These requirements apply to all students entering Fall 2016 or later. Students previously enrolled as graduate students in mathematics or applied mathematics may choose to satisfy these requirements or ones in effect at any time since they entered graduate school.

The following documents are not included in this document. They are found elsewhere in the departmental homepage:

2016 handbook  2011 handbook  2008 handbook

Requirements for the Master of School Mathematics students.
Requirements for the InfAs students with Mathematics as home department.

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1 Introduction

Graduate degree students in mathematics or applied mathematics at Iowa State University must meet requirements specified by the Graduate College, the Department of Mathematics, and the student’s program of study (POS) committee. The Graduate College requirements are published in the Graduate College Handbook (GCH). Each graduate student should become familiar with its contents. The requirements specified by the Department of Mathematics are described in this document. Requirements specified by the student’s POS committee are defined at the time the student’s POS committee is formed and the program of study formulated.

The Department of Mathematics offers programs leading to M.S. and Ph.D. degrees in both mathematics and applied mathematics. In addition, the Department grants an M.S.M. (Master of School Mathematics) degree which is intended for secondary school mathematics teachers. This document does not address the requirements for the M.S.M. degree.

Listed below is a summary of the most significant requirements of the Graduate College and the Department of Mathematics.

1. Graduate English requirement (applies to all international students; see GCH).
2. Core course requirements (see this document).
3. Major professor and POS committee (see GCH).
4. Program of study (see GCH and this document).
5. Written qualifying examination(s) for Ph.D. students (see this document).
6. Supervised teaching requirement for Ph.D. students (see this document).
7. Oral preliminary examination for Ph.D. students (see this document and GCH).
9. Final oral examination (see this document and GCH).

Time-lines for the sequences of procedures leading to master’s and doctor of philosophy degrees can be found in the GCH. Throughout this document any reference to semester refers to a regular academic year semester unless otherwise stated, that is, summer semesters are not included.

These requirements are imposed to establish certain minimum standards for normal situations. However, some situations may be unusual and require special consideration. Students who believe their circumstances warrant modification of these requirements should petition the Departmental Graduate Committee in writing.

The following sections describe the requirements for graduate degrees in mathematics and applied mathematics. Continuation in the graduate program and financial support is contingent upon satisfactory progress toward a degree. General guidelines for a student making satisfactory progress are outlined in this document.

2 Graduate program of study

The Graduate Coordinator of the Department of Mathematics serves as Director of Graduate Education (DOGE) for both the mathematics program and the applied mathematics program. The Graduate Coordinator designates a temporary advisor (normally the Graduate Coordinator) for all new graduate students in the Department of Mathematics. The temporary advisor guides the student in the selection of a field of study and in the development of a graduate program until the major professor and the POS committee are selected. The major professor serves as permanent advisor and as chair of the POS committee. A list of the duties of the POS committee may be found in the GCH. Timely selection of a major professor, appointment of a POS committee, and development of a program of study are essential requirements. Timing requirements depend on whether the student is in the M.S. or Ph.D. program, and on whether or not the student already has an M.S. upon entry. See sections 5.1 and 5.2 below for more details. The appointment of a major professor is by mutual agreement of the student and designated faculty member, who must have graduate faculty status in the program in which the student is enrolled. The POS committee is selected by the student with the aid of the major professor. Failure to select a major professor impedes progress towards the degree and may lead to dismissal from the program. If for any reason the major professor resigns or is removed from their position, and the student is in good academic standing, then the above procedure will be used to select a new major professor and reconstitute the POS committee.

3 Requirements for M.S. and Ph.D. degrees in mathematics

The Department of Mathematics offers programs leading to both M.S. and Ph.D. degrees in mathematics.

3.1 M.S. program in mathematics

For the M.S. program a minimum of 30 acceptable credits is required, with at least 22 of these earned in residence. The total of 30 credits must include 21 credits of 500-600 level mathematics courses excluding Math 590, 591, 592, 599 and 699, and these 21 credits must include at least
12 credits of core courses subject to the conditions in 3.4 below. There is also a 1 credit seminar requirement which is satisfied by taking both Math 591 and Math 592. Each student must elect a thesis or non-thesis master’s program. For the thesis program, 6 credits of Math 699 may be included in the 30 credits. The non-thesis program requires a creative component including a formal mathematics paper. Three credits of Math 599 may be included in the 30 credits for the creative component; these credits must be identified on the program of study. Although cognate study (as described in 3.2 below) is not required at the M.S. level, it is strongly recommended. When cognate study is in the form of a minor, it typically consists of 6–9 credits in a department other than Mathematics. These credits must be acceptable to the representative of the minor department on the student’s POS committee.

