MATH 564, Model Theory II, Fall 2004

MWF 9:05–9:55 PM, 124 Thomas, Schedule Number 384595, 3 credits

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Textbook: *Model Theory: An Introduction*, by David Marker, Springer, Graduate Texts in Mathematics, 2002.

Prerequisites: This course is suitable for all mathematics graduate students, especially those who are interested in algebra or mathematical logic.

Course Description: An important branch of mathematical logic is model theory, the study of first-order theories and the classes of models defined by such theories. This course will include numerous applications of model theory to algebra, especially ordered fields and differential fields. All of the necessary background in mathematical logic and algebra will be presented in detail. Among the high points of the course will be (1) the solution of Hilbert's 17th problem on positive definite forms, (2) the proof that every differential field of characteristic 0 has a unique differential closure.

Course Outline:

1. sentences and models
2. complete theories
3. the compactness theorem
4. decidability
5. elementary extensions
6. algebraically closed fields
7. saturated models
8. elimination of quantifiers
9. real closed fields
10. prime models (countable case)
11. differential fields of characteristic 0
12. totally transcendental theories
13. prime models (uncountable case)