

Syllabus for the Logic Qualifying Exam

1. Set Theory

- equivalent forms of the Axiom of Choice
- elements of cardinal and ordinal arithmetic

2. Model Theory and Proof Theory of the Predicate Calculus

- Completeness Theorem
- Theorems of Gentzen and Herbrand
- Interpolation and Consistency Theorems (Craig, Beth, Robinson)
- Downward Lowenheim-Skolem Theorem
- Compactness Theorem
- Quantifier Elimination and Model Completeness
- OPTIONAL: Ultrapowers and ultraproducts, non-standard models of arithmetic

3. Computability and Recursion Theory

- Turing Machines, the Universal Machine, the Halting Problem
- Primitive Recursive Functions, General Recursive Functions
- Church's Thesis, the Decision Problem
- Recursion Theorems
- Decidable Theories, Vaught's Test, Quantifier Elimination
- Undecidable Theories, Gödel's First Incompleteness Theorem
- Gödel's Second Incompleteness Theorem
- OPTIONAL: Complete r.e. sets, the Friedberg-Muchnik Theorem