Computability and Logic: 24 lectures in Lent Part III

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The course is expanded to 24 lectures from the 16 lectures of 2010/11 and 2011/12, and it is not yet 100% clear what will be in. However the following picture should be pretty accurate.

Recursive datatypes. Structural and wellfounded induction. Finite state machines. Primitive Recursive functions. General Recursive functions. Turing Machines. Lambda-representable functions. Semidecidable and decidable sets. Unsolvability of the halting problem. Rice's theorem. Recursive inseparability and Tennenbaum's theorem. Automatic structures (automatic groups) and automatic theories. Recursive structures. Recursive ordinals and hierarchies of fast-growing functions. Axiomatisable and nonaxiomatisable theories. Trakhtenbrod's theorem. Incompleteness of arithmetic. Undecidability of Predicate calculus. Introductory Degree theory: Friedberg-Muchnik, Baker-Gill-Solovay.

Pre-requisite Mathematics

The course is designed to be the sequel to Part II Logic and Set Theory.

Literature

There are numerous textbooks with titles like this course, and I can't think of any that the prospective reader needs to be warned against. Two suitable books easily available locally with your student discount are:

G. Boolos and R. Jeffrey "Computability and Logic" CUP paperback

N Cutland "Computability" CUP paperback

Earlier editions of Boolos-and-Jeffrey are to be preferred to the latest version prepared by Burgess. Mendelson's *Introduction to Mathematical Logic* is a good general background.