Student Learning Outcomes

The Bachelor’s degree in Mathematics

Mathematical Knowledge

Students will know the standard facts and algorithms of

K - 1. calculus and differential equations
K - 2. advanced analysis, including the theoretical justification of the basic rules of calculus
K - 3. abstract algebra, including the basic properties of groups, rings, and fields
K - 4. a specialized area of mathematics at a basic level (as defined by the student and the student’s advisor)

Mathematical Reasoning

Students will be able to

R - 1. define and explain mathematical concepts.
R - 2. compose and explain mathematical proofs and counter examples; make logical inferences
R - 3. propose conjectures, generalizations, and mathematical questions
R - 4. solve non-routine mathematical problems
R - 5. read, discuss, and write mathematics

For this degree, outcomes will be assessed at the basic level, characterized by an ability to explain and reproduce concepts and mathematical arguments developed in classes and readings and the ability to apply these ideas to new situations that are similar in broad outlines to previously encountered situations.
The Master’s degree in Mathematics

Mathematical Knowledge

Students will know the standard theorems and techniques of

K - 1. undergraduate mathematics,
K - 2. advanced analysis, including properties of metric spaces, Riemann integration and functions of several variables,
K - 3. abstract algebra, including homomorphism theorems, Galois theory, and vector spaces, and
K - 4. a specialized area of mathematics at an advanced level (as defined by the student and the student’s committee).

Mathematical Reasoning

Students will be able to

R - 1. define and explain mathematical concepts
R - 2. compose and explain mathematical proofs and counterexamples; make logical inferences
R - 3. propose conjectures, generalizations, and mathematical questions
R - 4. solve non-routine mathematical problems
R - 5. read, discuss, and write mathematics

For this degree, outcomes will be assessed at the advanced level, characterized by an ability to explain and reproduce mathematical concepts and arguments introduced in classes and readings, but with a possible expectation of further development by the student, and the ability to apply these ideas to new situations that may be dissimilar to previously encountered applications.
The Ph.D. degree in Mathematics

Mathematical Knowledge

Students will know the standard theorems and techniques of

K - 1. masters level mathematics,
K - 2. real and complex analysis, including Lebesgue theory and analytic function theory,
K - 3. higher algebra, including structure theorems,
K - 4. geometry/topology, including point-set topology, homotopy and homology theory, and differentiable manifolds, and
K - 5. a specialized area of mathematics at an expert level (as defined by the student and the student’s committee).

The areas of differential equations or applied mathematics may be substituted for one of K-2, K-3, or K-4. For more details on the specific topics of mathematical knowledge required for the Ph.D., see the qualifying exam syllabi on the mathematics department web site.

Mathematical Reasoning

Students will be able to

R - 1. define and explain mathematical concepts
R - 2. compose and explain mathematical proofs and counterexamples; make logical inferences
R - 3. propose conjectures, generalizations, and mathematical questions
R - 4. solve non-routine mathematical problems
R - 5. read, discuss, and write mathematics

For this degree, outcomes will be assessed at the expert level, characterized by an ability to create original and significant mathematics.