

PHILOSOPHY 303

INTRODUCTION TO SYMBOLIC LOGIC

Lecture: Tuesdays and Thursdays 10:10–11:30 in 2427 Mason

Section: Thursdays 9:10–10:00 in 3451 Mason

CONTACT INFORMATION

Professor Eric Swanson

ericsw@umich.edu

2220 Angell Hall

Office hours: Tuesdays 4–6 and by appointment

Office phone: 734-763-3494

AIMS OF THE COURSE

We will study two artificial languages—called *propositional logic* and *first-order logic*—and thereby gain a better understanding of

- the principles and techniques of good reasoning,
- the distinctive features of natural languages,
- the foundations of mathematics,
- the fundamental philosophical notions of meaning, truth, and proof.

COURSE WEB SITE

Available at <http://ctools.umich.edu>.

TEXTBOOK

Language, Proof, and Logic, by Barwise and Etchemendy. It's available at Shaman Drum. Be sure to buy a new copy so that the grading software will work for you.

GRADING

- Two midterm exams: 20% each
- Final exam: 40%
- Homework: 10% (graded excellent / good / needs improvement / not satisfactory / no effort (E/G/NI/NS/NE))
- Attendance and in-class participation: 10%

Homework is due at the start of class. You get credit for late homework only if you give a really good explanation for its being late. I encourage you to discuss homework exercises with other students in the class. But you may not copy others' work, and you may not share files. (Note that the software can detect file sharing.) I strongly recommend that you do the 'You try it' exercises in the book for your own benefit. They're good practice, and not difficult.

SCHEDULE

1/3	Background, syllabus, software
1/8	Atomic sentences Reading for class: §1.1–§1.4, §2.1–§2.5
1/10	Boolean connectives Reading for class: §3.1–§3.7
1/15	The logic of Boolean connectives Reading for class: §4.1–§4.4 Assignment due: 1.4, 1.9, 2.1, 2.8–2.10, 2.17–2.19, 2.24–2.26, 3.2, 3.3, 3.7, 3.13–3.16, 3.18, 3.21
1/17	Methods of proof for Boolean logic Reading for class: §5.1–§5.4
1/22	Formal proofs for Boolean logic Reading for class: §6.1–§6.6 Assignment due: 4.2, 4.4, 4.6, 4.12, 4.14, 4.18, 4.20, 4.22, 4.23, 4.28, 4.30, 5.15–5.18
1/24	Conditionals Reading for class: §7.1–§7.4
1/29	The logic of conditionals Reading for class: §8.1–§8.3 Assignment due: 6.2–6.12, 6.15, 6.19, 6.20, 6.29–6.31, 6.33, 6.37, 6.38, 7.6–7.8, 7.12, 7.25
1/31	Review Assignment due: 8.19–8.27 odds only, 8.31–8.37 odds only, 8.45–8.53 odds only
2/5	Exam 1
2/7	Quantifiers Reading for class: §9.1–§9.6
2/12	The logic of quantifiers Reading for class: §10.1–§10.4
2/14	Multiple quantifiers Reading for class: §11.1–§11.3 Assignment due: 9.3, 9.5, 9.9, 9.12, 9.16, 9.17, 10.1, 10.2, 10.4, 10.11–10.19 odds only, 10.25–10.29 odds only
2/19	More on multiple quantifiers Reading for class: §11.4–§11.5, §11.8
2/21	Methods of proof for quantifiers Reading for class: §12.1–§12.4 Assignment due: 11.3–11.5, 11.9–11.11, 11.16, 11.18, 11.21
2/26	Winter break; no class
2/28	Winter break; no class

3/4	Formal proofs with quantifiers Reading for class: §13.1–§13.5
3/6	Numerical quantifiers and FOL Reading for class: §14.1–§14.6
3/11	More practice with quantifiers Assignment due: 12.5–12.21 odds only, 13.3–13.17 odds only, 13.18, 13.21–13.27 odds only, 13.33–13.51 odds only, 13.52, 14.3–14.5, 14.10–14.13, 14.26–14.28
3/13	Review
3/18	Exam 2
3/20	No class (I'll be away at a conference)
3/25	Naïve set theory Reading for class: §15.1–§15.3
3/27	More set theory; Russell's paradox Reading for class: §15.4–§15.8
4/1	Mathematical induction Reading for class: §16.1–§16.4 Assignment due: 15.5, 15.12, 15.13, 15.17, 15.19, 15.23, 15.24, 15.26, 15.29–15.35 odds only, 15.40, 15.47, 15.48, 15.50, 15.60, 15.61
4/3	Completeness for propositional logic Reading for class: §17.1–§17.2
4/8	Truth and satisfaction, soundness for FOL Reading for class: §18.1–§18.3 Assignment due: 16.1–16.13 odds only omitting 16.9, 17.3–17.13 odds only
4/10	Gödel's Completeness Theorem for FOL A sketch of Gödel's Incompleteness Theorem for Peano Arithmetic Reading for class: §19.1, §19.8 Assignment due: 18.2, 18.8, 18.9, 18.13
4/15	Review
4/23	Final exam, 10:30–12:30