PHIL 152: Computability and Logic (Spring 2009)

ai.stanford.edu/~epacuit/classes/phil152spr09.html

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Office Hours:	TBA
Class Times:	TTh 2:15 - 3:30
Class Location:	200-030

Course Description

This course is a continuation of Phil 151/152 (First Order Logic). Specifically, we will study Chapter 3 of *A Mathematical Introduction to Logic* by Herbert Enderton which focuses on two famous theorems due to Kurt Gödel: The Incompleteness Theorems. The first of these states, roughly, that every formal mathematical theory, provided it is sufficiently expressive and free from contradictions, is incomplete in the sense that there are always statements (in fact, true statements) in the language of the theory which the theory cannot prove. We will prove the 1st and 2nd Incompleteness Theorems and survey their technical and philosophical repercussions.

In order to prove the Incompleteness Theorem(s), we will need to study the expressive power of formal languages and axiomatic theories and also discuss different approaches to effective computation: recursive functions, register machines, and Turing machines. We will discuss their equivalence, Church's thesis and elementary recursion theory. Finally, we will discuss modal provability logic.

Literature (Required)

A Mathematical Introduction to Logic (second edition) by Herbert Enderton, Academic Press (2002).

Prerequisites

PHIL 151/251 or consent of the instructor.

Course Webpage

Be sure to consult the course web page (given above) regularly for the up-to-date course schedule, additional reading materials, announcement, etc.

Grading Policy

There will be 3 homework assignments and a take-home final exam. Each homework assigment counts for 20% of the final grade and the final examp counts for 40%. The solutions will be made available at Tanner Library.

For the final exam, you may NOT collaborate with others in any way. For the homework assignments, you are encouraged to work in small groups. You may discuss the problems with one another or with me. *But you must always do the final write-up completely on you own.* A good strategy when working together is to use a blackboard and erase it completely before writing up your (separate) answers. Please write the name of your discussion partners on the front page of your homework assignments.

Schedule

We will cover chapter 3 of Enderton's book and possibly some of Chapter 4. A more detailed schedule will be maintained on the course website. We will also study modal provability logic (relevant material will be made available in class and placed on reserve in Tanner Library).