Mathematics (PhD)

The Mathematics Department at the University of Oregon offers a PhD in a variety of areas of mathematics. The American Mathematical Society has ranked us in the top group of U.S. research departments. The department has distinguished research groups in algebra, analysis, topology, geometry, probability, number theory, and mathematical biology. We are large enough to provide the quality and breadth required for a major research department, yet small enough so that graduate students have close interactions with the faculty. There are about 30 faculty members and 65 graduate students.

Program Learning Outcomes

Upon successful completion of this program, students will be able to:

- Demonstrate mastery of subject knowledge in three core areas. The core subject areas taught in our graduate program are algebra, topology/geometry, analysis/probability, and applied mathematics. Graduate students are expected to attain a mastery of this material at an advanced level for two of these core areas, and at least at an intermediate level for a third area.
- Demonstrate ability to learn from non-expository sources. Learning material from research papers is different from learning from courses and textbooks. Graduate students are expected to demonstrate the ability to learn material from non-expository sources, including at least one source that is written in French, German, or Russian.
- Conduct original and substantive research. The most important requirement for completing a Ph.D. in mathematics is producing a dissertation containing original and substantive mathematical work.
- The learning outcomes for students who earn a Master's degree consist of a modified version of LO1 for Ph.D. students. To earn a Master's degree, a student must complete full year course sequences in each of the three core areas, one at the advanced level and two at the intermediate level

Explanation:

Demonstrate mastery of subject knowledge in three core areas.

Explanation: The three core subject areas taught in our department are algebra, topology/geometry, and analysis/probability. Graduate students are expected to attain a mastery of this material at an advanced level for two of the three core areas, and at an intermediate level for the third area.

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Conduct original and substantive research

Explanation: The most important requirement completing a Ph.D. in mathematics is producing a dissertation containing original and substantive mathematical work.

Mathematics Major Requirements

The PhD is a degree of distinction not to be conferred in routine fashion after completion of a specific number of courses or after attendance in Graduate School for a given number of years.

The department offers a PhD degree in mathematics. Advanced graduate courses in each area of mathematics are typically offered in topics courses (numbered MATH 607). A student in the pre-PhD program may also be a candidate for the master's degree.

Pre-PhD Program

Students entering the pre-PhD program will have completed a course of study equivalent to the graduate preparatory bachelor's degree program described in the department's Undergraduate program. Students in the pre-PhD program must take the qualifying examination by the beginning of their third year, during the week before classes begin fall term. It consists of examinations on two basic 600-level graduate course sequences, one each from two of the following four categories:

1. algebra
2. analysis and probability
3. topology and geometry
4. applied math

The Sequence Requirement

Each student is required to complete at least one sequence from three of the following four areas: analysis/probability, topology/geometry, algebra, and applied mathematics, subject to the following requirements:

- The sequences in at least two areas must be at the 600-level.
- All courses applied to this requirement must be completed with a grade of B or above.
- The average grade in each sequence applied to this requirement must be at least B+.

Code	Title	Credits
Area 1: Analysis/Probability		
MATH 513–515	Introduction to Analysis I-III	
MATH 616–618	Real Analysis	
MATH 671–673		
Area 2: Geometry/Topology		
MATH 531–532	Introduction to Topology	
MATH 634–636	Algebraic Topology	
MATH 637–639	Differential Geometry	
Area 3: Algebra		
MATH 544–546	Introduction to Abstract Algebra I-III	
MATH 647–649	Abstract Algebra	
Area 4: Applied Mathematics		
MATH 607	Seminar: [Topic] (Stochastic Processes)	

MATH 607	Seminar: [Topic] (Statistical Learning)	
MATH 607	Seminar: [Topic] (Machine Learning)	
Total Sequence Requirement Credits		**36**
Electives		**27**
Dissertation		**18**
MATH 603	Dissertation	
Total Credits		**81**

PhD Program

Admission to the PhD program is based on the following criteria:

- satisfactory performance on the qualifying examination
- completion of three courses at a level commensurate with study toward a PhD
- satisfactory performance in seminars or other courses taken as a part of the pre-PhD or PhD program.

Students who are not admitted to the PhD program because of unsatisfactory performance on the fall-term qualifying examination may retake the examination at the beginning of winter term.

A student in the PhD program is advanced to candidacy after passing a language examination and the comprehensive examination. To complete the requirements for the PhD, candidates must submit a dissertation, have it read and approved by a dissertation committee, and defend it orally in a formal public meeting.

Language Requirement

The department expects PhD candidates to be able to read mathematical material in a second language selected from French, German, and Russian. Other languages are acceptable in certain fields. To fulfill the language requirement, the student must meet with a faculty member—a doctoral advisor or a member of the PhD committee—to obtain advice for a suitable paper or book. The paper or book should be written in French, German, or Russian and have mathematical material beneficial to the student's area of study. After reading, translating, and understanding the material, the student meets with the faculty member again. The faculty member determines whether the student understands the material. If satisfied, the faculty member deems the requirement met and the decision is added in writing to the student's record.

Comprehensive Examination

This oral examination emphasizes the basic material in the student's general area of interest. A student is expected to take this examination by the end of the second academic year in the PhD program. To be eligible to take this examination, a student must have completed the language examination and nearly all the course work needed for the PhD.

Dissertation

PhD candidates in mathematics must submit a dissertation containing substantial original work in mathematics. Requirements for final defense of the dissertation are those of the Graduate School.