In addition to the course work, the M.S. student must pass an oral, comprehensive final examination. A grade of B or better, in the course or on the final examination, must be earned in each core course on the POS (see 3.4 and 4.4 below). A grade of C or better must be earned in all other courses on the POS. The student must maintain a cumulative grade point average of at least 3.0 in all course work, exclusive of research credit.

### 3.2 Ph.D. program in mathematics

For the Ph.D. program, a minimum of 72 acceptable credits is required, with at least 36 of these earned in residence. (See the GCH for details regarding credit requirements.) At least 42 credits must be in formal courses (not research); 18 of the 42 must be in the core courses listed in 3.4 below. In addition, at least 36 must be in 500–600 level mathematics courses excluding Math 590, 591, 592, 599 and 699. There is also a 1 credit seminar requirement which is satisfied by taking both Math 591 and Math 592.

Included in the 42 credits of formal courses is a 0 credit cognate study requirement. A cognate course is defined to be a course which is (i) acceptable for graduate credit, (ii) taught in another department (a course cross-listed with Mathematics can count toward the cognate requirement if taught by a faculty member whose primary appointment is not in the Department of Mathematics, or if approved by the Graduate Committee), and (iii) relevant to the major. The course work for the cognate study requirement must be approved by the student’s POS committee. Students are encouraged to consider a minor in another department to meet the cognate study requirement.

The student is also required to take at least 3 credits of Math 699, Research in Mathematics.

In addition to the course work, the Ph.D. student must pass four written qualifying examinations and an oral preliminary examination, prepare a dissertation, and pass an oral final examination, which is usually limited to the defense of the dissertation. These requirements are described in subsequent sections.

A grade of B or better, in the course or on the final examination, must be earned in each core course on the POS (see 3.4 and 4.4 below). A grade of C or better must be earned in all other courses on the POS. The student must maintain a cumulative grade point average of at least 3.33 in graduate level mathematics courses and of at least 3.0 in all course work, exclusive of research credit.
3.3 Co-major Ph.D. degrees

Well-qualified students are encouraged to consider a Ph.D. program having a co-major in mathematics and some other appropriate program. Such programs are to be initiated by a written proposal from the student to the Mathematics Department Graduate Committee. A draft POS must be submitted when adding a co-major. The Mathematics co-advisor must have a primary appointment in the Mathematics department. The proposal must contain an outline of how all requirements are to be met. Authorization by the Graduate Committee to embark on a co-major program will be based on this proposal, and on the academic history of the student. The POS committee is to be directed by co-chairmen, one from each of the co-major departments. The dissertation must have significant content in both fields. Co-major programs are subject to the following minimum standards.

- Co-major Ph.D. students are required to earn at least 24 credits in 500–600 level mathematics courses other than Math 590, 591, 592, 599 and 699. They are required to take a total of four courses from the mathematics core including at least one one-year sequence (Math 504–505 or Math 515–516). They are also required to pass two of the qualifying examinations in one core area described in 3.5 below.

- Co-major Ph.D. students are required to have two years of professional experience including at least one year of supervised teaching. The other year may be supervised research as a research assistant or associate.

3.4 Core course requirements

The core course requirements for the M.S. in mathematics are:

1. At least 4 core courses.
2. At least 2 core courses in Algebra or at least 2 core courses in Analysis.

The core course requirements for the Ph.D. in mathematics are:

1. At least 6 core courses.
2. At least 3 core courses must be in Algebra or Analysis.
3. The core courses must include MATH 504 and MATH 515.

Core courses

- Algebra:
  - MATH 504 Abstract Algebra I,
  - MATH 505 Abstract Algebra II,
  - MATH 510 Linear Algebra

- Analysis:
  - MATH 515 Real Analysis I,
  - MATH 516 Real Analysis II,
• MATH 511 Complex Analysis

● Discrete Mathematics:
  – MATH 567 Graph Theory,
  – MATH 568 Enumerative Combinatorics,
  – MATH 566 Discrete Optimization

● Applied Mathematics:
  – MATH 519 Methods of Applied Mathematics I,
  – MATH 520 Methods of Applied Mathematics II,
  – MATH 557 Ordinary Differential Equations and Dynamical Systems

● Numerical Analysis:
  – MATH 561 Numerical Analysis I,
  – MATH 562 Numerical Analysis II,
  – MATH 517 Finite Difference Methods

A grade of B or better must be earned in each core course used to satisfy the requirements in this section. A deficiency may be made up any one of the following methods:

a) Retaking the course for credit and earning a B or better.

b) Retaking the final examination of the course and earning a B or better (permission of the instructor giving the final is required).

c) A pass on the associated qualifying examination, if such examination exists.

