

1 COURSE DESCRIPTION

Logic is the science of *valid arguments*, providing the foundations for mathematics, computer science, artificial intelligence, linguistics, and analytic philosophy. Formal logic allows us to analyze the notions of proof, validity, and sound reasoning with more precision than natural language permits. We'll use an artificial language—the language of truth-functional logic—to formulate precise understandings of logical consistency, entailment, and proof. We'll also make use of a system of inference rules for proving arguments with the utmost possible rigor.

Grade determinants:

- **Midterm exams:** 51% (17% × three exams)
- **Cumulative final exam** (Fri. 3/21, 11:30am–2:29pm): 25%
- **Weekly problem sets:** 18% (2% × nine psets)
- **In-class participation:** 6%

Note: Unless you have previous exposure to logic, you shouldn't be confident that this course will be easier than math or other STEM courses that fulfill college requirements. While many will find this course easy and intuitive, others will find it difficult and confusing, particularly when we transition to proofs in parts 3 and 4 of the course. (Remember, you've been studying the formal systems necessary for math courses since you were in elementary school, but logic's formal system is probably entirely new to you.) The grade distributions is usually bimodal, with many As and many Ds and Fs. Sometimes **as many as one third of students fail this course**. The average final grade in a typical quarter is between C+ and B, *among students who do not drop the course*. Please be prepared for the possibility that this course may be more difficult, and require more studying, than you expected.

2 TEXTBOOK AND RESOURCES

Textbook: forall x: *An Introduction to Formal Logic (Calgary Remix, 2023)*¹ This textbook is free and open-source. Download the correct edition on Canvas. (Note: we are *not* using *The Carnap Book*, linked on Carnap.)

Problem sets: conducted on Carnap (website; no software downloads). Carnap is also free, open-source, and programmed by philosophers. Carnap also provides a proof-checker. **Please register a Carnap account ASAP, using your UCSD email address and student ID number (including the initial 'A' or 'U')**. There is a sign-up link for this class on Canvas. If you can't access Canvas for this course, sign up on carnap.io and enroll in the course "UCSD Phil 10: Introduction to Logic (Winter 2025)".

¹ P. D. Magnus & Tim Button, with additions by J. Robert Loftis, remixed and revised by Aaron Thomas-Bolduc & Richard Zach.

In-class participation and mini-quizzes: conducted primarily on Class Question (a free alternative to iClicker). Sign up for an account and register for this class with class code **ZXVSB**. There is a sign-up link on Canvas, or you can register an account on classquestion.com/students.

3 POLICIES

Discussion sections: Discussion sections, conducted by TAs, will usually be devoted to working through logic exercises and answering students' questions. Attendance in discussion sections is not mandatory. You can drop in on additional discussion sections, not just the one assigned to you.

Email policy: *Your first point of email contact is your TA.* The TAs are happy to answer brief logistical questions via email, generally within 48 hours. However, if you have questions that would take more than a few sentences to answer, please bring them to your discussion section or to office hours with either your TA or me.

COVID Policies:

- If you have any COVID symptoms, **do not attend** class in-person. The course will be podcasted with video.
- If I have any COVID symptoms, lectures will be covered by a TA, held remotely (via Zoom), or held asynchronously (via video recording).

Grading policy: There will be no opportunities for extra credit after the final exam. There will be no special extra credit assignments offered to individual students. Grades will not be rounded up. In this course, in order to receive an A+, your score must exceed 100%.

Special pleading: I cannot make special exceptions to course policies except in the case of extraordinary circumstances beyond students' control. All policies apply equally to all students.

4 COURSEWORK

4.1 LECTURES, PARTICIPATION, AND DISCUSSION

In-class participation and mini-quizzes will mainly be conducted via Class Question (a free version of iClicker). You may miss up to two sessions of class without losing points. If you miss more than two sessions (outside of today) without a legitimate reason, the lost points cannot be made up.

4.2 EXAMS

There will be three midterm exams and a final exam. All midterms are in class, closed book, closed notes. Midterms take place in our normal classroom at our normal classtime. Each midterm corresponds to one of the parts of the course, and will cover corresponding material. There will be no make-up exams for the midterms. Midterms may not be taken early or late.

If you miss a midterm for a *legitimate reason* (see below), the points you miss can be made up in the following way: the final exam will be divided into four sections, corresponding to the four parts of

the class. Your score on the corresponding section of the final exam will determine your grade for the midterm. For example, if you miss Midterm 2 and receive an 80% on Part 2 of the final exam, then your grade for Midterm 2 will retroactively be recorded as 80%. Please fill out the Missed Exams Form (linked on Canvas) before the exam, or up to 24 hours later, to explain why you need to miss the exam.

If you miss a midterm for an *illegitimate reason* (see below) or without providing a reason, then your midterm points can be made up in the same way but with a 15 percentage point penalty. For example, if you miss midterm 2 for an illegitimate reason and get 80% of the points for section 2 of the final exam, then your grade for midterm 2 will be 65%.

