

# PMATH 432/632 - Winter 2018

## First Order Logic and Computability

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**Lectures:** Tuesdays and Thursdays 8:30-10:00am in QNC1506

**Objective:** The course is an introduction to mathematical logic. The aim is to develop enough mathematical logic to understand and appreciate Gödel's Incompleteness Theorems. The course starts by introducing the syntax and semantics of first-order logic. A formal proof system is introduced with a proof of its soundness and completeness. Some useful applications of completeness are presented. Computability theory is presented through Kleene recursion. Gödel's First Incompleteness Theorem is obtained as an application of computability to logic. Time permitting, a sketch of the Second Incompleteness Theorem is given.

**Final mark:**

- PMATH 432: Assessments - 25% + Final Exam - 75%
- PMATH 632: Assessments - 20% + Miniproject - 10% + Final Exam - 70%

**Text:** Christopher C. Leary and Lars Kristiansen, *A Friendly Introduction to Mathematical Logic*, 2nd Edition, Milne Library, SUNY Geneseo, 2015. The electronic version of the book is freely available from the publisher's website <https://minerva.geneseo.edu/a-friendly-introduction-to-mathematical-logic/>. University Book Store can print the book on demand.

**Assignments:** There will be 8-10 weekly assignments that will be posted to LEARN on Thursdays and due in class the following Thursdays. Assignments must be turned in by the end of the Thursday lecture. Late assignments will be marked only at my discretion and always incur a significant penalty. I will drop the lowest assignment mark for each student.

**Miniproject:** Graduate students enrolled in PMATH 632 are expected to complete a written essay of about 3-5 printed pages on an advanced topic assigned by me. The topics will be assigned after the Reading Week. The miniproject is due by the end of the last lecture.