

The George Washington University
New Graduate Mathematics Course
Math 272: Topics in Logic
Topics in Model Theory and Algorithmic Model Theory

Fall 2005
TuTh 2:20–3:35p.m.
1957 E Street, Room 313

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Thursdays 12:45–1:45p.m.
Other times by appointment

Math Department

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Course Description

We will cover a variety of important topics in model theory, and their counterparts in computable model theory. Model theory, emerged as a distinct field in the 1940's through the works of Gödel, Löwenheim, Malcev, Skolem, Tarski, and others. It provides a rigorous framework for the notions of language, meaning, and truth. A model, a concept used in all of sciences, describes a portion of reality by using a formal language to express properties under study. In the 1930's, Church, Gödel, Kleene, Post, Turing, and others developed computability theory, the mathematical theory of the power and limitations of algorithms. Their results paved the way for the invention of modern computers. Interaction of computability theory with model theory, as well as other areas of mathematics, has resulted in computable model theory and, more generally, in computable mathematics. Gödel's incompleteness theorem is a striking early result in computable model theory. While some mathematical constructions are algorithmic, or can be replaced by algorithmic ones yielding the same results, others are intrinsically non-algorithmic. Examples of negative results in computable model theory include the undecidability of the Hilbert's tenth problem, and the undecidability of the word problem in combinatorial group theory.

Textbook

A Shorter Model Theory by Wilfred Hodges, Cambridge University Press, 1997.
Other material, including material on computable model theory, will be provided in class.

Grading

Class participation (attendance, discussion, blackboard presentations of problems): 50%
Take-home assignments and projects and their presentations: 50%