one basic course each from a third and a fourth area.
3. (Grade requirement) For M.A. students, the grades received in all courses above must be $\mathrm{B}-$ or higher; for Ph.D. students, the grades received in all courses above must be $\mathrm{B}+$ or higher.

For an M.A. student, if the oral examination option is chosen, the courses fitting the requirements given above must be among those that the student is examined on in the oral exam.

If the student receives a master's degree from this department, then any or all of the courses used to satisfy the Area Distribution Requirements for the M.A. degree can also be used to satisfy the Area Distribution Requirements for Ph.D. (but they must receive $\mathrm{B}+$ or higher in these courses.)

## Exception:

For a Ph.D. student who receives a master's degree from another university, if he/she has taken courses fitting the requirements above, and the transcript from that university is available, then these courses can be used to satisfy the requirements only with the approval of the student's advisor and the Chair of the Graduate Committee.

### 2.3 Grades

## General:

There is no uniform policy in the department on the meaning of grades, but a reasonable rule of thumb is that students expecting to complete a Ph.D. should be getting grades of A- or A in their courses. Students expecting to receive the M.A. degree should be getting grades of B or higher in their courses.

## As affects support:

The school will terminate monetary support for students that do not maintain a B average (3.0) or higher.

## Calculating averages:

Averages are calculated according to the following table:

| $\mathrm{F}=0$ | $\mathrm{D}=1$ | $\mathrm{C}-=1.7$ | $\mathrm{C}=2$ | $\mathrm{C}+=2.3$ | $\mathrm{~B}-=2.7$ | $\mathrm{~B}=3$ | $\mathrm{~B}+=3.3$ | $\mathrm{~A}-=3.7$ | $\mathrm{~A}=4$ |
| :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- |

### 2.4 Graduate courses taken while an undergraduate

This only applies to graduate students in the department who were also undergraduates at Binghamton University. If a student takes a graduate course in the department while an undergraduate and uses the course to satisfy the major requirements for a bachelor's degree with a major in mathematics, then this course cannot be used to satisfy the requirements for either the M.A. or the Ph.D. degree.

### 2.5 Undergraduate courses taken while a graduate

This can only be done as an independent study (course number 597). There are special rules governing the use of 597 to take an undergraduate course.

### 2.6 Courses taken outside the department

Courses taken outside the Department of Mathematical Sciences do not count toward a degree, except by joint approval of the advisor of the student and the Chair of the Graduate Committee. Student on department and/or university financial support may only take courses that count toward a degree.

### 2.7 Courses presented for a degree

Each degree has credit requirements. The courses College Teaching of the Discipline (591), Thesis Research (599), Pre-dissertation Research (698), Dissertation Research (699), Continuous Registration (700), and Research Skills (707) cannot be used to satisfy any credit requirements.

Furthermore, no course listed as a seminar may be used to satisfy any credit requirements without the approval of the Graduate committee. Permission will not be granted unless the request is made by the student's permanent advisor.

Lastly, no course numbered lower than 500 can be used to satisfy any credit requirements under any circumstances.

### 2.8 Deadlines

If you plan to get a degree (M.A. or Ph.D.) in a given semester, you will need to declare the candidacy by the date in the deadlines for degree completion webpage. This is done on-line. See the heading "Graduate Application for Degree" in the Graduating Students column on the new and current graduate students page of the Graduate School or on the line below "deadlines" in the deadlines for degree completion page.

WARNING: The deadline for filing the "Graduate Application for Degree" is rather early in the semester. The deadline for the Fall Semester is usually in early November, and the deadline for the Spring Semester is usually in late March. There is no penalty for not getting a degree if you file, so if you think you might get a degree in a given semester, you should file.

The web page deadlines for degree completion also has information about important dates later in the semester when all paperwork (including the thesis or dissertation, if relevant) must be presented to the Graduate School. Failure to meet these deadlines could result in delayed graduation and extra expense for credits required in the following semester or summer session needed to receive the degree.

