

Symbolic Logic

Philosophy 370 (Fall 2014)

Instructor: Max Bialek

Office Hours: M 11:50am–1:50pm

Office Location: SKN 1103B

Time: MW 11:00–11:50am

Location: KEY 1117

Online Component: see below

Course Description. “A review of propositional and predicate logic and related topics and an introduction to the semantics and metatheory of first-order logic.”

This course will introduce students to the meta-theory of logic—the analysis *of* a logic as opposed to analysis *with* a logic—and train them to be comfortable with the formal style used to talk about logic outside of an introductory course. The logics whose meta-theory we will be studying are Propositional Logic and First Order Logic. Propositional and First Order Logic should be familiar to students who have taken PHIL170, and many topics glossed in PHIL170, like the soundness and completeness of those logics, will be part of the focus of this course. We will also dedicate a fair amount of time on basic set theory and mathematical proof (especially by induction) in order to prepare to study the meta-theory of these logics .

Course Materials. There is no required textbook for this course. We will be working almost exclusively out of notes that will be posted online. If you clamor for the guidance of a book, I would recommend Enderton’s *A Mathematical Introduction to Logic*. Mendelson’s *Introduction to Mathematical Logic*, Kleene’s *Mathematical Logic*, and Ebbinghaus, Flum, and Thomas’ *Mathematical Logic* may also be of value to you. All of these texts may be found at the library, and, while presenting roughly the same material (the titles might clue you in to that fact), you might find the variations in their approach helpful if you are stuck on something.

Online Component. Every student must, each week (except one of their choosing, for a total of 15 times) do the following: (1) Post some question relating to the material being covered that week to the forums of the ELMS site (due by 11:59pm on Monday) and (2) respond (not necessarily answer) to some reasonable degree to the question of another student (due by 11:59pm on Tuesday).

Course Requirements & Grading. Each part of the online component (described above) of the course is worth 1% of the course grade. Distributed throughout the course will be a combination of ten total light (possibly surprise) quizzes and in-class assignments that will be worth 2% of the course grade each. Each of the three units of the course (see the schedule below) will end in an exam covering material just from that unit that will be worth 10% of the course grade. Lastly, there will be a comprehensive final exam worth 20% of the course grade. Attendance is ungraded, but highly recommended (especially since there will be regular graded in-class work). In short:

30% — 15 Weekly Online Posts at 2% each

20% — 10 In-Class Assignments/Quizzes at 2% each

30% — 3 Unit-Specific Exams at 10% each

20% — Comprehensive Final Exam

Accommodations. Students who require special accommodations should inform the instructor at the beginning of the course, and must provide the appropriate documentation from the DSS office (see <http://www.counseling.umd.edu/DSS/>).

Unpleasantries. You should make sure you are familiar with the rules regarding proper academic conduct as outlined at <http://www.shc.umd.edu/>.

Class Cancelations. The University may be closed in the event of an emergency, in which case class will be cancelled. To find out if the University is closed you can check its main site (www.umd.edu), its emergency preparedness site (<http://www.umd.edu/emergencypreparedness/>), or call the “snow phone line” at 301-405-7669 (which covers more than just snow caused closings). If class is cancelled while the University remains open, then there will be an announcement posted on the course ELMS page.

Schedule. Below is the tentative schedule for the course. Any known attendance issues should be brought to the instructor’s attention as soon as possible (e.g. you know now about religious holidays and away games, so if they cause a conflict you should tell me now).

Unit 1: Introduction and Background (a.k.a. Math for Doing More Math)

Sept 3. Introduction

Sept 8 & 10. Set Theory, Read “Pacuit - Discrete Math”

Sept 15 & 17. “Informal” Proofs & Recursion

Sept 22 & 24. Proofs by Induction

Sept 29. Review

Oct 1. EXAM 1

Unit 2: Propositional Logic (all readings from “Fitting - Propositional Logic”)

Oct 6 & 8. Review of Prop. Logic, Read §§1–3

Oct 13 & 15. Soundness and Lindenbaum, Read §§4–6

Oct 20 & 22. Completeness Part I: The Operators, Read §§7–11

Oct 27. Completeness Part II: Completing the Proof, Read §12

Oct 29. NO CLASS, EXAM 2 (take-home) due in class Nov 3

Unit 3: First Order Logic (all readings from “Pacuit - FOL”)

Nov 3 & 5. FOL Re-Introduction Part I: From Terms to Models, Read §§1–2

Nov 10 & 12. FOL Re-Introduction Part II: Models, Meaning, and Proofs, Read §3

Nov 17 & 19. Soundness and Lindenbaum, Read §4

Nov 24. Completeness Part I: The Canonical Model, Continuing §4

Nov 26. NO CLASS (Thanksgiving)

Dec 1 & 3. Completeness Part II: The Truth Lemma, Continuing §4

Dec 8. Review

Dec 10. EXAM 3

TBA. FINAL EXAM