Mathematics (MS)

Master's degree programs are available to suit the needs of students with various objectives. There are programs for students who intend to enter a doctoral program and for those who plan to conclude their formal study of pure or applied mathematics at the master's level.

In addition to general Division of Graduate Studies requirements, the specific graduate program courses and conditions listed below must be fulfilled. More details can be found in the Department of Mathematics *Graduate Student Handbook*, available in the department office and online (https://math.uoregon.edu/wp-content/uploads/2022/11/Handbook-22-23.pdf). All mathematics courses applied to degree requirements, including associated reading courses, must be taken for letter grades. A final written or oral examination or both is required for master's degrees except under the pre-PhD option. This examination is waived under circumstances outlined in the departmental *Graduate Student Handbook*.

Program Learning Outcomes

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

- Use the language of mathematics correctly in the context of linear algebra and multi-variable calculus.
- Read and interpret written mathematics expressed using definitions, axioms, theorems, proofs and conjectures.
- Write clear and logical explanations of mathematical ideas.
- Apply computational and problem solving skills to investigate new mathematical questions.
- Demonstrate familiarity with the remarkable breadth of classical mathematics, including at least one area from algebra (groups of symmetries, factorization in commutative rings), analysis (limits, derivatives, integrals, and series), and number theory (prime numbers, Diophantine equations, and quadratic reciprocity).
- (Standard track) Model real world situations using mathematical tools such as differential equations or statistics to fit models to data. Apply analytic and critical reasoning skills in the context of models and data. Use appropriate scientific programming (such as Python or R) to make computations or analyze data sets.

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.

Demonstrate ability to learn from non-expository sources.
Explanation: 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.
Explanation: The most important requirement completing a Ph.D. in mathematics is producing a dissertation containing original and substantive mathematical work.

The learning outcomes and assessments for students who earn a master's degree consist of a modified version of Learning Outcome #1 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 600-level and two at the 500-level, with an average grade of B+ or better and a minimum grade of B or better in each sequence. In addition, the student is required to complete at least 45 graduate credit hours, at least 30 of which are completed in the Department of Mathematics.

Mathematics Major Requirements

Code	Title	Credits
Three of the following sequences below with at least one at 600-level [1]		**30**
500-Level Sequences		
MATH 513	Introduction to Analysis I	
& MATH 514	and Introduction to Analysis II	
& MATH 515	and Introduction to Analysis III	
MATH 531	Introduction to Topology I	
& MATH 532	and Introduction to Topology II	
& MATH 533	and Introduction to Differential Geometry	
or MATH 53:	Introduction to Topology I	
	and Introduction to Topology II	
& MATH 532	and Introduction to Topology III	
& MATH 534		
MATH 544	Introduction to Abstract Algebra I	
& MATH 545	and Introduction to Abstract Algebra II	
& MATH 546	and Introduction to Abstract Algebra III	
600-Level Sequences		
MATH 647	Abstract Algebra	
& MATH 648	and Abstract Algebra	
& MATH 649	and Abstract Algebra	
MATH 634	Algebraic Topology	
& MATH 635	and Algebraic Topology	
& MATH 636	and Algebraic Topology	
MATH 637	Differential Geometry	
& MATH 638	and Differential Geometry	
& MATH 639	and Differential Geometry	
MATH 616	Real Analysis	
& MATH 617	and Real Analysis	
& MATH 618	and Real Analysis	
MATH 616	Real Analysis	
& MATH 672	and Theory of Probability	
& MATH 673	and Theory of Probability	
MATH 607	Seminar: [Topic]	
& 607	and Seminar: [Topic]	
& 607	and Seminar: [Topic] [2]	
Electives [3]		**9-15**
Total Credit Requirement:		45

1 At least 9 credits of 600-level mathematics courses. Excluding Reading and Conference: [Topic] (MATH 605).

2 Only MATH 607 courses in the "applied math" sequence count toward this requirement.

3 Up to 15 credits can be taken outside of mathematics.

Students should also have taken a three-term upper-division or graduate sequence in statistics, numerical analysis, computing, or other applied mathematics.