

PHILOSOPHY 305: INTRODUCTION TO FORMAL PHILOSOPHICAL METHODS

Lecture: Tuesdays and Thursdays 1:10–2:30, in G115 AH
Section 002 (Eric Swanson): Thursdays 10:10–11, in 2310 SEB
Section 004 (Jason Konek): Tuesdays 4:10–5:00, in G168 AH

CONTACT INFORMATION

Professor Eric Swanson
ericsw@umich.edu
2259 Angell Hall

Office hours: Wednesdays 3:30–5:30, and by appointment. (There are two exceptions. (1) On October 26 my office hours will be 2:30–4:30. (2) I will have office hours from 3:30–5:30 on Monday, November 21, and no office hours on Wednesday, November 23.)

Jason Konek
jpkonek@umich.edu
1156 Angell Hall
Office Hours: Thursdays 2:30–5:30

COURSE DESCRIPTION

Formal methods help us articulate and answer questions in a wide range of disciplines, including philosophy and all its subfields. Over the last century formal methods have been used to illuminate and sharpen questions about (for example) the nature of possibility, probability, and necessity; about the nature of meaning of natural languages; about the relationship between an omniscient God and human freedom; and about the power and limitations of mathematics and computers. This course focuses on methods that are commonly used in contemporary epistemology, ethics, metaphysics, philosophy of language, philosophy of mind, and philosophy of science.

These methods are also useful for work in computer science, linguistics, discrete mathematics, statistics, economics, and other quantitative social sciences. We will cover deductive proofs in sentential logic, translation between English and extensional and intensional logics, naïve set theory and the modeling of relations and functions, the semantics of conditionals, and probability theory. We will also regularly consider applications of the techniques we develop, seeing how and why they can shed light on philosophical problems—and on problems in many other disciplines, as well.

Students will be encouraged and helped to develop what is sometimes called “mathematical maturity”: roughly, the ability to reason clearly, carefully, and creatively about abstract ideas and principles. This course, however, does not presuppose knowledge of any particular areas of mathematics; we build from the foundations up.

BOOKS

Language, Proof, and Logic, by Jon Barwise and John Etchemendy. (Be sure to buy a new copy so that the grading software will work for you—it works only for the original purchaser.)

Logic, Language, and Meaning: Intensional Logic and Logical Grammar, by L. T. F. Gamut. Please be sure to get volume 2; we won't use volume 1.

All other materials will be available on the course CTools site (<http://ctools.umich.edu>).

GRADING

- Three in class exams: 15% each
- Final exam (cumulative): 30%
- Homework: 10%, with the lowest grade dropped (graded excellent / good / needs improvement / not satisfactory / no effort (E/G/NI/NS/NE))
- Attendance and in-class participation: 15%

Homework is due at the start of class. You get credit for late work only if you give a really good explanation for its being late. We 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 grading software detects file sharing.) We *strongly recommend* that you do the 'You try it' exercises in *Language, Proof, and Logic* for your own benefit. They are *especially* important to do if you are having any trouble in the class, because they are a good warm-up to the exercises assigned as homework.

