Philosophy 321 sec. 001 Induction, Decision and Game Theory Syllabus
2025 - 26 Winter Term 1 (Fall 2025) Monday, Wednesday, Friday: Noon to 12:50 p.m. in Woodward Instructional Resources Centre (IRC) Floor: G; Room 5

Acknowledgment: UBC's Point Grey Campus is located on the traditional, ancestral, and unceded territory of the xwməθkwəy̓əm (Musqueam) people. The land it is situated on has always been a place of learning for the Musqueam people, who for millennia have passed on in their culture, history, and traditions from one generation to the next on this site.

Please note: Course content will be provided *in-person*. Lectures will not be recorded or live-streamed. I typically do not use overhead slides. Roughly once a week we will have an *in-class* assignment. Do not take this course if you are unable or unwilling to attend in person.*

Instructor: Chris Stephens
Office: Buchanan E-356
Office Hours: Mondays and Wednesdays, 1-2 p.m., or by appointment; email for a Zoom link or to meet in person at other times. I prefer to meet in person whenever possible.
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Course Description: What makes a decision rational? In this course we will examine two different approaches to this question: decision theory and game theory.† Decision theory is used to analyze the decision making of an individual under various degrees of ignorance about what will affect the outcomes of the agent's choices. Game theory is used to analyze decisions in which the outcomes of an agent's decision are determined in part by what other agents do.

Decision and game theory are studied and used in a wide variety of areas, including economics, statistics, business, evolutionary biology, psychology, political science, mathematics, computer science and philosophy. Although we will have occasion to discuss examples from some of these areas, the primary emphasis will be on philosophical issues. This means that we will focus on the conceptual foundations of decision and game theory, with special attention given to certain puzzles such as Newcomb's paradox and the Prisoner's Dilemma. We will develop theories of both rational belief and rational action. We will also spend time thinking about the applications of these theories to various areas of philosophy, including social and ethical problems.

Learning outcomes *Successful students will*
- understand the differences between ordinal, internal and ratio scales and the preference conditions relevant to decisions under ignorance and under risk.
- explain how disagreement about rationality under ignorance underlies the Rawls – Harsanyi debate about principles of distribution one would choose behind a "veil of ignorance"
- recall and explain the pros and cons of decision theoretic rules under ignorance such as maximin, minimax regret, the optimism pessimism rule and the principle of indifference.
- know the axioms of probability and how to apply Bayes' theorem to calculate probabilities.
- understand the role of probability in decision theory and be able to articulate the pros and cons of the major interpretations of probability such as degree of belief, propensity, and hypothetical relative frequency.
- reconstruct the axiomatic approach to decisions under ignorance.
- explain and critically assess the Allais, Ellsberg and St. Petersburg paradoxes.
- learn the standard axioms and theorem of von Neumann and Morgenstern's utility theory.
- explain the pros and cons of difference responses to the Predictor paradox.
- understand the main assumptions that go into standard game theory, including common knowledge assumptions.
- apply the minimax test for zero-sum games
- identify Nash Equilibria in various games; explain the difference between Nash equilibria and evolutionary stable strategies.
- understand and apply various games, including the Prisoner's Dilemma game, Chicken game, Stag hunt, Hawk-Dove game, Ultimatum game; Dictator game; divide the cake
- understand the strengths and weaknesses of Skyrms' use of evolutionary game theory to explain our sense of justice.
- construct and defend your own philosophical arguments about some controversial topic in decision or game theory.

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* Course materials – including exams, assignments, lecture notes and the lecture itself – are all protected by copyright. Recording, copying or sharing these materials without permission may be a violation of Canadian copyright law and UBC policies. Please check with me first if you need to record a class meeting.

† The course also has "induction" in the title. We won't say much about the traditional problem of induction in this course, though we will have a small unit on confirmation theory. If you are primarily interested in the problem of induction, you are better off taking PHIL 369.

Texts:
(1) (**IDT**) *An Introduction to Decision Theory*, second edition, by Martin Peterson (Cambridge University Press, 2017). Available at UBC Bookstore.
(2) (**OL**) On line readings. Links to the on-line readings will be available at the course website through Canvas. This requires your CWLogin information)
Please let the bookstore know if they run out of copies of Peterson's book. Of course you can also order it on-line.

