

Logic III: Metatheory

Dr. Jacob Archambault

Course Description

This course goes through the proofs for the main theorems of classical logic, providing a mathematically rigorous introduction to classical metatheory at a pace accessible to graduate and upper-level undergraduate students. Some of the theorems reviewed, such as the soundness and completeness theorems for the classical first-order calculus, should be familiar in their content, if not in all of their details. Others, like the Craig Interpolation Theorem, are likely to be introduced for the first time.

Course Requirements

Homework – Each week, the student will hand in typed responses to questions assigned from the chapter reviewed the previous week. Both midterm and final grades will be determined wholly by the quality of the proofs handed in as homework.

Textbooks

Boolos George S., Burgess, John P., and Jeffrey, Richard C. (2007). *Computability and Logic*. 5th edition (Cambridge: Cambridge University Press).

Syllabus

Week 1	Enumerability and Recursion Reading: Boolos et al., ch. 1
Week 2	Diagonalization Reading: Boolos et al., ch. 2.
Week 3	Classical logic: Syntax and Semantics Reading: Boolos et al., ch. 9.
Week 4	Classical logic: Syntax and Semantics Reading: Boolos et al., ch. 10.
Week 5	Classical Logic: Church's Theorem Reading: Boolos et al., ch. 11
Week 6	Classical Logic: Löwenheim-Skolem and Compactness Theorems Reading: Boolos et al., ch. 12
Week 7	Classical Logic: Löwenheim-Skolem and Compactness Theorems Reading: Boolos et al., ch. 13
Week 8	Classical Logic: Soundness and Completeness Reading: Boolos et al., ch. 14
Week 9	Classical Logic: Normal Forms Reading: Boolos et al., ch. 19
Week 11	Classical Logic: The Craig Interpolation Theorem Reading: Boolos et al., ch. 20
Week 12	Classical Logic: Monadic and Dyadic Logic Reading: Boolos et al., ch. 21