

Graduate Course: Model Theoretic Algebra  
Math 872.3 (1), T1, 2005–06  
**COURSE OUTLINE**

This course is an introduction to model theory and its applications to algebra. It will at the same time introduce several algebraic concepts, mainly from field theory. The following topics shall be studied:

- Structures, languages and axioms
- Embeddings and elementary extensions
- The Compactness Theorem
- Quantifier Elimination
- Types and saturation
- Existentially closed substructures, Robinson's Test
- Model complete and complete theories
- Model companion and model completion
- Ultraproducts
- Ordered abelian groups
- formally real fields
- formally  $p$ -adic and valued fields (if time permits)
- Nullstellensätze and Hilbert's 17th Problem
- Artin's Conjecture (if time permits).

The final mark will be calculated as follows:

- Assignments (approx. one every two weeks): 20 %
- Midterm Exam: 30 %
- Final Exam: 50 %.

Basic literature:

Kuhlmann, F.-V.: *Introduction to Model Theoretic Algebra*, manuscript. Will be distributed at the beginning of the class.

Chang, C. C. – Keisler, H. J.: *Model Theory*, Amsterdam – London (1973)

Prestel, Alexander: *Einführung in die Mathematische Logik und Modelltheorie*, vieweg studium, Braunschweig (1986)

More references will be given during the course.