Pre-requisites: Although Phil 120 or Phil 220 is listed as a prerequisite, neither course is required. Students should, however, have some degree of mathematical sophistication. That is, you should feel comfortable with basic algebra, probability and logic. If you have taken introductory courses in mathematics, economics or computer science, that is sufficient background for this course. Please see me if you have any questions about whether you have the appropriate background.

Course Requirements		**Marking Scale**		
(1) Best 10 out of 11 Group Exercises	10%	90-100% A+	85-89% A	80-84% A-
(2) 2 Problem Sets (each 5%)	10%	76-79% B+	72-75% B	68-71% B-
(3) Mid-term Exam	20%	64-67% C+	60-63% C	55-59% C-
(4) Final Exam	40%	50-54% D	0-49% F	
(5) Term Paper	20%			

Each of these course requirements is discussed below.

Group Exercises
Periodically I will break you up into groups of about 3-4 people and each group will complete an exercise. Each member of a given group (who is present) will receive the same grade on the assignment. The group exercises are generally NOT announced in advance. Your best 10 (out of 11) group exercises count toward your final group exercise grade. Your final group exercise grade can be affected by the performance evaluations of the other members of your group. You will have an opportunity to evaluate your fellow group members on the final exam.

Problem Sets
There will be two sets of homework problems, designed to give you some additional practice at solving decision and game theory problems. Each set is worth 5% of your total course mark. Problem sets are marked down by 5% per day late. Problem sets are not accepted more than one week late. Problem sets should be uploaded to the relevant link on Canvas.

In-class Exams
Each student is required to take the mid-term and final examinations. The exams are designed to test your comprehension of the material that has been covered in class and in the readings. The exams will likely consist of a mixture of multiple choice and short answer questions. I will hand out a review sheet about a week or two before each exam.

Term Paper
Each student is required to write one (double-spaced) paper approximately 2,000 words in length. I will pass out paper topics a few weeks into the term (about 5 weeks before the paper is due). At that time, I will also pass out information about how to write a good paper. Term papers will also be marked down by 5% per day late. Additionally, term papers submitted late will receive fewer comments. Term papers have two due dates: a draft of your term paper is due **in class** on **Friday, Nov 14th and the final version is due one week later on Friday Nov. 21st at 11:59 p.m. (submitted to Canvas).**

Attendance
There is no official requirement that you attend class. However, it is difficult to do well unless you attend regularly. *I will not be recording or live-streaming any of the lectures. Furthermore, I do not usually use overhead slides.* If you do miss class, it is your responsibility to find out what you missed. Please contact another student, Steven, or me. Remember that the group exercises are not generally announced ahead of time, so if you miss class you run the risk of missing a group activity. If you miss a group activity and you do not have a University-sanctioned excuse, you will receive a "0" for that assignment. Take notes! Evidence suggests that for most people, retention is better if you take notes by hand. Finally, you will not be allowed to make up exams without a documented, University-sanctioned excuse.

In general, I expect students to be consistently well prepared for class by having read (and thought about) the material. These readings are not to be passively consumed - I welcome (and expect) questions and challenges in class. I also hope that students will drop by my office frequently to discuss what we're doing or just to say "hello" and let me know how the course is going. If you are unable to come to my office hours, please feel free to set up an appointment. You are also encouraged to discuss any problems you may have with the teaching of the course.

If you are sick you shouldn't come to class. You can find out what you missed by doing the relevant readings, getting notes from a fellow student, and talking to me. I am happy to meet to chat one-on-one in person or over Zoom (email me for a Zoom link).

The Centre for Accessibility (https://students.ubc.ca/about-student-services/centre-for-accessibility) provides resources for students who need academic accommodation. Please contact me personally as soon as possible so we can discuss accommodations necessary to ensure full participation and to facilitate your educational opportunities.

