MATH 6000: Model Theory (CU, Spring 2026)

MWF 11:15 am - 12:05 pm, MUEN E113

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Office hours: Monday 12:15-1:15 pm (Math 310), Tuesday 12:15-1:15 pm (Zoom), and by appointment
Course website: `http://math.colorado.edu/~mayr/teaching.html`

Course description. Model theory is a part of mathematical logic in which we study mathematical structures (e.g., fields, graphs,...) by the first-order sentences that are true in these structures as well as the sets that can be defined by first-order sentences. Its tools have applications in other parts of math, like algebra, number theory and algebraic geometry.

We will cover the following topics:

- Compactness Theorem
- Categoricity
- Löwenheim-Skolem Theorems
- Ehrenfeucht-Fraïssé Games
- Quantifier Eliminiation
- Types
- Saturated Models
- Morley's Categoricity Theorem

Assignments. Every Wednesday I will post homework problems on the website. Please submit solutions as pdf on Canvas before the beginning of class on the following Wednesday. Late homework will not be accepted. The 3 lowest homework scores will not count towards the final grade.

I encourage you to discuss homework problems. Your write-ups, however, have to be completed individually and without AI.

For a passing grade, each student also has to pose (at least) one question a week in class and write it and its answer in the class notebook.

Instead of a final exam, I will ask you to give a short presentation on a model theoretic topic of your choice in the final weeks of the semester.

The final grade is based on homework (50%), questions (25%), and presentation (25%).

Text. David Marker, Model Theory: An Introduction (2002).

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