### 2.9 Oral Examinations

Several examinations at the graduate level are oral. These include the master's oral exam (when the oral exam option is chosen), the thesis defense for the master's thesis (when the thesis option is chosen), the admission to candidacy examination, the doctoral dissertation defense, and possibly others.

It is a policy of the department that the student being examined may bring refreshment to the exam, but that such refreshment can be only for the student being examined.

### 2.10 Requirements for the M.A. degree in Mathematics

There are three requirements for the M.A. degree.

1. The student must have taken 32 credits (eight courses) within the department maintaining at least a B average in those 32 credits and having a minimum grade not lower than C- in those 32 credits. See the section on courses presented for a degree (Section 2.7) for explanations of what courses are allowed. See the section on grades (Section 2.3) for an explanation on how averages are calculated.
2. The student must have taken and received $\mathrm{B}-$ or higher in courses that are used to satisfy the Area Distribution Requirements. See the section on areas within mathematics (Section 2.2) for details.
3. The student must either pass an oral exam covering 8 courses taken within the department (the more common option) or present and defend a written master's thesis. If the oral exam option is chosen, the courses used to satisfy the Area Distribution Requirements must be among the 8 courses being examined on.

## The oral exam option:

If the oral exam option is chosen (the most common choice), the student is responsible for getting together the examination committee. The Master's Exam Coordinator should be consulted well in advance (at least 4 weeks) of the exam. The Master's Exam Coordinator will go over the student's transcript to find whether the student has the credit hours and the Grade Point Average needed to graduate. The Master's Exam Coordinator will also help form the examination committee.

The Examination Committee consists of 3 or more faculty members. These will typically be instructors that the student has taken courses from. The oral exam should cover eight 4 -credit courses that the student has taken that meet the grade, average, and area distribution requirements listed above. The student may use courses which are being taking at the time of the exam. In that case the examination cannot be too early in the semester. Each of the eight courses must be assigned to one of the members on the Examination Committee.

Once the Examination Committee has been selected, the student must arrange a time for the oral exam which is convenient to all members on the Examination Committee. Usually the oral exam lasts 2 hours.

See the section on deadlines (Section 2.8) for important dates and information about how and when to file for the degree. This should be checked early in the semester in which the degree is expected.

## The master's thesis option:

To do a master's thesis rather than the oral exam, the student must find a permanent advisor to supervise the thesis. This should be done no later than the beginning of the second year.

The advisor must get approval from the Graduate Committee on the topic of the proposed thesis. No approval will be granted unless the student has a B course average at the time of the proposal.

See the section on thesis preparation (Section 2.14) for links to guidelines from the Graduate School on preparing a thesis. See the section on thesis defense (Section 2.15) for information about the formation of an examination committee and the defense of the thesis. More details on the requirements for completing the M.A. degree may be found on the Graduate School's web page on academic policies for master's degree.

See the section on deadlines (Section 2.8) for important dates and information about how and when to file for the degree. This should be checked early in the semester in which the degree is expected.

### 2.11 Requirements for the M.A. degree in Applied Statistics

The program requires courses specific to the area of applied statistics, and the student is required to finish ten 4-credit courses and two 1-credit capstone seminars for a total of 42 credits. An exit exam or final thesis is not required.

In addition to the course requirements ( 24 credits from 6 core courses, 16 credits from 4 elective courses, and 2 credits from 2 capstone seminars), the student must maintain at least a B average (GPA 3.0) in these courses and have a minimum grade not lower than B - in these courses. In addition, the student must have a minimum grade not lower than $B$ in the two capstone seminars.

See the web page on the Applied Statistics Curriculum for more information.

### 2.12 Requirements for the Ph.D. degree

There are six requirements for the Ph.D. degree.