Students are strongly encouraged to consult their advisor prior to deciding which core courses to take, since certain core course combinations may not be suitable for certain areas of research.

3.5 Ph.D. qualifying examinations

A Ph.D. student in the mathematics program must pass four written qualifying examinations, including:

1. at least two in Algebra and/or Analysis, and

2. at least two in one area.

The 10 qualifying examinations are (listed as examination name, associated course #, area):

• Abstract Algebra, MATH 504, Algebra

• Linear Algebra, MATH 510, Algebra

• Real Analysis, MATH 515, Analysis

• Complex Analysis, MATH 511, Analysis

• Graph Theory, MATH 567, Discrete Mathematics
• Enumerative Combinatorics, MATH 568, Discrete Mathematics
• Methods of Applied Mathematics I, MATH 519, Applied Mathematics
• Methods of Applied Mathematics II, MATH 520, Applied Mathematics
• Numerical Analysis I, MATH 561, Numerical Analysis
• Numerical Analysis II, MATH 562, Numerical Analysis

Students are strongly encouraged to consult their advisor prior to deciding which examinations to take, since certain examination combinations may not be suitable for certain areas of research.

Each examination has a written syllabus (check the departmental homepage for “graduate students”) and one associated core course. A student taking an examination will be responsible for the topics listed in the appropriate examination syllabus. These topics are normally covered in the associated core course. However, the qualifying examination syllabi are definitive, and not all topics on the syllabi are covered each year in the appropriate courses. It is the student’s responsibility to be prepared to answer questions about any topic on the appropriate syllabus.

Each qualifying examination is offered twice per year (if there is demand at the relevant time), once in August and once within a month of the conclusion of the associated course. Students must request the examination in advance via the graduate secretary by the deadline set by the Graduate Committee (such request may be cancelled without penalty until 24 hours prior to the examination).

A student granted full admission to the Ph.D. program is expected to pass four qualifying examinations (subject to the rules above) within the first two calendar years in the program. A student who has passed three qualifying examinations in his or her first two years may request in writing an additional year to complete the fourth; such request should be addressed to the Graduate Committee (via the graduate secretary) with support from the student’s advisor. While such request is not guaranteed a positive response from the Graduate Committee, for a student otherwise in good standing this is considered a routine request. Whereas, approval of an appeal for more time to complete qualifying examinations from a student who has not passed three qualifying examinations will normally require extenuating circumstances.

For a student in the Ph.D. program not granted full admission (i.e., one who enters on restricted or provisional admission), the student will normally have two years to complete the qualifying examination requirement from the time his/her admission status is changed to “full”. Any exception to this rule would be put in writing by the DOGE at the time the student is admitted.

3.6 Oral preliminary and final examinations

3.6.1 Oral preliminary examination (Ph.D. only)

The oral preliminary examination of a Ph.D. student tests a student’s knowledge of the major, minor and supporting fields of their research area. The examination is taken after a student has passed four written qualifying examinations, satisfied the graduate English requirement, formed a POS committee, and has an approved POS form. A student who fails the preliminary oral examination is allowed to retake it one additional time. Six months must elapse between the first attempt and the second. The preliminary oral examination must be passed at least six months prior to the final defense, unless an exception is allowed by the Dean of the Graduate
College. A form requesting scheduling of the examination must be submitted to the Graduate College at least two weeks before the proposed date of the examination.

3.6.2 Final oral examination

The final examination of an M.S. candidate is oral and comprehensive. It normally consists of a defense of the thesis or creative component and an examination of the candidate’s knowledge of the topics covered in the program of study.

The final examination of a Ph.D. candidate is oral, and is usually limited to a defense of the dissertation.

3.7 Graduate English requirements

Graduate students whose native language is not English must meet the Graduate College English Requirement. (See the GCH for details.)

