

PROBABILITY & DECISION THEORY

PHL 475-001 | Fall 2025 | 3 Credit Hours

T, TR 2-3:15pm

Lloyd Hall 226

Dr. Poston

Updated: Tuesday, November 18, 2025

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Course Description

Uncertainty is a fundamental and unavoidable feature of daily life. People often must reason about what to do when they do not possess complete information about the possible scenarios and outcomes. To reason and act intelligently, they need to appropriately handle uncertainty. This course dives into the realms of decision theory and probability, offering a blend of philosophical insights and mathematical rigor. Drawing primarily from Resnik's [Choices: An Introduction to Decision Theory](#) and Hacking's [An Introduction to Probability and Inductive Logic](#), students will explore foundational concepts, from basic probability rules to the different rules for decision-making. The curriculum delves into intriguing paradoxes, ethical implications, and real-world applications, enriched with insights from game theory, statistical reasoning, and social choice theory. Supplementary readings and case studies will further enhance understanding, providing a multifaceted perspective on how individuals and organizations make decisions. Through engaging lectures, discussions, and practical exercises, participants will gain a robust understanding of how probability informs choices, and the philosophical underpinnings that drive decision-making processes. This course is ideal for those curious about the intersection of philosophy, mathematics, and human behavior, equipping them with tools to make informed decisions in complex scenarios.

Required Texts from UA Supply Store:

- Martin Peterson *An Introduction to Decision Theory* 2nd edition
- Resnik, Michael. [Choices: An Introduction to Decision Theory](#). 1987.
- Hacking, Ian. [An Introduction to Probability and Inductive Logic](#). 2001.

Suggested Texts

- Michael Titelbaum *Bayesian Epistemology* Volumes 1 & 2
- Richard Jeffery *The Logic of Decision* 2nd edition

Office Hours

Lloyd Hall 302

T, TR 1-2pm & by appointment

Student Outcomes for Probability & Decision Theory

1. *Conceptual Understanding*: Students will grasp foundational concepts in decision theory and probability, including expected utility, Bayesian reasoning, and the philosophical implications of various probability interpretations. Use decision trees and expected value to analyze and compare different options in decision-making situations.
2. *Analytical Skills*: Participants will develop the ability to apply mathematical tools and frameworks to real-world decision-making scenarios, deciphering complex problems using probabilistic models and decision trees.

3. *Ethical Reasoning*: Students will cultivate an understanding of the ethical dimensions of decision-making, recognizing the moral implications of choices in various contexts, and integrating fairness and justice considerations.
4. *Critical Evaluation*: Participants will be equipped to critically evaluate different decision-making strategies, identifying potential biases, and weighing the pros and cons of different probabilistic interpretations.
5. *Historical and Philosophical Perspective*: Students will acquire a broad understanding of the historical evolution of probability and its philosophical nuances, appreciating the interdisciplinary nature of decision theory.
6. *Practical Application*: Through case studies and real-world examples, students will gain experience in applying decision theory concepts to practical scenarios, ranging from everyday choices to organizational decision-making.
7. *Collaborative Learning*: By engaging in group discussions, projects, and debates, students will enhance their collaborative skills, learning to effectively communicate and deliberate on decision-making processes within team environments.

Grading Policy

Grades will be assigned with typical + / - scale. 100-97 A+, 96-93 A, 92-90 A-, and so on. I will average grades to within a point.

Policy of Missed Exams and Coursework

Missed exams and coursework will be not receive any credit unless prior notice is given. In the event of documented illness, a student will have the opportunity to make up an exam and/or coursework. In any other circumstance, the student will be given an opportunity to take reduced credit for missed coursework at the professor's discretion.

Attendance Policy

Each day a student will receive a 1 or 0 for attendance. 1 is earned by showing up on time and being attentive in class. At the end of the semester, I will drop the lowest two attendance scores. In the event of an unforeseen emergency or illness (suitably documented), I will drop that day's attendance score from the student's average.

Assignments

1. 3 exams (40% total)
 - a. Thursday October 2 (take home exam)
 - b. Tuesday November 11 (take home exam)
 - c. Final Exam
 - i. Wednesday December 10th 1:30-3:30pm Lloyd 226
2. Homework (10%)
3. In class work (25%)
4. 2 short papers (15% total)
 - a. [Due Monday 10.27 by noon in my email.](#)
 - b. Topic to be determined
5. Attendance (10%)

Schedule

Date	Topic	Reading / Notes
Thu Aug 21	Lecture 1	Pascal Pensées (selections); Lycan, “In Defense of Pascal’s Wager”
Tue Aug 26	The Basics	Peterson Ch. 1 ; Study Questions
Thu Aug 28	The Basics	Peterson Ch. 2; Study Questions
Tue Sep 2	Discussion of Peterson Chs. 1 & 2	Optional: “Instrumental Rationality,” §§ 1, 2 & 4
Thu Sep 4	Decisions under Ignorance	Peterson Ch. 3; Titelbaum §2.1; Optional: Resnik Ch. 2
Tue Sep 9	Decisions under Risk I	Peterson Ch. 4; Titelbaum §2.1; Optional: Resnik Ch. 3
Thu Sep 11	Decisions under Risk II	Peterson Ch. 4; Optional: Pascal’s Wager §§2–5.2
Tue Sep 16	Applications & Paradoxes	Peterson Ch. 4; Optional: Resnik Ch.4; Broome; Smith
Thu Sep 18	Utility	Peterson Ch. 5; Resnik §§4.1– 4.3; Titelbaum §§7.1–7.2
Tue Sep 23	Representation Theorems	Titelbaum Ch. 8
Thu Sep 25	Expected Utility	Joyce Ch.1 'Instrumental Rationality as Expected Utility Maximization'
Tue Sep 30	Exam 1	
Thu Oct 2	Foundations of Probability	Titelbaum §§2.2–2.5; Ch.3; Optional: Peterson Ch.6
Tue Oct 7	Practice & Discussion	
Thu Oct 9	Practice & Discussion	
Tue Oct 14	Conditional Probability	Optional: Hájek (2011) 'Conditional Probability'

Thu Oct 16	Conditional Probability (cont.)	
Tue Oct 21	Updating by Conditionalization	Titelbaum Ch.4
Thu Oct 23	No Class – Work on First Paper	
Tue Oct 28	Further Rational Constraints	Titelbaum Ch.5
Thu Oct 30	Fall Break – No Class	
Tue Nov 4	What is Probability?	Peterson Ch.7
Thu Nov 6	Confirmation	Titelbaum Ch.6
Tue Nov 11	Exam 2	No in-person class: Take home exam (due Thursday Nov 13)
Thu Nov 13	The Problem of the Priors	Titelbaum Ch.13
Tue Nov 18	Causal vs. Evidential Decision Theory	Peterson Ch.9 ; Titelbaum §7.3; Resnik §§4.5–4.6
Thu Nov 20	Game Theory I	Peterson Ch.11
Tue Nov 25	No Class – Thanksgiving Break	
Tue Dec 2	Game Theory II	Peterson Ch.12
Thu Dec 4	Social Choice Theory	Peterson Ch. 13
	Final Exam	Due Wednesday Dec 10.