

PHIL 120: Symbolic Logic

Fall 2024. UCSD

Syllabus

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1 Course Description

This course will provide an introduction to symbolic logic from propositional logic to first order logic with quantifiers.

2 Course Information

- Meeting time: Monday, Wednesday, Friday 4:00-4:50pm. The first class will take place on Friday September 27th.
- Class meets in person, in RWAC, Arts and Humanities Building, Room 0426.
- Office hours: Monday, Wednesday, Friday 4:50-5:30pm. Other times by appointment.
- Graduate Student Grader: Joseph O'Brien (j3obrien@ucsd.edu)
- Joseph's office hours: Tuesday 2-3pm, RWAC 0436.
- Required textbook:

Dave Barker-Plummer, Jon Barwise, and John Etchemendy, *Language, Proof, and Logic*, 2nd edition, CSLI Publications. (Note: You will need a new copy of the book that comes with a valid license for the online softwares, as it is required for submitting and grading homework online.)

3 Symbolic Logic

Why study symbolic logic? The knowledge you learn in this class can apply to many domains, including linguistics, computer science, mathematics, and philosophy. You will study how to make and evaluate arguments. More than that, you will study how to turn those arguments into symbolic forms that can be “understood” by computers. This last skill is particularly useful in new fields such as artificial intelligence. In philosophy, symbolic logic can be used to interpret and evaluate complex arguments in epistemology, metaphysics, ethics, philosophy of science, and philosophy of mathematics.

4 About Me

I am an associate professor in the department of philosophy at UCSD. My research interests include: philosophy of physics, philosophy of science, philosophy of mathematics, metaphysics, and decision theory. I am also interested in philosophy of mind, philosophy of religion, and Chinese philosophy. I am also a fellow of the John Bell Institute for the Foundations of Physics. I did my graduate studies at Rutgers University, NJ, where I received a PhD in philosophy, a master in mathematical physics, and a graduate certificate in cognitive science.

5 Learning Goals

Our main goal is to become proficient in using the language and inference rules of first-order logic. At the end of this course, students are expected to know how to construct truth tables, counter-models, check validity of inferences, and master the skills of proving first-order propositions from a set of premises using the inference rules of Fitch.

6 Grading and Expectations

- Grade assignment: $100 \geq A+ \geq 98 \geq A \geq 92 \geq A- \geq 88 \geq B+ \geq 85 \geq B \geq 82 \geq B- \geq 78 \geq C+ \geq 75 \geq C \geq 72 \geq C- \geq 68 \geq D \geq 59 \geq F \geq 0$.

Warning: symbolic logic is a difficult class. Its difficulty is on par with some intermediate mathematics and computer science classes. In fact, the same class is sometimes taught in those departments. You are expected to spend 8-15 hours per week studying outside of class. The class discussion will move very fast. It requires a lot of effort to get an A. In the past 13 years, the average grade was often B-. In some years the average grade was C+. I am always happy to help those who are willing to put in the effort. The assignments are designed to help you learn. But please be prepared to put in the effort.

- Homework assignments: 30%

The most important thing in this class is to **keep up**. If you don't understand any concepts in some chapter, it will be very hard to follow what comes next.

(1) Reading assignments and online videos. There will be reading assignments and videos to watch before each class. Please do not skip them as they are crucial for keeping up with the class, especially if you are new to logic. Given the tight schedule, our class time will be devoted to working through examples and answer students' questions. I can't check whether you have completed them, but your exam scores will be a reflection.

(2) There will be homework problems assigned after each class. They are due before the beginning of the next class. The homework assignments are designed to help with your learning process. You will receive full credit for each assignment for simply completing them.

Most of the homework problems will be completed on the courseware softwares (*Tarski's World*, *Fitch*, *Boole*), and they should be submitted online using the courseware software *Submit*. Your answers to the homework problems will be checked automatically by the Grade Grinder. Within a few minutes you will receive a report telling you where your mistakes are. You are welcome to submit each assignment as many times as you need to get every question right. This way you can get instant feedback on whether you have a good understanding of the materials. **Currently, the courseware softwares can be used in the internet browsers, so you don't have to download them on your computer.** If you have questions about how to use the softwares, feel free to ask your classmates, me, or Joseph.

You can miss up to 3 homework assignments without penalty. But after that, for each assignment you miss, your final grade will be lowered by 2 points. So, if you miss 6 HW assignments, the first 3 are free but the next 3 will lower your final grade by 6 points.

The assigned HW problems are a minimum for what you need to understand the materials. If you have problems with the materials, you should consider doing additional exercises in the textbook that are not assigned. If you have problems with the software, please post on the Canvas discussion board. I will try to answer asap and other students are welcome to contribute. **You are encouraged to form online study groups and collaborate with each other on HW assignments.** But please do not copy and paste from other people's answers or files. Each file has a unique time stamp that can be checked by Grade Grinder and submissions with duplicate files (files created by someone else or copied by someone else) will receive a zero grade and be reported to the UCSD Academic Integrity Office.

If you put in sufficient effort for completing the HW assignments (completing each part of every question and trying to get every answer right no matter how many times it takes you), you will have no problem with the midterms or final exam.