3.8 Teaching requirements

Each Ph.D. student is required to have one year of supervised teaching. However, if approved by the student’s POS committee, equivalent supervised experience in oral mathematics communication may be substituted for teaching. In that case the POS committee must specify in writing what the equivalent experience will be.

Every teaching assistant must demonstrate an ability to teach effectively. To assure this, before the beginning of the first semester they assumes their duties, teaching assistants are required to give a short, prepared lecture to a panel of experienced teaching assistants and/or faculty that is suitable for an algebra, trigonometry, or similar class. In addition, each teaching assistant whose native language is not American English must take the SPEAK/TEACH test (the test administered by the University to screen applicants for classroom duties) unless such student is a native English speaker from Australia, Canada, New Zealand, the United Kingdom of Great Britain, or Ireland. They must pass it at the first or second level before they are assigned a class or recitation section, and they must pass it at the first or second level within their first year of residence to guarantee continued financial support.

4 Requirements for M.S. and Ph.D. degrees in applied mathematics

The Department of Mathematics offers programs leading to both M.S. and Ph.D. degrees in applied mathematics.

4.1 M.S. program in applied mathematics

For the M.S. program a minimum of 30 acceptable credits is required, with at least 22 of these earned in residence. The total of 30 credits must include 21 credits of 500-600 level mathematics courses excluding Math 590, 591, 592, 599 and 699, and these 21 credits must include at least 12 credits of core courses subject to the conditions in 4.4 below. There is also a 1 credit seminar requirement which is satisfied by taking both Math 591 and Math 592. Each student must elect
a thesis or non-thesis master’s program. For the thesis program, 6 credits of Math 699 may be included in the 30 credits. The non-thesis program requires a creative component including a formal mathematics paper. Three credits of Math 599 may be included in the 30 credits for the creative component; these credits must be identified on the program of study.

Although cognate study (as described in 4.2 below) is not required at the M.S. level, it is strongly recommended. When cognate study is in the form of a minor, it typically consists of 6–9 credits in a department other than the Department of Mathematics. These credits must be acceptable to the representative of the minor department on the student’s POS committee.

In addition to the course work, the M.S. student must pass an oral, comprehensive final examination.

A grade of B or better, in the course or on the final examination, must be earned in each core course on the POS (see 4.4 below). A grade of C or better must be earned in all other courses on the POS. The student must maintain a cumulative grade point average of at least 3.0 in all course work, exclusive of research credit.

### 4.2 Ph.D. program in applied mathematics

For the Ph.D. program, a minimum of 72 acceptable credits is required, with at least 36 of these earned in residence. (See the GCH for details regarding credit requirements.) At least 42 credits must be in formal courses (not research); 18 of the 42 must be in the core courses listed in 4.4 below. In addition, at least 36 must be at the 500–600 level, excluding Math 590, 591, 592, 599 and 699. There is also a 1 credit seminar requirement which is satisfied by taking both Math 591 and Math 592.

Included in the 42 credits of formal courses is a 6 credit cognate study requirement. A cognate course is defined to be a course which is (i) acceptable for graduate credit, (ii) taught in another department (a course cross-listed with Mathematics can count toward the cognate requirement if taught by a faculty member whose primary appointment is not in the Department of Mathematics, or if approved by the Graduate Committee), and (iii) relevant to the major. The course work for the cognate study requirement must be approved by the student’s POS committee. Students are encouraged to consider a minor in another department to meet the cognate study requirement.

The student is also required to take at least 3 credits of Math 699, Research in Mathematics.

In addition to the course work, the Ph.D. student must pass four written qualifying examinations, pass an oral preliminary examination, prepare a dissertation, and pass an oral final examination which is usually limited to the defense of the dissertation. These requirements are described in subsequent sections. A grade of B or better must be earned in each core course, and a grade of C or better in all other courses of the POS. The student must maintain a cumulative grade point average of at least 3.33 in graduate level mathematics courses and of at least 3.0 in all course work, exclusive of research credit.

### 4.3 Co-major Ph.D. degrees

Well-qualified students are encouraged to consider a Ph.D. program having a co-major in mathematics and some other appropriate program. Such programs are to be initiated by a written proposal from the student to the Mathematics Department Graduate Committee. A draft POS
must be submitted when adding a co-major. The Applied Mathematics co-advisor must have a primary appointment in the Mathematics department. The proposal must contain an outline of how all requirements are to be met. Authorization by the Graduate Committee to embark on a co-major program will be based on this proposal, and on the academic history of the student. The POS committee is to be directed by co-chairmen, one from each of the co-major departments. The dissertation must have significant content in both fields. Co-major programs are subject to the following minimum standards.