1. The student must have a master's degree, or the equivalent, in mathematics or a mathematical science (such as statistics). The master's degree can be from Binghamton University or from another university.
2. The student must take 24 credits (six courses) within the department after receiving the master's degree and maintaining at least a B average in those 24 credits and having a minimum grade not lower than C - in those 24 credits. A student entering with a master's degree from another university often takes more than 24 credits while at Binghamton. The grades expected from a Ph.D. student are considerably higher than the minimums stated. See the section on courses presented for a degree (Section 2.7) for explanations of what courses are allowed.
3. The student must have taken and received $\mathrm{B}+$ or higher in courses that satisfy the Area Distribution Requirements. See the section on areas within mathematics (Section 2.2) for details. These courses can be taken before or after receiving the master's degree.
4. Sometime during the taking of the 24 credits past the master's degree, the student must arrange for a permanent advisor. The advisor is usually an instructor from one of the courses taken at Binghamton, but this is not required. If no permanent advisor is found by the end of five semesters at Binghamton, the Chair of the Graduate Committee should be consulted.
5. After the four requirements above are satisfied, the student must be admitted to candidacy by passing an admission to candidacy exam. See the section on admission to candidacy (Section 2.13) for details.
6. The student must write and defend a doctoral dissertation. This is done with the advice of the permanent advisor. See the section on thesis preparation (Section 2.14) for links to guidelines from the Graduate School on preparing a thesis or dissertation. See the section on thesis defense (Section 2.15) for information about the formation of an examination committee and the defense of the doctoral dissertation.

More details on the requirements for completing the Ph.D. degree may be found on the Graduate School's web page on academic policies for doctoral degree.

See the section on deadlines (Section 2.8) for important dates and information about how and when to file for the degree. This should be checked early in the semester in which the degree is expected.

### 2.13 Admission to candidacy

A student is considered to be admitted to candidacy when he/she has satisfied all requirements for the Ph.D. except the writing of a dissertation. In other schools this is often called ABD ("all but dissertation") or "passed the comprehensives". Being admitted to candidacy is a requirement by the Graduate School for all students going for the Ph.D. degree.

Admission to candidacy is accomplished by completing the first four requirements in the section on requirements for the Ph.D. degree (Section 2.12) and passing an examination. The purpose of the exam is to verify that the student has mastered a certain amount of mathematical materials at a level deemed necessary to conduct original mathematical research.

### 2.13.1 Consequences and timing of admission to candidacy

For both academic and financial reasons, admission to candidacy is typically done towards the end of the fourth year of graduate study in the department.

## Academic reasons

For students who earn their master's degrees from the department, the third and fourth year are usually devoted to accumulating the required 24 credits and preparation for the admission to candidacy exam. Students that enter the department with master's degrees can sometimes take the admission to candidacy exam earlier than the fourth year, but often take the full four years if certain courses are needed before embarking on research in the student's chosen area within mathematics.

Failure to pass candidacy by the end of the fourth year of study will be regarded as lack of satisfactory progress toward the Ph.D. degree unless there are exceptional circumstances.

## Financial reasons

After being admitted to candidacy, a student is only required to pay for one credit each semester if the other credits registered (to maintain full time status) are for Continuous Registration ( 700 or 701). See Section 2.17 for definition of full time status. For students not on financial support, this makes a difference in their education expenses. However, this also affects students on financial support, since after the fourth year financial support from the university does not cover the cost of tuition. Thus delaying admission to candidacy past the fourth year will be costly to the student.

### 2.13.2 Details of the examination

1. The format of the examination is worked out by the permanent advisor in consultation with the student.
2. The proposal of the examination must be submitted by the permanent advisor to the Graduate Committee at least one month before the examination. The proposal should include the following.
(a) A description of the nature, format and topics of the examination.
(b) The proposed examination committee (including at least three faculty members from the department, including the permanent advisor him/herself) to conduct the examination. There is no requirement of an outside examiner.
(c) An up-to-date transcript for the student.
(d) A statement that the permanent advisor intends to act as advisor during the writing of the dissertation.
3. On approval of the proposal, the examination will take place and the results of the examination will be reported to the Graduate Committee.
4. Oral portions of the examination (if any) will be open to the public.
5. Written portions of the examination (if any) will be submitted to the Graduate Committee on completion of the examination and made part of the student's permanent record.
6. Successful completion of the examination will be communicated to the Graduate School by the Chair of the Graduate Committee.