All exams are closed-book, closed-notes. Exams must be completed independently, without the help of anyone or anything beyond the resources just mentioned. Any form of communication with others during exams counts as cheating. Consulting any resource outside of your own brain (including notes, your phone, the textbook, logic-related tattoos, etc.) counts as cheating. Looking at another student's exam for any reason (even to check the date or your TA's name) counts as cheating. Students caught cheating will face immediate academic integrity charges.

4.3 PROBLEM SETS

There will be weekly problem sets ("psets") on Carnap. You must register on Carnap using your UCSD email address and student ID number. Please read the "Carnap Instructions and Troubleshooting" page on our Canvas site.

- If you register a non-UCSD email account, you'll have to redo all your psets on your UCSD account, and they'll be counted as late.
- If you accidentally register for the wrong course on Carnap, you can change your enrollment; but this will not count as a legitimate reason for late psets. Similarly for if you complete the wrong psets.

Psets must be completed individually and without collaboration. Students who give or receive help on psets will be reported to the university for committing an academic integrity infraction.

Psets are **due every Tuesday by 11:00 pm**. Late exercises are worth half the points of on-time exercises, *rounding down* (typically 40%, since exercises are typically worth 5 points), and may be submitted any time before the final exam. In order for a late pset to be excused, you must fill in the pset extension form on the course website and provide a *legitimate reason*, at least 12 hours before the problem set is due.² By default, if your reason is legitimate, this will generate a two-day extension.

Psets may be time-consuming and involve some technical, typographical, and logical challenges; give yourself ample time and **start your psets early** to avoid facing last-minute technical challenges. Feel free to contact your TA with questions.

² Barring extraordinary and documented circumstances: for example, medical emergency.

4.4 LEGITIMATE AND ILLEGITIMATE REASONS FOR LATE ASSIGNMENTS AND MISSED EXAMS

- *Legitimate reasons:* illness or other medical emergency; death of a family member; ...
- *Illegitimate reasons:* not knowing how to use Carnap; not having registered on time; adding the course late; conflicts with other classes; not knowing the due date; not knowing how to do the exercises; ...

5 OTHER INFORMATION

5.1 ACADEMIC INTEGRITY

Please familiarize yourself with [university policies](#) on cheating, plagiarism, and academic integrity. *Cheating and plagiarism need not be knowing or intentional to be penalizable.* Any form of cheating or plagiarism will be reported immediately. Penalties for academic integrity infractions include **failing the exam, failing the course, suspension, and expulsion from the university.**

5.2 ACCOMMODATIONS

Students requesting accommodations for this course due to a disability must provide a current Authorization for Accommodation letter issued by the Office for Students with Disabilities. Please have your AFA letter sent as soon as possible. Students are required to present their AFA letters to faculty and to the OSD liaison in the department at least one week in advance of affected assignments so that accommodations may be arranged.

5.3 BASIC NEEDS SUPPORT

If you are having difficulties affording or accessing food, you may be eligible for CalFresh, California's Supplemental Nutrition Assistance Program, that can provide up to \$292 a month for food. Students can apply at benefitscal.com/r/ucsandiegocalfresh. For more information on resources for food, stable housing, and financial literacy, visit The Hub Basic Needs Center: basicneeds.ucsd.edu

6 SCHEDULE

This schedule is subject to change. All readings are from **forall x: Calgary**. You should complete these readings before lectures. Note: many days require rereading previously assigned chapters. You might be tempted not to bother. But the reason our readings are so short is because they are densely packed with material. You'll understand this material better, and internalize it better, if you read it, hear lectures about it, attempt some exercises, and then read it again.

PART I. LOGICAL CONCEPTS

Week 1: *Introduction to logic*

Wed. Jan. 8 Intro session

Fri. Jan. 10 Ch. 1–4

Week 2: *Truth functional notions*

Wed. Jan. 15 Ch. 5–8

Fri. Jan. 17 reread ch. 1–8

Week 3: *Truth tables*

Wed. Jan. 22 **midterm 1**

PART II. TRUTH TABLES

Fri. Jan. 24 Ch. 9–11

Week 4: *Truth tables, continued*

Wed. Jan. 29 Ch. 12–15

Fri. Jan. 31 reread ch. 9–15

Week 5: *Natural deduction systems*

Wed. Feb. 5 **midterm 2**

PART III. SIMPLE PROOFS

Fri. Feb. 7 Ch. 16, 17.1–17.4

Week 6: *Basic inference rules*

Wed. Feb. 12 Ch. 17.5–17.8, 18

Fri. Feb. 14 reread Ch. 17

Week 7: *Proofs*

Wed. Feb. 19 reread ch. 17, 18

Fri. Feb. 21 reread ch. 16–18

Week 8: *Additional inference rules*

Wed. Feb. 26 reread ch. 16–18

Fri. Feb. 28 **midterm 3**

PART IV. COMPLEX PROOFS

Week 9: *Proof-theoretic concepts*

Wed. Mar. 5 Ch. 19

Fri. Mar. 7 Ch. 20, 21

Week 10: *Review*

Wed. Mar. 12 reread ch. 19–21

Fri. Mar. 14 Comprehensive review