

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 topic in applied model 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 fields equipped with various operators, with an eye toward these applications.

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.

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.