If a student changes adviser after passing his/her admission to candidacy examination, he/she may be asked to pass an additional examination.

### 2.13.3 On delaying admission to candidacy

The following guidelines were adopted by the department concerning the length of time a student may stay in the doctoral program without being admitted to candidacy. The Graduate Committee shall recommend dematriculation to the Graduate

School for any full-time student proposing to stay for more than four years without being admitted to Candidacy. Exceptions to this rule shall be governed by the following guidelines:

1. A member of the faculty may request the Graduate Committee to delay this action for one year. This request shall be made in writing during the student's eighth semester and shall be placed in the student's file. The request shall state: the student's progress to date, the reason for delaying admission to candidacy, and the faculty member's opinion of the student's prospects.
2. The same procedure shall be followed once a year from then until the student is admitted to candidacy. However, in subsequent years, the faculty member must declare his/her intention of becoming the student's dissertation adviser once the student is admitted to candidacy.
3. Graduate Committee approval of an extension for an eighth or subsequent year should be granted only in very unusual circumstances.
4. Graduate Committee approval of an extension does not necessarily imply that the Graduate Committee will recommend financial support for the student getting the extension.
5. In these guidelines the term "full-time student" includes but is not limited to any student who has received full financial support from the department or the university for eight not necessarily consecutive semesters.

### 2.14 Thesis preparation

The material in this section applies to both the thesis option for the M.A. degree and for the Ph.D. degree.

There are guidelines for preparing or submitting a thesis or dissertation from the Graduate School Manual. There are also instructions on preparing and submitting a thesis or dissertation, as well as the all important formatting requirements for thesis and dissertation on the Graduate School web pages.

The student should consult with the permanent advisor on matters of content and style.

### 2.15 Thesis defense

The advisor will present for approval from the Graduate Committee a thesis/dissertation committee to hear the defense of the thesis. Upon approval of the proposal by the Graduate Committee, the Chair of the Graduate Committee shall submit the required form to the Graduate School.

If the thesis is a master's thesis, the thesis committee will consist of three or more members of the department including the permanent advisor.

If the thesis is a doctoral dissertation, the dissertation committee will consist of at least three faculty members of the department including the permanent advisor plus
a fourth examiner from outside the department. The outside examiner may be from another department within Binghamton University, or be from another university (from any department). The outside examiner must be approved by the Graduate School unless the outside examiner is on a list maintained by the Graduate School as "pre-approved." Only faculty members from Binghamton University are on the preapproved list. This list is available from the Chair of the Graduate Committee. An outside examiner not on the pre-approved list must supply a current curriculum vitae which demonstrates experience either supervising doctoral dissertation, or being on committees to hear defenses of doctoral dissertation.

Because of the extra level of approval for Ph.D. dissertation defense, the proposal of a dissertation committee for Ph.D. defense should be submitted to the Graduate Committee at least two months before the defense is scheduled. The defense is an oral presentation by the student at a time agreeable to the student and members of the committee and is open to the public.

### 2.16 Financial support

Some students receive financial support from the department during all or part of their time spent with the department as a graduate student. Continuation of support is contingent on making satisfactory progress toward a degree and on the availability of funds. Below are policies of the department connected to financial support.

1. Eligibility.

To maintain eligibility for financial support, a graduate student must:
(a) maintain his/her status as a full time matriculated student in the M.A. or Ph.D. program of this department,
(b) maintain a B grade average (See Funding Policies, and Academic Policies in the Graduate School Manual),
(c) maintain satisfactory degree progress (see point 2 below), and
(d) satisfactorily perform whatever service responsibilities are required of him/her in connection with his/her award as determined by the chairperson of the department or by person(s) delegated by the chairperson to make that determination.
2. Satisfactory degree progress.