- Co-major Ph.D. students are required to earn at least 24 credits in 500–600 level mathematics courses other than Math 590, 591, 592, 599 and 699. They are required to take a total of four courses from the applied mathematics core including at least one one-year sequence (Math 561–562 or Math 519–520). They are also required to pass two of the qualifying examinations in one core area described in 4.5 below.

- Co-major Ph.D. students are required to have two years of professional experience including at least one year of supervised teaching. The other year may be supervised research as a research assistant or associate.

4.4 Core course requirements

The core course requirements for the M.S. in applied mathematics are:

1. At least 4 core courses.

2. At least 2 core courses in Applied Mathematics or at least 2 core courses in Numerical Analysis.

The core course requirements for the Ph.D. in applied mathematics are:

1. At least 6 core courses.

2. At least 3 core courses must be in Applied Mathematics or Numerical Analysis.

3. The core courses must include MATH 519 and MATH 561.

Core Courses

- Algebra:
  - MATH 504 Abstract Algebra I,
  - MATH 505 Abstract Algebra II,
  - MATH 510 Linear Algebra

- Analysis:
  - MATH 515 Real Analysis I,
  - MATH 516 Real Analysis II,
  - MATH 511 Complex Analysis

- Discrete Mathematics:
  - MATH 567 Graph Theory,
– MATH 568 Enumerative Combinatorics,
– MATH 566 Discrete Optimization

• Applied Mathematics:
  – MATH 519 Methods of Applied Mathematics I,
  – MATH 520 Methods of Applied Mathematics II,
  – MATH 557 Ordinary Differential Equations and Dynamical Systems

• Numerical Analysis:
  – MATH 561 Numerical Analysis I,
  – MATH 562 Numerical Analysis II,
  – MATH 517 Finite Difference Methods

A grade of B or better must be earned in each core course used to satisfy the requirements in this section. A deficiency may be made up any one of the following methods:

a) Retaking the course for credit and earning a B or better.

b) Retaking the final examination of the course and earning a B or better (permission of the instructor giving the final is required).

c) A pass on the associated qualifying examination, if such examination exists.

Students are strongly encouraged to consult their advisor prior to deciding which core courses to take, since certain core course combinations may not be suitable for certain areas of research.

4.5 Ph.D. qualifying examinations

A Ph.D. student in the applied mathematics program must pass four written qualifying examinations, including:

1. at least two in Applied Mathematics and/or Numerical Analysis, and
2. at least two in one area.

The 10 qualifying examinations are (listed as examination name, associated course #, area):

• Abstract Algebra, MATH 504, Algebra
• Linear Algebra, MATH 510, Algebra
• Real Analysis, MATH 515, Analysis
• Complex Analysis, MATH 511, Analysis
• Graph Theory, MATH 567, Discrete Mathematics
• Enumerative Combinatorics, MATH 568, Discrete Mathematics
• Methods of Applied Mathematics I, MATH 519, Applied Mathematics
• Methods of Applied Mathematics II, MATH 520, Applied Mathematics
• Numerical Analysis I, MATH 561, Numerical Analysis

• Numerical Analysis II, MATH 562, Numerical Analysis

Students are strongly encouraged to consult their advisor prior to deciding which examinations to take, since certain examination combinations may not be suitable for certain areas of research.

Each examination has a written syllabus (see links above) and one associated core course. A student taking an examination will be responsible for the topics listed in the appropriate examination syllabus. These topics are normally covered in the associated core course. However, the qualifying examination syllabi are definitive, and not all topics on the syllabi are covered each year in the appropriate courses. It is the student’s responsibility to be prepared to answer questions about any topic on the appropriate syllabus.

Each qualifying examination is offered twice per year (if there is demand at the relevant time), once in August and once within a month of the conclusion of the associated course. Students must request the examination in advance via the graduate secretary by the deadline set by the Graduate Committee (such request may be cancelled without penalty until 24 hours prior to the examination).

A student granted full admission to the Ph.D. program is expected to pass four qualifying examinations (subject to the rules above) within the first two calendar years in the program. A student who has passed three qualifying examinations in his or her first two years may request in writing an additional year to complete the fourth; such request should be addressed to the Graduate Committee (via the graduate secretary) with support from the student’s advisor. While such request is not guaranteed a positive response from the Graduate Committee, for a student otherwise in good standing this is considered a routine request. Whereas, approval of an appeal for more time to complete qualifying examinations from a student who has not passed three qualifying examinations will normally require extenuating circumstances.