SCHEDULE

September 6	Introduction: goals, syllabus, software
September 8	Why we study formal languages; atomic sentences; valid and sound arguments Reading for this class: §1.1–§1.4 and §2.1–§2.5 of <i>Language, Proof, and Logic</i>
September 13	Boolean connectives; parentheses; tautologies; logical and tautological consequence Reading for this class: §3.1–§3.7 and §4.1–§4.4 of <i>Language, Proof, and Logic</i> Assignment from <i>Language, Proof, and Logic</i> due: 1.4, 1.9, 2.1, 2.8–2.10, 2.17–2.19, 2.24–2.26
September 15	Methods of proof for sentential logic; proof by cases; reductio Reading for this class: §5.1–§5.4 of <i>Language, Proof, and Logic</i> Assignment from <i>Language, Proof, and Logic</i> due: 3.2, 3.3, 3.7, 3.13–3.16, 3.18, 3.21, 4.2, 4.4, 4.6, 4.12, 4.14, 4.18, 4.20, 4.22, 4.28, 4.30 (these are all graded by the software, so you will have feedback before this class)
September 20	☞ In-class exam
September 22	Formal proofs for sentential logic: conjunction, disjunction, negation rules; subproofs Reading for this class: §6.1–§6.6 of <i>Language, Proof, and Logic</i>
September 27	The material conditional; conversational implicature; truth-functional completeness Reading for this class: §7.1–§7.4 of <i>Language, Proof, and Logic</i> Assignment from <i>Language, Proof, and Logic</i> due: 5.15–5.18, 6.2–6.12, 6.15, 6.19, 6.20, 6.29–6.31, 6.33, 6.37, 6.38
September 29	Conditional and biconditional introduction and elimination Reading for this class: §8.1–§8.3 of <i>Language, Proof, and Logic</i>
October 4	Quantifiers; first-order validity and consequence; first-order equivalence Reading for this class: §9.1–§9.6 and §10.1–§10.4 of <i>Language, Proof, and Logic</i> Assignment from <i>Language, Proof, and Logic</i> due: 7.6–7.8, 7.12, 7.25, 8.19–8.27 odds only, 8.31–8.37 odds only, 8.45–8.53 odds only
October 6	Multiple quantifiers Reading for this class: §11.1–§11.5, §11.8 of <i>Language, Proof, and Logic</i>
October 11	More practice with multiple quantifiers; numerical quantifiers; definite descriptions Reading for this class: §14.1–§14.4 of <i>Language, Proof, and Logic</i> Assignment from <i>Language, Proof, and Logic</i> 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

October 13	Catch up (if necessary) and review Assignment from <i>Language, Proof, and Logic</i> due: 11.3–11.5, 11.9–11.11, 11.16, 11.18, 11.21, 14.3–14.5, 14.26–14.28 (these are all graded by the software, so you will have feedback before this class)
October 18	No class: Fall Study Break
October 20	☞ In-class exam
October 25	Naïve set theory Reading for this class: §15.1–§15.4 of <i>Language, Proof, and Logic</i>
October 27	Relations and their properties; functions; Russell’s Paradox Reading for this class: §15.5–§15.8 of <i>Language, Proof, and Logic</i>
November 1	The intensional turn Reading for this class: Nelson Goodman, “The Problem of Counterfactual Conditionals”; Gamut, “The Origins of Intensional Logic” Assignment from <i>Language, Proof, and Logic</i> due: 15.1, 15.4, 15.8, 15.9, 15.16, 15.18, 15.20, 15.23, 15.24, 15.36–15.42 evens only, 15.47, 15.48, 15.50, 15.60, 15.61
November 3	Intensional sentential logic Reading for this class: Gamut, “Intensional Propositional Logic”
November 8	Selection functions: Stalnaker’s 1968 theory of conditionals Reading for this class: Robert Stalnaker, “A Theory of Conditionals” Assignment due: Gamut, Exercises 1–4 and 7–9 of Chapter 2
November 10	Variably strict semantics: Lewis’s 1973 theory of counterfactuals Reading for this class: David Lewis, “Counterfactuals and Comparative Possibility” Optional reading: Angelika Kratzer, “Modality” and “Conditionals”
November 15	☞ In-class exam
November 17	Intensional predicate logic Reading for this class: Gamut, “Intensional Predicate Logic” Optional reading: Barbara Partee, “Possible Worlds in Model-Theoretic Semantics” Assignment due: Assignment on conditionals, handed out in class
November 22	Counterpart theory Reading for this class: David Lewis, “Counterparts of Persons and Their Bodies” Optional reading: David Lewis, “Counterpart Theory and Quantified Modal Logic”
November 24	Thanksgiving
November 29	Probability theory and rationality Reading for this class: Richard Jeffrey, “Probability Primer,” §1.1–§1.3 Assignment due: Gamut, Exercises 1–5, 7 of Chapter 3, plus one question on counterpart theory, handed out in class
December 1	Conditional probability, Bayes’ Theorem, probabilistic independence Reading for this class: Richard Jeffrey, “Probability Primer,” §1.4–§1.7
December 6	Cancelled class Assignment due (in the Philosophy Department drop box outside of Angell 2215 for Section 002 (be sure to write my name clearly on the top of your assignment) / in section for Section 004): Jeffrey, Exercises 1–3, 5, 9, 11
December 8	Catch up and a little more on probability , depending on the needs and interests of the class
December 13	Review for final exam
December 19	☞ Final exam (cumulative)