

## PHIL 122AB: REASONING AND ARGUMENT

UNIVERSITY OF SOUTHERN CALIFORNIA

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Class times and locations	Tuesdays and Thursdays 5:00 - 6:50 pm, CPA 109
Office hours	Mondays and Thursdays 11am-12pm, MHP B5C

### COURSE DESCRIPTION

This course is an introduction to *deductive* arguments and reasoning. An argument is deductive when, intendedly, the truth of the premises guarantees the truth of the conclusions. Deductive arguments are the sort of argument you typically find in a mathematical proof, but they also play a central role in nearly every area of philosophy.

Proficiency with deductive reasoning is constituted by several specific skills. One such skill is the ability to construct good deductive arguments for different sorts of conclusions. In this course you will learn how to come up with effective argument strategies based on the logical form of your desired conclusions, and practice applying these strategies by coming up with your own arguments.

Another skill that makes up proficiency with deductive reasoning is the ability to criticize flawed deductive arguments. The most serious flaw a deductive argument can have is being *invalid*, i.e., having a conclusion that does not follow from the premises. We will study a family of systems of propositional logics, which you can think of as alternative ways of identifying valid and invalid deductive arguments in a fairly simple fragment of natural language. You will practice checking whether an argument is valid in a given logic through a variety of syntactic and semantic techniques.

You will learn that some arguments can be valid in one logic but invalid in another. This will naturally raise philosophical questions about logical disagreement, that is, disagreement about which argument forms are legitimate. The course will give you technical and philosophical tools to help you think clearly about issues of this sort. You will learn how to manipulate propositional logics by adding and removing axioms, thus appreciating how widespread logical disagreement can in principle be. Furthermore, you will explore philosophical motivations behind alternative systems of propositional logics. Finally, you will learn to construct translations of logics into one another, in ways that can be used to argue that some logical disagreements are in fact merely apparent.

As you may have guessed from this description, this course will cover a number of fairly technical topics. This should not discourage you: technical topics will always be philosophically motivated and gently introduced in a way suitable to students without any advanced mathematical background.

## LEARNING OBJECTIVES

After successful completion of this course, students will be able to:

- Identify the logical form of natural language sentences and deductive arguments.
- Come up with effective argument strategies to prove or disprove a given claim based on its logical form.
- Distinguish constructive and non-constructive deductive reasoning.
- Check the (classical, intuitionistic, and modal) satisfiability or validity of propositional formulae using syntactic and semantic methods.
- Perform basic frame constructions.
- Apply technical results on translations between logics to philosophical issues of logical disagreement.

## PREPARATION AND COURSE MATERIALS

**Pre-requisites.** The course is divided into two modules, PHIL 122A and PHIL 122B. There are no requirements for joining PHIL 122A, though PHIL 122A is required for PHIL 122B.

**Continuity.** Several interesting themes teased in PHIL 122A (logical disagreement in *primis*) will only get a satisfactory treatment in PHIL 122B. So, you will get much more from the course if you stick around for both modules.

**Recommended Preparation.** To familiarize yourself with the style of argument used in mathematical proofs, which will be used throughout the course, you may read chapter 3 of Velleman, Daniel J. (2006). *How to Prove It: A Structured Approach*. Second edition. New York: Cambridge University Press. We will read selections of this chapter during the course, but you can read the full chapter in advance if you want to be extra prepared.

**Course Materials.** We will primarily rely on lecture notes written by me and distributed in due time before class. Early in the course we will read extracts from chapter 3 of Velleman, Daniel J. (2006). *How to Prove It: A Structured Approach*. Second edition. New York: Cambridge University Press. This will be available through the library system. For some topics, additional readings will be made available online.

## ASSESSMENT

**Assignments Description.** PHIL 122A and PHIL 122B are graded separately. The final grade of each module is computed as a weighed average of the grades for the following components.

*Participation (10%).* Ask questions, engage in class discussion.

*Weekly exercises (55%).* Every Tuesday except in weeks 1, 7, and 15, I will hand out a short exercise sheet. These are due the next Tuesday before class begins. You need to hand in at least 4 of these to pass PHIL 122A, and at least 5 of these to pass PHIL 122B. If you submit more than 4 PHIL 122A weekly assignments then the worst grade will not count towards your final grade, and similarly if you submit more than 5 PHIL 122B.