For a student in the Ph.D. program not granted full admission (i.e., one who enters on restricted or provisional admission), the student will normally have two years to complete the qualifying examination requirement from the time his/her admission status is changed to “full”. Any exception to this rule would be put in writing by the DOGE at the time the student is admitted.

4.6 Oral preliminary and final examinations

4.6.1 Oral preliminary examination (Ph.D. only)

The oral preliminary examination of a Ph.D. student tests a student’s knowledge of the major, minor and supporting fields of their research area. The examination is taken after a student has passed four written qualifying examinations, satisfied the graduate English requirement (if required), formed a POS committee, and has an approved POS form. A student who fails the preliminary oral examination is allowed to retake it one additional time. Six months must elapse between the first attempt and the second. The preliminary oral examination must be passed at least six months prior to the final defense, unless an exception is allowed by the Dean of the Graduate College. A form requesting scheduling of the examination must be submitted to the Graduate College at least two weeks before the proposed date of the examination.
4.6.2 Final oral examination

The final examination of an M.S. candidate is oral and comprehensive. It normally consists of a defense of the thesis or creative component and an examination of the candidate’s knowledge of the topics covered in the program of study.

The final examination of a Ph.D. candidate is oral, and is usually limited to a defense of the dissertation.

4.7 Graduate English requirements

Graduate students whose native language is not English must meet the Graduate College English Requirement. (See the GCH for details.)

4.8 Teaching requirements

Each Ph.D. student is required to have one year of supervised teaching. However, if approved by the student’s POS committee, equivalent supervised experience in oral mathematics communication may be substituted for teaching. In that case the POS committee must specify in writing what the equivalent experience will be.

Every teaching assistant must demonstrate an ability to teach effectively. To assure this, before the beginning of the first semester they assumes their duties, teaching assistants are required to give a short, prepared lecture to a panel of experienced teaching assistants and/or faculty that is suitable for an algebra, trigonometry, or similar class. In addition, each teaching assistant whose native language is not American English must take the SPEAK/TEACH test (the test administered by the University to screen applicants for classroom duties) unless such student is a native English speaker from Australia, Canada, New Zealand, the United Kingdom of Great Britain, or Ireland. They must pass it at the first or second level before they are assigned a class or recitation section, and they must pass it at the first or second level within their first year of residence to guarantee continued financial support.

5 Satisfactory progress towards the degree

Every Spring each graduate student, with assistance from their advisor, is required to complete a Graduate Student Activities Report for the previous calendar year. In addition, instructors are requested to prepare brief evaluations of each mathematics graduate student’s performance in each course; these are placed in the student’s file. The Graduate Committee uses this information to assess each student’s progress and make recommendations to the Department Chair for financial support in the next academic year. Financial support is contingent upon satisfaction of the requirements outlined in this section.

The Committee uses the following general guidelines as criteria to assess progress toward the degree. International students with teaching assistantships should pass the SPEAK/TEACH test and satisfy the Graduate English requirement within their first year.
5.1 M.S. degree students

Students in the M.S. program should complete all requirements for the M.S. degree in two years. Under special circumstances, the student and their advisor may request an additional semester of support. A POS committee should be formed before the beginning of the third semester in the M.S. program.

The student must maintain a cumulative grade point average of at least 3.0 in all course work, exclusive of research credit.

5.2 Ph.D. degree students

5.2.1 Students admitted to the Ph.D. program on entering with an M.S.

A student who already possesses a U.S. mathematics M.S. or equivalent degree on entry should complete all requirements for the Ph.D. degree in four years. Under special circumstances, the student and their advisor may request one additional year of support. The student should take at least one qualifying examination upon arrival on campus, pass two examinations by the beginning of the third semester, and pass four examinations by the beginning of the fourth semester. The POS committee should be formed by the beginning of the fourth semester. The oral preliminary examination should be taken no later than the end of the sixth semester.

The student must maintain a cumulative grade point average of at least 3.33 in graduate level mathematics courses and of at least 3.0 in all course work, exclusive of research credit.

