

CALIFORNIA STATE UNIVERSITY, SACRAMENTO
Department of Mathematics and Statistics

SYLLABUS

Math 161: Introduction of Mathematical Logic

Prerequisites: Math 108 Offered in Fall Semester only

An Introduction to mathematical logic. Syntax and semantics of propositional logic and of 1st order predicate logic.

- I. Introduction
 - Some paradoxes, and an overview of logic.
 - A brief review of induction and some material from Math 108.
- II. Propositional logic, semantics and syntax
 - a. Statements and connectives
 - b. Truth functions and truth tables
 - c. Normal forms (briefly)
 - d. Adequacy of sets of connectives
 - e. Axioms for propositional logic -- with an introduction to formal theories
 - f. Formal proofs and meta proofs
 - g. The Deduction Theorem Completeness and Soundness of propositional logic
- III. First order predicate logic, syntax and semantics
 - a. Predicates and quantifiers
 - b. Free variables, bound variables, substitutions
 - c. Interpretations, satisfaction, truth, validity, models
 - d. First order theory of predicate calculus
 - e. Some proof theory; the Deduction Theorem
 - f. Godel's Completeness Theorem
 - g. Lowenheim - Skolem Theorem, Compactness Theorem
- IV. Selected Topics

As time permits, selected topics from model theory, Godel's incompleteness theorems, theory of computability, unsolvability, and undecidability.