Phil 125: Probability and Decision Theory

TTh 5–6:20 p.m.

Syllabus, Spring 2025

RWAC 0426

Professor: J. Carr
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Office Hours: RWAC 0466
T 2:30–3:20, 6:20–7:10pm

1 OVERVIEW

The goal of this course is to teach you how to reason clearly in an uncertain world. You face a vast number of decisions every day. Your most important, live-changing decisions must be made from a position of uncertainty: you don't know how things will turn out. (*'Will a special so-and-so agree to a date with me, or laugh in my face?' 'Will it be safe to visit my grandparents this summer?' 'What kind of job will I get after graduating?')* To make the best possible choices, you need to (i) form rational beliefs, and degrees of belief, in response to your limited information, and (ii) make rational decisions for how best to pursue your ends. **Formal epistemology** provides theories of rational beliefs and degrees of belief. **Decision theory** provides theories of rational decisions under limited information.

Formal epistemology and decision theory provide mathematically rigorous tools that are used in many fields, including cognitive science, psychology, economics, computer science, AI, political science, and beyond. They are also central throughout philosophy: in every subfield of contemporary philosophy, there are philosophers using these formal tools to clarify ideas and to solve problems. Philosophers of mind use probability and decision theory to explain intentionality, to model perception and perceptual belief, and to explain belief-formation heuristics and biases. Ethicists use formal methods from decision theory to precisify and solve puzzles for moral choices under uncertainty. Philosophers of physics use probabilities and tools from formal epistemology to understand different kinds of stochastic processes, and to clarify puzzles for particular interpretations of quantum mechanics. And so on. The objective of this course is to provide an introduction to probability, decision theory, and philosophical topics within each.

Prerequisites: none. The only math we'll presuppose is basic arithmetic with variables.

2 GRADING BREAKDOWN

- Problem sets weekly: 30% (3% × 10)
- Midterms: 40% (20% × 2)
- Final exam (Thursday, June 12, 7–10 p.m.): 30%

3 TEXTBOOK AND RESOURCES

Textbook: *Odds and Ends: Introducing Probability & Decision with a Visual Emphasis*, by Jonathan Weisberg. This textbook is **free** and available digitally. A few other readings will be available on the course website.

In-class polls/ungraded mini-quizzes: conducted primarily on Class Question (a free alternative to iClicker). There are instructions for signing up on Canvas.

4 ASSESSMENTS

4.1 PROBLEM SETS

Problem sets must be completed independently, without the help of other people or AI.

Problem sets ("psets") are **due every Sunday at 11:59 p.m.**. Unexcused late psets lose 20% of their maximum possible credit for each day that they're late, for the first three days.[1] Thereafter, you can earn up to 40% of their credit at any point for the rest of the course. 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 6 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.

4.2 EXAMS

There will be two midterms and a final exam. All must be completed **without assistance from, or interaction with, other students, or any resource other than your memory**. The exams may include both short- and long-answer questions.

If you miss an exam for a legitimate reason, you must email me within 24 hours of the exam to schedule a make-up exam and explain your reasons for missing the original time. I trust that your explanations will adhere to the Honor Code.

4.3 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 the content of the syllabus; conflicts with other courses or activities; missed alarms; …

5 POLICIES

Email policy: I'm 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 class or to office hours—it's much more efficient, and you'll understand better if you can ask follow-up questions!

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: grade cutoffs are at integers.

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.

[1] Days are rounded up: for example, if you submit 0.04 days late, your submission is counted as 1 day late and your maximum grade is 80%.

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

6 OTHER INFORMATION

6.1 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**.

6.2 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.

6.3 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`

7 TENTATIVE SCHEDULE (SUBJECT TO CHANGE)

This schedule is subject to change. Unless otherwise indicated, readings are from Weisberg, *Odds and Ends.* Readings marked with "*" are not in Weisberg and are available on the course website.

Week 1 *Background Concepts*

Tue. Apr. 1	Introduction, syllabus overview
Thu. Apr. 3	Ch. 1–3: Monty Hall, Logic, Truth Tables

Week 2 *Logic and Probability*

Tue. Apr. 8	⋆ Adams, "Logic and Probability"
Thu. Apr. 10	Ch. 4-5: The Gambler's Fallacy, Calculating Probabilities

Week 3 *Calculating Probabilities*

Tue. Apr. 15	Ch. 6: Conditional Probability
Thu. Apr. 17	Ch. 7: Calculating Probabilities II

Week 4 *Bayes' Theorem*

Tue. Apr. 22	Ch. 8, 9: Bayes' Theorem, Multiple Conditions
Thu. Apr. 24	Ch. 15: Two Schools, Ch. 18: The Problem of Priors

Week 5 *Decisions*

Tue. Apr. 29	**Midterm 1**
Thu. May. 1	⋆ Weatherson, Ch. 2, Simple Reasoning Strategies, Ch. 3, Uncertainty

Week 6 *Expected Utilities*

Tue. May. 6	Ch. 11: Expected Value
Thu. May. 8	Ch. 12: Utility, reread Expected Value

Week 7 *Decision Theories and Challenges*

Tue. May. 13	⋆ Peterson: Causal vs. Evidential Decision Theory
Thu. May. 15	Ch. 13: Challenges to Expected Utility

Week 8 *Decision Theory in the Infinitary Case*

Tue. May. 20	**Midterm 2**
Thu. May. 22	Ch. 14: Infinity and Beyond

Week 9 *Dutch Books; Self-Locating Beliefs*

Tue. May. 27	Ch. 16, 17: Beliefs and Betting Rates, Dutch Books
Thu. May. 29	⋆ Elga, "Self-Locating Belief and the Sleeping Beauty Problem" ⋆ Elga, "Defeating Dr. Evil with Self-Locating Belief"

Week 10 *TBA*

Tue. Jun. 3	TBA
Thu. Jun. 5	TBA

THE HONOR CODE

The Honor Code is a commitment by students and faculty. Students committed to the Honor Code agree:

1. that they will not give or receive help in any graded work for the course;
2. that they will not use unpermitted sources in any graded work for the course, nor represent others' work as their own;
3. that they will not lie to or deceive their instructors in any way related to submission of academic work;
4. that they will not offer, solicit, provide, or accept bribes for aid on any academic work or for grades;
5. that they will do their part to see to it that others uphold the spirit and letter of the Honor Code.

Members of the faculty in turn agree to demonstrate their confidence in the honor of their students by agreeing:

1. that they will refrain from taking exorbitant precautions to prevent students from violating the above commitments;
2. that they will refrain from taking unusual or unreasonable measures to determine whether students have violated the above commitments.

In abiding by the Honor Code, students and faculty work together to maintain academic integrity at the University of California.

VIOLATIONS OF THE HONOR CODE

Examples of conduct in violation of the Honor Code include:

- Copying others' work on graded assignments and exams;
- Giving or receiving unpermitted help on assignments and exams;
- Plagiarism of any sort;
- Deliberate falsification with the intent to deceive in written or verbal form related to the submission of academic work, including justifications for missed or late work;
- Bribery in any way related to the course;
- Representing another person's work as their own;
- Giving or receiving help on any academic assignment where reasonable person would have known that such aid was not permitted.

This list is not exhaustive.