Math 161 : Mathematical Logic

California State University, Sacramento · Department of Mathematics & Statistics

An introduction to mathematical logic. Syntax and semantics of propositional logic and of 1st order predicate logic. Offered in Fall Semester only

Catalog Description

Advanced study of logic with special application to mathematics.   **Graded**: Graded Student.   **Units**: 3.0.

Prerequisites

Math 108.

Course Outline

  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.