

PMATH 930 Winter 2023

Topics in Logic: Model theory of differential fields

Instructor: Rahim Moosa

This course is a follow up to the model theory part of PMATH 433/733 taught in Fall 2022. This course will focus on a particular first-order theory, while developing advanced topics in abstract model theory as they come up.

A *differential* field is a field equipped with a linear operator satisfying the Leibniz rule. The motivating examples come from algebraic vector fields. Over the last 30 years, the model theory of such structures has played a significant role in applications to algebra, geometry, and number theory. This course will be an introduction to the model theory of differential fields with an eye toward these applications.

Lectures: Tuesdays and Thursdays, 10–11:20, MC 5417.

Office Hours: Wednesdays, 3–4, MC 5018.

Web page: This course will have little online presence, but there is a LEARN page where I will post assignments and the odd note.

Text: There will be no text for the course, the lectures will be essentially self contained. Some external sources may be suggested as we go along.

Evaluation: I plan for there to be several assignments (5?) throughout the term as well as a final oral exam (really just a conversation).

Prerequisites:

- Some model theory. Familiarity with languages and structures, with the compactness theorem and its consequences, and with quantifier elimination. Certainly PMATH 433/733 is enough, but is not necessary.
- Commutative algebra. Especially fields, algebras, and polynomial rings.
- Algebraic geometry. Mostly around the Zariski topology on affine algebraic varieties.