Plagiarism
Finally, please note that cheating and plagiarism are serious offenses. Your work should be your own: this means that you should not use **Chat-GPT** or other AI devices to write your essay for you. (see https://academicintegrity.ubc.ca/chatgpt-faq/#:~:text=The%20use%20of%20ChatGPT%20or,use%20in%20teaching%20and%20learning.) Doing so in this course constitutes academic misconduct. If you do use Chat-GPT to or another AI to aid in your paper, *you should explain in your "references" section how you used it*. I reserve the right to examine students orally about their essays. If you have any questions about what constitutes academic misconduct, please check with me or review the UBC guidelines:
UBC link about Academic misconduct: https://academicintegrity.ubc.ca/regulation-process/academic-misconduct/

Statement of UBC values and policies:
UBC provides resources to support student learning and to maintain healthy lifestyles but recognizes that sometimes crises arise and so there are additional resources to access including those for survivors of sexual violence. UBC values respect for the person and ideas of all members of the academic community. Harassment and discrimination are not tolerated, nor is suppression of academic freedom. UBC provides appropriate accommodation for students with disabilities and for religious and cultural observances. UBC values academic honesty and students are expected to acknowledge the ideas generated by others and to uphold the highest academic standards in all of their actions. Details of the policies and how to access support are available here: https://senate.ubc.ca/policies-resources-support-student-success/.

Schedule of Subjects, Readings and Assignments (subject to possible change).
(**IDT**) *An Introduction to Decision Theory, second edition* (**OL**) On line (https://isit.arts.ubc.ca/canvas/)

Week	Dates	Subject	Reading Assignment
1	Sept 3, 5	Intro to Decision Theory	(**IDT**) ch. 1, ch. 2, p. 1-40
2	Sept 8, 10, 12	Decisions under ignorance	(**IDT**) ch. 3, p. 41-64. (**OL**) Gardiner "A Core Precautionary Principle"
3	Sept 15, 17, 19	Decision under risk; utility	(**IDT**) ch. 4 (4.1, 4.2, 4.3); begin (**IDT**) ch. 5
4	Sept 22, 24, 26	Utility; interpretations of probability	(**IDT**) ch. 5; (**IDT**) ch. 6; (**IDT**) ch. 7
5	Sept 29, Oct 1, 3	Bayesianism, Pragmatic arguments	(**IDT**) ch. 8; (**OL**) Handout on Dutch Book arguments
		Problem Set #1 due Oct 3rd by 11:59 p.m. (submitted to Canvas)	
6	Oct 6, 8, 10	Puzzle Cases: Allais' paradox; Ellsberg, St. Petersberg,	(**IDT**) ch. 4 (4.4, 4.5, 4.6, 4.7, 4.8)
No class Monday, Oct. 13th **(Thanksgiving)**			
7	Oct 15, 17	Newcomb's Paradox & Causal vs. Evidential Decision theory	(**IDT**) ch. 9 (**OL**) Egan "Some Counterexamples to Causal Decision Theory"
		Midterm Exam Friday Oct. 17th (in class)	
8	Oct 20, 22, 24	Psychology & Game theory Intro to game theory	(**IDT**), ch. 14 and begin (**IDT**) ch. 11
9	Oct 27, 29, 31	More intro to game theory	(**IDT**) ch. 11

10	Nov. 3, 5, 7	Failures of Equilibrium; Prisoner's Dilemma	(**IDT**) ch. 12 (12.1, 12.2, 12.3, 12.4)

Problem Set #2 due by Nov 7st at 11:59 p.m. (submitted to Canvas)

No class Nov. 10 through Nov 12 **(Midterm break)**

11	Nov 14	Term Paper Peer Review	Bring draft of your term paper to class.

Term Paper Drafts Due in class on Friday, Nov. 14th

12	Nov 17, 19, 21	Evolutionary Game Theory, intro	(**IDT**) ch. 12 (12.5, 12.6) (**OL**) Skyrms *Evolution of the Social Contract*, ch. 1 & 2.

Final Version of Term Paper due Friday Nov 28th (11:59 p.m., submitted to Canvas)

13	Nov 24, 26, 28	Evolutionary Game theory, continued	(**OL**) D'Arms et. al "Game theoretic explanations of the evolution of justice" (**OL**) Henrich et al "In search of homo economicus: Behavioral experiments in 15 small scale societies"
14	Dec 1, 3, 5	Wrap Up and Review for Final	(**OL**) Skyrms "The Stag Hunt"

The final exam will be between December 9th and 20th. Please do not take this course if your travel plans prohibit you from taking the final exam during this time.