The Graduate Committee of the Department of Mathematical Sciences determines which students are making satisfactory degree progress. It meets early in the spring semester of each year to review the progress of every student receiving financial aid from the department. Each student is given, no later than 15 March, a letter indicating whether the student will or will not be supported the following year; a student may be told that the support decision will depend on the student's grades during the current (spring) semester. Some considerations regarding satisfactory progress are:
(a) In the past the Graduate Committee has considered maintenance of a B average to be satisfactory progress toward an M.A. provided the student can reasonably expect to complete work on the M.A. within a 2 year period.
(b) Maintenance of a B average is not sufficient to demonstrate satisfactory degree progress toward the Ph.D. Academic standards for Ph.D. students are, naturally, higher.
(c) Under ordinary circumstances, it is expected that admission to candidacy will take place before the start of the fifth year. Not to do so in the absence of extraordinary circumstances will be evidence of lack of satisfactory progress. See the section on admission to candidacy (Section 2.13).
3. Length of support.

Once a graduate student has been given an award, it is the department's intent to provide support so long as the student maintains eligibility, is making satisfactory progress towards a degree, and so long as financial resources are available to provide the funding. The following gives additional detail.
(a) Two years of support are the maximum available to students working toward the M.A. degree. A student who does not yet have an M.A. degree is considered to be working toward the M.A. degree.
(b) Six years of support is the typical maximum available to any student. This includes any years of support used before the M.A. degree is received if the M.A. degree is obtained at Binghamton. Note that to receive support past the M.A. degree, the higher standard of satisfactory progress needed for the Ph.D. degree will have to be met. Funding changes occur from time to time and while six years of support are typical for those making satisfactory progress at the Ph.D. level, only four years of total support can be considered to be guaranteed.
(c) The department has often been able to support, as adjuncts, some Ph.D. students who have been making satisfactory degree progress and who have exceeded the time limitations mentioned above. The dollar value of such support is lower than the support through the first six years. Adjuncts are regarded as employees of the department, and priorities in who will be funded as an adjunct past the sixth year are set by the department chair.
4. Tuition.

For students on financial support, tuition is paid by the university for the first four years of support. The tuition covered each semester is only up to the number of credits needed to have full time status. See Section 2.17 below for details of full time status. In the unusual case where a student wishes to take more credits than required for full time status, the cost of the extra credits must be born by the student. Students desiring to learn more than the required number of courses may audit the extra courses at no extra cost.
From the fifth year on, students must pay for tuition themselves. Since admission to candidacy typically takes place at the end of the fourth year, this is
not a large burden since students admitted to candidacy can arrange to pay for only one credit per semester. See the paragraph in Section 2.13 .1 on the financial reasons for not delaying admission to candidacy.

### 2.17 Full time status

A student is considered to be full time if the student is taking at least the minimum number of credits appropriate to the level of the student. The levels and minimums are given below. Note that most courses in the department are 4 credits, while seminars are variable (starting at 1 credit).

- For those not having an M.A. degree and having fewer than 24 graduate credits at Binghamton, the minimum is 12 credits per semester.
- For those either having an M.A. degree or having at least 24 graduate credits at Binghamton, the minimum is 9 credits per semester.
- For those having been admitted to candidacy, often referred to as "all but dissertation" - ABD, the minimum is 9 credits per semester; however the student can arrange to pay for one credit each semester. See the paragraph in Section 2.13.1 on the financial reasons for not delaying admission to candidacy.

There is more discussion in the Chronology below.

## 3 The Chronology

Below is a year by year breakdown of what is expected of students in this department. It covers various decisions, formalities, exams and other events that occur during a student's stay here, as well as some discussion of courses.

The department offers the M.A. and Ph.D. degree. Students that already have master's degrees when they enter the department can skip to the section on getting the Ph.D. degree (Section 3.2).

### 3.1 Getting the M.A. degree

The M.A. degree is generally obtained in two years.

