MATH 150 SUGGESTED SYLLABUS

Textbook: Herbert Enderton: A Mathematical Introduction to Logic

Topics:

- Sentential Logic: The language of sentential logic, formulas, truth assignments; Tautologies, extensions of truth assignments, satisfaction and implication; Ancestral trees; Boolean functions, completeness of connectives; conjunctive and disjunctive normal forms; Optional: Logical gates.
- Infinite trees, König's Lemma, Compactness Theorem for sentential logic.
- The language of first order predicate logic, variables, terms, formulas, free variables, sentences; Structures, satisfaction relation, logical implication.
- Examples of first order structures and theories: groups and rings, Robinson arithmetic, Peano arithmetic, partial and linear orderings, dense linear orderings without endpoints, graphs, natural, rational, real and complex numbers. Optional: Structures for language of set theory.
- Axioms and rules of inference, formal deductions.
- Soundness.
- Gödel Completeness Theorem.
- Applications of the Compactness Theorem: Nonstandard models of natural/real numbers, expressible strength of languages.
- Optional: Elementary notions of model theory: Elementary classes, substructures, embeddings, elementary substructures and Vaught criterion, elementary embeddings.