5.2.2 Students admitted to the Ph.D. program on entering without an M.S.

Ph.D. students entering without a U.S. mathematics M.S. or equivalent degree should complete all requirements for the Ph.D. degree in five years. Under special circumstances, the student and their advisor may request one additional year of support. The student should take at least two qualifying examinations by the beginning of the third semester, pass two examinations by the beginning of the fourth semester, and pass four examinations by the beginning of the fifth semester. The POS committee should be formed by the beginning of the fifth semester. The oral preliminary examination should be taken no later than the end of the eighth semester.

The student must maintain a cumulative grade point average of at least 3.33 in graduate level mathematics courses and of at least 3.0 in all course work, exclusive of research credit.

Ph.D. students admitted without an M.S. or equivalent degree will be required to transfer to the M.S. program under any of the following circumstances:

- They have failed to pass three qualifying examinations by the beginning of their fifth semester;
- Their cumulative grade point average in graduate level mathematics courses does not exceed 3.32 by the beginning of their fifth semester;
- They have failed to constitute a Ph.D. POS committee by the beginning of their sixth semester.

Such students are expected to complete all requirements for the M.S. degree within one year of the transition to the M.S. program.
5.2.3 Students admitted to the Ph.D. program from the M.S. program

(See 5.3 below.) For a student entering the Ph.D. program from the M.S. program, the timeline for completion of the Ph.D. for a student entering without an M.S. is applied to the student’s entire tenure in the ISU Mathematics Department. Thus, the student should complete all requirements for the Ph.D. degree within five years of admission to the M.S. program. Under special circumstances, the student and their advisor may request one additional year of support. The student should pass four qualifying examinations by the beginning of the third semester in the Ph.D. program. A POS committee for the Ph.D. should be formed by the beginning of the third semester in the Ph.D. program. The oral preliminary examination should be taken by the end of the eighth semester in the department.

The student must maintain a cumulative grade point average of at least 3.33 in graduate level mathematics courses and of at least 3.0 in all course work, exclusive of research credit.

5.3 Admission into the Ph.D. program from the M.S. program

By the beginning of the third semester an M.S. student desiring to continue for a Ph.D. should request admission into the Ph.D. program. This request should be made in writing to the Graduate Committee. Students requesting admission into the Ph.D. program should meet the following minimum requirements:

- They must have maintained a 3.33 or better grade point average on graduate level mathematics courses.
- They must have passed at least two written qualifying examinations.

Students who fail to meet these requirements will be classified as terminal M.S. candidates.

A student in the M.S. program who has completed more than one year must request permission to attempt a qualifying examination.

5.4 Failure to maintain academic standing

If a graduate student does not maintain a cumulative 3.0 grade point average on all course work taken, exclusive of research credit, they may be placed on probation by the Dean of the Graduate College. The Graduate College places a hold on future registrations by a student on probation; see the GCH for more details. Before a student on probation registers for each term, there must be a review of their record by the POS committee. Further registration will not then be permitted without recommendation in writing by the Graduate Committee to the Graduate College.

It is the purpose of the yearly review to anticipate any problems that a student may have in making satisfactory progress toward a degree. Generally, failure to meet the time limits or maintain the grade point averages specified in 5.1 above and 5.2 above is considered the main evidence of unsatisfactory academic progress. If the student fails to meet any of the time limits under extenuating circumstances, they may petition the Graduate Committee for extension of one or more of those limits.

Under certain circumstances it may be necessary to terminate a graduate student’s enrollment in a program because of lack of satisfactory academic progress, or for other reasons as specified in the GCH. The procedures of dismissal are spelled out in the GCH.
5.5 Grievance procedures

If dismissal is based on failure to make satisfactory progress, the graduate student may appeal to
an ad hoc grievance committee that is appointed for this purpose by the Chair of the Department
of Mathematics. Details of the constitution of the grievance committee, and the procedures it
will follow, are given in the GCH.

6 Minor requirements for students from other departments

Ph.D. students who declare a minor in mathematics or applied mathematics are required to
have at least 12 credits in mathematics courses which are acceptable for non-major graduate
credit, excluding Math 590, 591, 592, 599 and 699, and of which at least 6 must be in 500-
600 level mathematics courses. M.S. students who declare a minor in mathematics or applied
mathematics are required to have at least 6 credits in mathematics courses which are acceptable
for non-major graduate credit, excluding Math 590, 591, 592, 599 and 699, at the 400-level or
above. The decision whether the minor is most appropriately declared in mathematics or applied
mathematics shall be left to the discretion of the POS committee.