### 3.1.1 The first year.

Almost all students will take three courses in each of their first two semesters since it is required in order to maintain full time status. Typically, this will consist of an introductory course in each of three of the areas within mathematics in the first semester and a post-introductory course in each of those three areas in the second semester.

Students aspiring to receive an M.A. degree should maintain at least a B average. Students aspiring to a Ph.D. should maintain at least an A- average. Students that do not maintain a B average will need to discuss their status with the Chair of the Graduate Committee.

### 3.1.2 The second year.

Students typically take two courses and a seminar each semester. In the fall, at least one course should be a continuation of one of the areas taken in the first year. The other course can be another course in the same area, a course in one of the three areas taken in the first year, or an introductory course in an area not taken in the first year. By the spring semester, the student should have a good idea of what the student's interests are.

During the second year, the student should make sure that the Area Distribution Requirements (see Section 2.2) for the M.A. degree are met.

The same grade considerations apply as for the first year.
During the spring semester of the second year, decisions will be made by the Graduate Committee based on both grades and reports from individual instructors that the student has had as to the suitability of the student's continuing past the M.A. degree. Students that are continued can be done so on a regular or a provisional basis.

At the end of the second year, either the oral exam is taken or a master's thesis is written and defended. See the section on requirements for the M.A. degree (Section 2.10) for more information on the two options. If you plan to get the M.A. degree in a given semester, you will need to declare your intention early in the semester by completing the "Graduate Application for Degree" form on-line in the Graduate School web pages. See the section on deadlines (Section 2.8).

WARNING: The deadline for filing the "Graduate Application for Degree" is rather early in the semester. There is no penalty for not getting a degree if you file. So if you think you might get a degree in a given semester, you should complete the form.

If you select the oral exam option, you must take the examination by the deadlines set by the Graduate School.

If you select the master's thesis option, you must prepare and defend your thesis by the deadlines set by the Graduate School.

### 3.2 Getting the Ph.D. degree

### 3.2.1 Students that enter with master's degrees

A student entering with a master's degree needs to consult carefully with an advisor as to the appropriate level of courses to take. Depending on the student's background, the student might start with introductory courses, or might start with courses at a higher level.

### 3.2.2 The third year.

During the third (and also the fourth) year, the student should insure that the Area Distribution Requirements (see Section 2.2) for the Ph.D. degree are met.

Students in the third year should seek to find a permanent advisor. This can occur earlier. It probably should occur earlier for students that enter with the M.A. degree.

If a student has obtained the M.A. degree early enough in the process and will have 24 credits beyond the M.A. degree by the end of the third year, the student may be admitted to candidacy during the third year. This is not typical, but has advantages. See Section 3.2.4 below on the Dissertation Year Fellowship.

### 3.2.3 The fourth year.

Students in the fourth year need to prepare for admission to candidacy. This requires that at least 24 credits of regular course work be obtained after the M.A. degree, and that the student pass a admission to candidacy exam. The nature of the exam is determined by the student's permanent advisor with the approval of the Graduate Committee. See the section on admission to candidacy (Section 2.13) for more detailed information.

### 3.2.4 Dissertation Year Fellowship.

Students in their fourth year of study who have been admitted to candidacy are eligible for the Dissertation Year Fellowship (DYF) which allows a student to remain on full support while having no teaching duties. In the past the department has been given funding to award this to only one student each year. In years where there has been more than one student eligible, the department has typically given one semester of the DYF to each of two students. Since the funding for the DYF is limited, the DYF is considered to be a competitive award.

### 3.2.5 After admission to candidacy.

Students that have been admitted to candidacy generally work on their Ph.D. dissertation under consultation with their permanent advisor. The advisor determines whether the student is demonstrating adequate progress towards the degree during this period. The section on thesis preparation (Section 2.14) should be consulted.

Details of the dissertation defense shall be arranged by the dissertation advisor in consultation with the graduate committee. See the section on thesis defense (Section 2.15) for more information.

