

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.