*Take-home exam (35%).* On Mondays in week 7 and exam week (week 16) I will release a take-home exam. Each is due the next Tuesday by 5pm. The take-home exams are somewhat more challenging versions of the weekly exercise sheets and will cover all the topics in their respective module. You must hand in the PHIL 122A take-home exam to pass PHIL 122A, and the same goes for PHIL 122B

**Collaboration Policy.** You are encouraged to discuss weekly assignments with other students, but you must write up your solutions individually. Please indicate the names of the students with whom you collaborated on your submission. However, you are not allowed to discuss solutions to the take-home exam exercises with other students.

**Assignment Submission Policy.** Assignments will be released on Blackboard and should be submitted there. Submissions should be PDF files. Typed submissions are preferred. Scanned handwritten submissions are in principle fine, but please make sure your handwriting is legible.

**Grading Timeline.** Assignments will normally be graded 48h after submission.

**Late Submissions.** Late submissions of take-home exams are not accepted. Late submissions of weekly exercises are possible but will be penalized half a grade for each day the assignment is late. So, if you submit on the day of the deadline but after class begins you will get a half grade penalty. If you submit the day after the deadline you will be docked a full grade. And so on. Grade penalties can be waived if you have *very* good reasons for missing a deadline. This will be determined on a case-by-case basis.

**Attendance Policy.** Students are expected to attend all classes. Absences can be excused if there is a good reason, but you will have to catch up on your own. Unexcused absences will affect the participation grade.

## OTHER POLICIES

**Technology Policy.** You are welcome to use your laptop or tablet to take notes. However, taking good class notes will often involve writing symbols and drawing diagrams or tables. So typing may not always be the best note-taking method. I suggest you bring pen and paper (or a digital pen for your tablet/laptop) as a backup.

**Communication Policy.** If you wish to contact me to discuss course-related matters, please use the subject line: PHIL 122 - **<whatever you want to discuss>**. I will do my best to answer all emails within 48h, excluding weekends and holidays. If I do not answer within 48h feel free to send me a reminder.

You are encouraged to come to office hours at least once per module, even if you have nothing in particular to discuss.

## TENTATIVE SCHEDULE

Schedule is subject to change depending on students' interests and/or needs.

PHIL 122A		
Week 1	Aug 23 Aug 25	Organization meeting Introduction to deductive arguments
Week 2	Aug 30 Sep 1	Propositional connectives in ordinary language Argument strategies
Week 3	Sep 6 Sep 8	Sets, functions and relations 1 Sets, functions and relations 2
Week 4	Sep 13 Sep 15	Classical logic: syntax Classical logic: truth tables
Week 5	Sep 20 Sep 22	Classical logic: frame semantics Exercise class on frame semantics
Week 6	Sep 27 Sep 29	Classical logic: natural deduction Exercise class on natural deduction
Week 7	Oct 4 Oct 6	Completeness of classical logic Overflow and exam review
PHIL 122B		
Week 8	Oct 11 Oct 13	Constructive reasoning (Fall recess, no class)
Week 9	Oct 18 Oct 20	Intuitionistic logic: Kripke semantics Exercise class on Kripke semantics
Week 10	Oct 25 Oct 27	Intermediate logics Exercise class on Intermediate logics
Week 11	Nov 1 Nov 3	Modal logic: introduction Modal logic: Kripke semantics
Week 12	Nov 8 Nov 10	Elementary correspondence theory Exercise class on correspondence theory
Week 13	Nov 15 Nov 17	Basic theory of transitive frames Exercise class on transitive frames
Week 14	Nov 22 Nov 24	Logical disagreement and the Gödel translation (Thanksgiving holidays, no class)
Week 15	Nov 29 Dec 1	The negative translation Overflow and exam review

## STATEMENT ON ACADEMIC CONDUCT AND SUPPORT SYSTEMS

**Academic Conduct.** Plagiarism – presenting someone else’s ideas as your own, either verbatim or recast in your own words – is a serious academic offense with serious consequences. Please familiarize yourself with the discussion of plagiarism in SCampus in Part B, Section 11, “Behavior Violating University Standards” [policy.usc.edu/scampus-part-b](https://policy.usc.edu/scampus-part-b). Other forms of academic dishonesty are equally unacceptable. See additional information in SCampus and university policies on [Research and Scholarship Misconduct](#).

