

Math 114L: Mathematical Logic

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Catalog Description

114L. Mathematical Logic (Formerly numbered 114B). Lecture, three hours; discussion, one hour. Requisite: course 110A or 131A or Philosophy 135. Introduction to mathematical logic, aiming primarily at completeness and incompleteness theorems of Gödel. Propositional and predicate logic; syntax and semantics; formal deduction; completeness, compactness, and Löwenheim/Skolem theorems. Formal number theory: nonstandard models; Gödel incompleteness theorem. P/NP or letter grading.

General Information

If a sentence is true, is there necessarily a proof of it? What is a proof? These questions stand at the heart of mathematical activity.

Math 114L shows that these questions can be investigated by mathematical methods. A major goal is the completeness theorem for first-order logic, which shows that the concept of provability from axioms can be completely nailed down. The Gödel incompleteness theorem shows that there is an inherent gap between what is true (about the positive integers, for example) and what can be proved in a formal system.

The course is suitable both for mathematics students and for those studying the philosophy of mathematics.