- Quizzes: 30%

There will be three quizzes, in Week 2, Week 5, and Week 9. Each counts towards 10% of your final grade. They will be similar to the homework assignments but slightly longer and more challenging. **The quizzes are closed-book take-home exams to be submitted online. No collaboration is allowed.**

- Midterm exams: 20%

There will be two midterm exams, in Week 3 and Week 7. Each counts towards 10% of your final grade. **Midterms are closed-book, in-person written exams. No collaboration is allowed.**

- Final exam: 20%

The final exam will be held in the final exam week, on December 10th at 3-6pm. **The final is a closed-book in-person written exam. No collaboration is allowed.**

- Attendance: I expect lively discussions. If you have taken courses with me in the past, you know that I teach best when students ask questions during class. Your questions and feedback would help me adjust my pace and pedagogy. Please do not text or call on your phone, or surf the internet (Twitter, Facebook, Instagram) during class.
- Since this is an upper-level class, please feel free to visit my office hours and Joseph's office hours to discuss your questions about the class materials. If you cannot come to my regular office hours, I am happy to make appointments with you to accommodate your schedule.
- Feedback on teaching.

7 Accessibility

I would like to make sure that everyone in the class feels safe and respected. If you have any particular need, please contact the UCSD Office for Students with Disabilities at the beginning of the semester. They will forward the necessary information to me. We can work out the details in person.

From the website of the UCSD Office for Students with Disabilities:

The Office for Students with Disabilities (OSD) at UC San Diego works with undergraduate, graduate, and professional school students with documented disabilities, reviewing documentation and, through an interactive process with the student, determining reasonable accommodations. Disabilities can occur in the following areas: psychological, psychiatric, learning, attention, chronic health, physical, vision, hearing, and acquired brain injuries, and may occur at any time during a student's college career. We encourage you to contact the OSD as soon as you become aware of a condition that is disabling so that we can work with you. Students registered with the OSD have the same responsibilities as other students: getting to class regularly, meeting with faculty and peers to study and learn, and finally demonstrating understanding and mastery of course content. OSD helps students with disabilities navigate that system by establishing a set of academic accommodations based on each student's individual disability. In order to receive support, students must schedule an appointment with the OSD to discuss obtaining reasonable accommodations based on their current, functional limitations, particularly as they pertain to a higher education academic setting.

8 Academic Integrity

Here is the Integrity of Scholarship Agreement as stated on the UCSD Academic Integrity Office. Please follow these expectations in this course.

Students are expected to complete the course in compliance with the instructor's standards. No student shall engage in any activity that involves attempting to receive a grade by means other than honest effort, for example:

- No student shall knowingly procure, provide, or accept any materials that contain questions or answers to any examination or assignment to be given at a subsequent time.
- No student shall complete, in part or in total, any examination or assignment for another person.
- No student shall knowingly allow any examination or assignment to be completed, in part or in total, for himself or herself by another person.
- No student shall plagiarize or copy the work of another person and submit it as his or her own work.
- No student shall employ aids excluded by the instructor in undertaking course work.
- No student shall alter graded class assignments or examinations and then resubmit them for regrading.
- No student shall submit substantially the same material in more than one course without prior authorization. A student acting in the capacity of an instructional assistant (IA), including but not limited to teaching assistants, readers, and tutors, has a special responsibility to safeguard the integrity of scholarship. In these roles the student functions as an apprentice instructor, under the tutelage of the responsible instructor. An IA shall equitably grade student work in the manner agreed upon with the course instructor. An IA shall not make any unauthorized material related to tests, exams, homeworks, etc. available to any student.

Each student is responsible for knowing and abiding by UCSD's Policies on Integrity of Scholarship and Student Conduct. Any student violating these policies will earn an 'F' in the course and will be reported to the University for the violation. Authorized course assistance is available in person and electronically from the course instructor and instructional assistants.

9 Course Plan

- **Week 0.**
 - * Sep 27. Introduction.

- **Week 1.**
 - * Sep 30. Language, Proof, and Logic (LPL) Chapter 1: 1.1-1.3.
 - * Oct 2. LPL 1.4.
 - * Oct 4. LPL 2.1-2.2.
- **Week 2.**
 - * Oct 7. 2.3-2.4.
 - * Oct 9. 2.5.
 - * Oct 11. 3.1-3.4.

Quiz 1.
- **Week 3.**
 - * Oct 14. 3.5-3.7.
 - * Oct 16. 4.1-4.2.
 - * Oct 18. Midterm exam #1
- **Week 4.**
 - * Oct 21. 4.3-4.4.
 - * Oct 23. 5.1-5.3.
 - * Oct 25. 6.1-6.3.
- **Week 5.**
 - * Oct 28. 6.4-6.5.
 - * Oct 30. 7.1-7.2.
 - * Nov 1. 8.1-8.2. 8.4.

Quiz 2.
- **Week 6.**
 - * Nov 4. 9.1-9.3.
 - * Nov 6. 9.4-9.6.
 - * Nov 8. 10.1-10.2.
- **Week 7.**
 - * Nov 11. No class (Veterans Day holiday)
 - * Nov 13. Midterm exam #2
 - * Nov 15. No class
- **Week 8.**
 - * Nov 18. 10.3.
 - * Nov 20. 11.1-11.2.
 - * Nov 22. 11.3-11.5, 11.8.

- **Week 9.**

- * Nov 25. 12.1-12.3.

- * Nov 27. 12.4.

- * Nov 29. No class (Thanksgiving)

- Quiz 3.**

- **Week 10.**

- * Dec 2. 13.1.

- * Dec 4. 13.2.

- * Dec 6. 13.3.

- Final exam, in person, Dec 10th at 3-6pm.**