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GENERAL SYLLABUS FOR MA531. MATHEMATICAL LOGIC

The course provides a treatment of first-order logic as the basis for mathematical logic and an underlying language for mathematics. The syntax and semantics of quantifiers are analyzed, leading to Gödel's Completeness Theorem. Gödel's Incompleteness Theorem is then sketched and its ramifications for computability and philosophy are considered.

If there is time left, Turing's Halting Problem and the beginnings of the theory of computability are discussed.

Required Texts: Herbert B. Enderton *A Mathematical Introduction to Logic* Second Edition, Harcourt Academic Press.

GENERAL SYLLABUS FOR MA532. FOUNDATIONS OF MATHEMATICS

The course begins, if necessary, with a review of first-order logic and formal systems. It then focuses on axiomatic set theory as the basic framework for mathematics, and as a distinctive field of mathematics. With emphasis on the historical context, the theory is developed from its beginnings in the work of Cantor and Zermelo through to modern preoccupations.

Proceeding through the basic axioms, the algebra of classes, and the set vs. class distinction, mathematical concepts of number from integers to reals are discussed. Then Cantor's transfinite numbers and Continuum Hypothesis are considered, and Zermelo's Axiom of Choice and its role in mathematics surveyed. Finally, recent results and current problems are broached.

Required Text: Karel Hrbacek and Thomas Jech, *Introduction to Set Theory*, Third Edition (New York: Marcel Dekker 1999).

Grading for Both Courses: Exercises, 50%; midterm 16.7%; and final 33.3%. Exercises will be periodically assigned, collected on the date due, and corrected. They can be recycled once for full credit up to the collection date of the succeeding assignment.

Incompletes and Withdrawals: The incomplete grade *I* is given only in exceptional cases to students who have maintained a good record through much of the course and suddenly find themselves in difficult circumstances (illness, death in the family). Others who find early on that they are not keeping up are urged to drop or withdraw from the course.

Please be aware of the last date to process a Withdrawal. Currently, it seems to be in the 8th week of the semester.