MATH0050 Logic

Year:	2024–2025
Code:	MATH0050
Level:	6 (UG)
Value:	15 credits (= 7.5 ECTS credits)
Term:	2
Assessment:	85% examination, 15% coursework
Normal Pre-requisites:	MATH0047
Lecturer:	Dr I Strouthos

Course Description and Objectives

In this course, we will aim to introduce a language for (first order predicate) mathematical logic and proceed to study the interplay between the notions of 'truth' and 'provability' in the propositional and first order predicate 'versions' of logic. We will then aim to study computability, via register machines, recursive functions and coding, and try to use these concepts to show that first order predicate logic is undecidable.

Students from outside the Mathematics Department should take this module rather than MATH0037, and are expected to have achieved a strong result in a previous mathematics module (normally MATH0047). In this course, we will aim to introduce various aspects of logic to students based in departments other than the Department of Mathematics at UCL.

Recommended Texts

There is a number of textbooks covering the subject area(s) studied in this course. We will aim to make the course quite self-contained, but please feel free to contact the lecturer if you would like to obtain some further information regarding suitable textbooks for the course.

Detailed Syllabus

Language: Description and construction of a formal language for first order predicate logic.

Propositional logic: A study of the semantic and syntactic aspects of propositional logic, including the semantic tableaux method, and a description of the completeness theorem for propositional logic and of some of its consequences.

Predicate logic: A study of the semantic and syntactic aspects of firstorder predicate logic, including examples of first order languages and theories, and a description of the completeness theorem for first order predicate logic and of some of its consequences.

Computability: An introduction to recursive partial functions and, via the notion of register machines, to computable partial functions, and a description of the halting problem.