

Logic I (Model Theory)

MATH 71100

Fall 2015

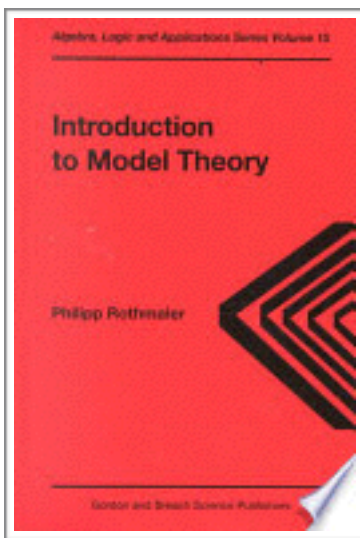
TueTh 6:30-8:00PM

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Model theory is the study of mathematical structures from a logic point of view, with rigorous attention to the terms and symbols used in our descriptions of mathematical structures, and also to how much we can hope to prove about these structures based on those descriptions. Model theory therefore has many connections to other mathematical disciplines, a fact that we will constantly emphasize throughout the course. Most examples will be taken from algebra (group theory, field theory), geometry and topology, so some knowledge of these topics might be useful, although it is not required.

We will use P. Rothmaler's book *Introduction to Model Theory*, Gordon and Breach Science Publishers, Algebra, Logic and Application Series **15** (2000). I will regularly assign homework, which we will discuss the next session. There will be two written assignments (worth 25% each) and one take-home final (worth 50%) based on which I will give you a final grade in this course. All this material will be posted on my website.

The sequence Math 711-712 is the usual preparation for students wishing to take the Logic Qualifying Exam.

Tentatively, we will cover the following topics:

- Chapter 1. Structures
- Chapter 2. Languages
- Chapter 3. Semantics
 - Assignment #1: Geometric approach to definable sets
- Chapter 4. The finiteness theorem
- Chapter 5. First consequences of finiteness theorem
- Chapter 6. Malcev's applications to group theory
- Chapter 8. Elementary maps
- Chapter 9. Elimination
 - Assignment #2: Muchnik's proof of Tarski's QE for the reals
- Applications: field theory
 - Take-home final