**Students and Disability Accommodations.** USC welcomes students with disabilities into all of the University’s educational programs. The Office of Student Accessibility Services (OSAS) is responsible for the determination of appropriate accommodations for students who encounter disability-related barriers. Once a student has completed the OSAS process (registration, initial appointment, and submitted documentation) and accommodations are determined to be reasonable

and appropriate, a Letter of Accommodation (LOA) will be available to generate for each course. The LOA must be given to each course instructor by the student and followed up with a discussion. This should be done as early in the semester as possible as accommodations are not retroactive. More information can be found at [osas.usc.edu](https://osas.usc.edu). You may contact OSAS at (213) 740-0776 or via email at [osasfrontdesk@usc.edu](mailto:osasfrontdesk@usc.edu).

### Support Systems.

*Counseling and Mental Health.* (213) 740-9355 – 24/7 on call.

[studenthealth.usc.edu/counseling](https://studenthealth.usc.edu/counseling)

Free and confidential mental health treatment for students, including short-term psychotherapy, group counseling, stress fitness workshops, and crisis intervention.

*National Suicide Prevention Lifeline.* 1 (800) 273-8255 – 24/7 on call.

[suicidepreventionlifeline.org](https://suicidepreventionlifeline.org).

Free and confidential emotional support to people in suicidal crisis or emotional distress 24 hours a day, 7 days a week.

*Relationship and Sexual Violence Prevention Services (RSVP).* (213) 740-9355(WELL), press “0” after hours – 24/7 on call.

[studenthealth.usc.edu/sexual-assault](https://studenthealth.usc.edu/sexual-assault).

Free and confidential therapy services, workshops, and training for situations related to gender-based harm.

*Office for Equity, Equal Opportunity, and Title IX (EEO-TIX).* (213) 740-5086.

[eeotix.usc.edu](https://eeotix.usc.edu).

Information about how to get help or help someone affected by harassment or discrimination, rights of protected classes, reporting options, and additional resources for students, faculty, staff, visitors, and applicants.

*Reporting Incidents of Bias or Harassment.* (213) 740-5086 or (213) 821-8298.

[usc-advocate.symplicity.com/care\\_report](https://usc-advocate.symplicity.com/care_report).

Avenue to report incidents of bias, hate crimes, and microaggressions to the Office for Equity, Equal Opportunity, and Title for appropriate investigation, supportive measures, and response.

*The Office of Student Accessibility Services (OSAS).* (213) 740-0776.

[osas.usc.edu](https://osas.usc.edu).

OSAS ensures equal access for students with disabilities through providing academic accommodations and auxiliary aids in accordance with federal laws and university policy.

*USC Campus Support and Intervention.* (213) 821-4710.

[campussupport.usc.edu](https://campussupport.usc.edu).

Assists students and families in resolving complex personal, financial, and academic issues adversely affecting their success as a student.

*Diversity, Equity and Inclusion.* (213) 740-2101.

[diversity.usc.edu](https://diversity.usc.edu).

Information on events, programs and training, the Provost’s Diversity and Inclusion Council, Diversity Liaisons for each academic school, chronology, participation, and various resources for students.

*USC Emergency.* UPC: (213) 740-4321, HSC: (323) 442-1000 – 24/7 on call.

[dps.usc.edu](https://dps.usc.edu), [emergency.usc.edu](https://emergency.usc.edu).

Emergency assistance and avenue to report a crime. Latest updates regarding safety, including ways in which instruction will be continued if an officially declared emergency makes travel to campus infeasible.

*USC Department of Public Safety.* UPC: (213) 740-6000, HSC: (323) 442-120 – 24/7 on call.

[dps.usc.edu](https://dps.usc.edu).

Non-emergency assistance or information.

*Office of the Ombuds.* (213) 821-9556 (UPC) / (323)-442-0382 (HSC).

[ombuds.usc.edu](https://ombuds.usc.edu)

A safe and confidential place to share your USC-related issues with a University Ombuds who will work with you to explore options or paths to manage your concern.

*Occupational Therapy Faculty Practice.* (323) 442-3340 or [otfp@med.usc.edu](mailto:otfp@med.usc.edu).

[chan.usc.edu/otfp](https://chan.usc.edu/otfp).

Confidential Lifestyle Redesign services for USC students to support health promoting habits and routines that enhance quality of life and academic performance.