**Ph.D. in Mathematics**

Students in mathematics are expected to develop competence in real and complex analysis and at least two areas chosen from applied mathematics, dynamical systems, functional analysis, numerical analysis, partial differential equations, probability, topology or other topics the student’s committee may approve.

The student’s graduate committee determines additional requirements. Degree candidates are expected to be familiar with both departmental and The Graduate School degree requirements.

**Departmental Requirements**

Described below are the Department of Mathematical Sciences requirements for the Ph.D. in Mathematics. These departmental requirements supplement those set out by the Graduate School in the Graduate Catalog for Ph.D. Students.

There are no foreign language requirements or qualifying exam for a Ph.D. in Mathematics.

**Ph.D. Committee**

- The Ph.D. committee must include a minimum of five members excluding the Graduate School-assigned Graduate Representative.
- A committee must be formed before the end of the student’s second semester of study.
- The Committee Chairperson (Advisor) must be a faculty member within the Department of Mathematical Sciences.
- The first three committee members listed on a candidate’s Program of Study read and assess the dissertation.

**Course Requirements**

- A minimum of 30 credit hours beyond the M.S. degree are required (see the Graduate Catalog for Ph.D. Students for details).
- A minimum of 18 credit hours of Doctoral Thesis (M 690) must be taken.
- The Ph.D. student’s Program of Study listing their intended coursework must be approved by all committee members.
- The student must take a minimum of 4 credits of the M 594 seminar series.

Typically, a Ph.D. student takes 18 credits of mathematics in courses numbered 500 or higher to prepare for their comprehensive examination. Students are encouraged to begin some form of doctoral reading or research (either informally or in the form of M 689 credits) with a committee member by their second year of study.

**Ph.D. in Mathematics Comprehensive Exam**

The Ph.D. Comprehensive examination consists of both a written and an oral comprehensive examination. The candidate must pass the written comprehensive exam before taking the oral comprehensive examination.

**Written Comprehensive Exam**

How a student may choose and retake exam components is determined by all of the following:

1. The written comprehensive exam consists of 4-hour exam components graded as Pass or Fail.
2. The candidate must pass three components to pass the written comprehensive examination though they may attempt more.

3. If a candidate fails a component it may be attempted at most one more time.
4. The candidate must pass the following "required" components:
   a. Measure Theory (M 547), Complex Analysis (M 551)
5. Normally the remaining components are from the following list of "standard" components:
   a. General Topology (M 511)-Geometry & Algebraic Topology (M 512)
   b. Dynamical Systems I (M 595)-Dynamical Systems II (M 596)
   c. Functional Analysis I (M 584)-Functional Analysis II (M 585)
   d. Numerical Solution of Partial Differential Equations I (M 581)-Numerical Solution of Partial Differential Equations II (M 582)
   e. Part Differential Equations I (M 544)-Part Differential Equations II (M 545)
   f. Methods of Applied Mathematics I (M 560)-Methods of Applied Mathematics II (M 561)
   g. Measure Theory (M 547), Probability Theory (M 586)
6. At most one "nonstandard" component not from the "standard" components (list above) may be taken. To take such a component a petition form must be completed.

**Oral Comprehensive Exam**

After passing the written comprehensive exam the candidate must pass an oral comprehensive exam at a date agreed upon by the candidate’s committee. Normally the oral comprehensive exam is a thesis topic proposal where the candidate’s ability to conduct research on the proposal is assessed. When this is not the case, the candidate will be informed of the nature of the oral comprehensive exam by their committee. The candidate has at most two attempts to pass the oral comprehensive examination.

**Ph.D. in Mathematics Dissertation Requirements**

Once the Ph.D. candidate has passed the comprehensive exam (both written and oral parts) the student has at most five years to submit an acceptable dissertation and pass their final defense. The first three committee members listed on a candidate’s Program of Study must be approved by all committee members. The first three committee members listed on a candidate’s Program of Study must be given an acceptable dissertation and pass their final defense. The student has at most five years to submit an acceptable dissertation and pass their final defense. The first three committee members listed on a candidate’s Program of Study must be approved by all committee members.

**Ph.D. in Mathematics Final Defense**

Department policies on the final defense and all other administrative procedures regarding the degree completion are exactly those as set out by The Graduate School.