PMATH 432/632 – Fall 2024

Mathematical Logic

Instructor: Rahim Moosa, MC 5006, rmoosa@uwaterloo.ca

This is a **new** course, being offered only for the second time. Unlike the pre-2023 course with the same number, this course is a broad (and hence necessarily not very detailed) introduction to mathematical logic, including *proof theory*, *model theory*, *computability theory*, and *set theory*. It is aimed at advanced undergraduate and graduate students. I will teach a **new** follow-up course on Model Theory (PMATH 433/733) in Winter 2025, for which Mathematical Logic is a prerequisite. Pending approval, I hope to teach a graduate topics course in model theory (PMATH 930) in the Fall of 2025.

Pre-requisites. (Equivalent of) PMATH 347, or consent of instructor.

Topics. The completeness and compactness theorems of first order logic. Gödel's incompleteness theorem. Zermelo-Fraenkel set theory and ordinals/cardinals.

Required Textbook. David Marker's **new** book entitled "An Invitation to Mathematical Logic", Graduate Texts in Mathematics 301, 2024.

Structure. Lectures will be held MWF at 12:30 in MC 2035. I will hold office hours on Wednesdays, 2–3, or by appointment. This is an in-person course with no streaming or recorded video of lectures, and no Piazza discussion (on my part). The course does have a LEARN page. There will be about 10 assignments, submitted through Crowdmark on Thursdays, worth a total of 25%. The final exam will be scheduled by the Registrar and is worth 75%. There will be no midterm exam.