

Rational Choice

Units 9.0
Time Monday, Wednesday: 1:00–2:20PM
Location CMUQ 1190

Instructor David Emmanuel Gray
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Office hours Sunday, Monday, Tuesday, Wednesday, Thursday: 9:00–10:00AM, 3:00–4:00PM

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Course Overview

Description

Most people like to think of themselves as rational. Telling someone “You are not being rational” is normally not a complement. To be irrational is to be foolish, confused, muddled, illogical. But what does it mean to be rational?

This course provides an overview of rational choice theory, which attempts to answer this question as applied to decision making. Aristotle emphasized this field’s importance, arguing that “the origin of action is choice, and that of choice is desire and reasoning: for good action and its opposite cannot exist without a combination of intellect and character”. While I cannot promise to inculcate you with good character, I do aim to develop your intellectual reasoning for good decision making in a variety of contexts. In particular, this course will stress the role that formal methods play in this analysis. As a result, this course’s approach may be at times more rigorous than you are used to, but its applications remain quite relevant to philosophy, economics, psychology, computer science, statistics—and even your life!

We begin the course by examining choice in situations where there is neither ignorance, nor risk, nor uncertainty involved in the consequences of your decisions. Unfortunately, most decisions are not like this, so we then look at choice under ignorance; that is, when you know the possible consequences but do not know their respective probabilities. Following this, we explore choice under risk and uncertainty—when you do know these probabilities. This leads us to conclude the course by studying the nature of probability. Throughout all this, we examine various formal models, their philosophical underpinnings, and experimental results testing the extent to which the decisions of real people conform to them.

Readings

The following is the required textbook for the course:

- Martin Peterson. *An Introduction to Decision Theory*. Cambridge: Cambridge University Press. 2009.

Additional readings will be posted on the course webpage. You are expected to read the material according to the class schedule.

Objectives

By the end of this term, I expect that you will be able to:

- Formally represent and analyze decision making in a variety of contexts,
- Assess psychological claims about whether people, in real life, actually conform to canonical theories of rational choice, and
- Form a considered position concerning what you judge to be the most appropriate norms of rational decision making.

I have designed each course requirement with these objectives in mind.

Announcements and Other Communication

I will post important information on the course webpage, so please routinely check for updates at

<http://www.andrew.cmu.edu/user/degray/choice/>

Otherwise, I am glad to answer your questions, discuss your work, or respond to you concerns. Please see me at my office hours or get in touch via email.

Requirements and Grading

Classes will typically follow an interactive lecture format, driven by application and analysis of the readings. As a result, the quality of the course depends critically on your individual attention and participation. The purpose of us coming together as a class is to both learn, practice, and critically assess the theories of rational choice together as a group.

I strongly encourage you to discuss the course’s material outside of class with your fellow classmates, friends, and family, as well as with myself. However, all your work must be done independently, unless otherwise noted. You are expected to be familiar with the university policies on cheating and plagiarism. If you have any questions, please ask; do not assume.

Assignments include 23 quizzes, 2 unit exams, and 1 cumulative final exam. Please refer to page 2 for details.

The total points will vary from assignment to assignment. However, each is ultimately scaled to a score from 0 to 5. Unless you are notified of otherwise, the grading distribution will be as follows:

4.00–5.00	A	2.00–2.99	C	0.00–0.99	R
3.00–3.99	B	1.00–1.99	D		

Your final course grade will be on the same 5-point scale, with each assignment weighted as indicated on page 2. (The wise student will realize that using this scale provides you with opportunities to recover if you do poorly on an assignment or two.)

If during the semester you wish to know how you are currently doing in more specific terms than what you can infer from this information, do not hesitate to meet with me. Please note, however: due to Family Educational Rights and Privacy Act (FERPA) regulations, *I will not transmit grade information over email*. All discussion of grades must be done face-to-face with me.

Late Policy / Absence Policy

I do not allow make-up quizzes and exams, and you get *no* “free” absences in this class. There are only two exceptions to this:

1. You and I agree on a reasonable accommodation *prior* to either the original quiz/exam date or the date you are missing class, or
2. You provide me with a signed letter from the Dean of Academic Affairs justifying why it is permissible for you to take a make-up quiz/exam or to be absent from class.

I recognize that these are extremely demanding requirements. *If you do not feel that you can meet them, please enroll in another course.*

Participation and Attendance

Formal decision theory is intellectually demanding, and so we will work in and out of class with a lot of examples to make it more concrete. As such, attendance and participation are very important. I expect you to show up to class on time, participate thoughtfully, ask questions when you are confused, take notes, and have a grasp of what was accomplished in each meeting. *Attendance is therefore required without exception, and anyone showing up more than 10 minutes late will be politely asked to leave and come back (on time) to our next class meeting.* To enforce this policy, I will promptly take attendance at 1:00PM. If you arrive after I have called your name, then you will be marked as tardy. Please refer to page 2 for details.

Assignments

Reading

Most days of class will have an assigned reading (see the schedule on pages 3 and 4) that you will be expected to have read and thought about *before* class. This will allow us to devote our time to discussing and assessing the texts rather than simply reviewing their contents. Hence, you need to do more than merely peruse the readings: you must endeavor to understand what they are trying to convey. Keep in mind that reading the course material is not like reading a novel. There will be times when you have to read slowly and carefully. Sometimes you may have to stop and think about things; and you should be prepared to go back and reread if necessary. In some cases, multiple readings of the text may be necessary. I highly recommend taking notes while you read, so that you can remember the text's main points. Finally, feel free to bring questions about the reading to class.

Participation (10% of Final Grade)

Your base participation grade will be on the 5-point scale from page 1, and it will consist of your overall grade on all graded assignments. For example, if the weighted average of your grades on quizzes and exams is an 3.57, then your base participation grade is also an 3.57, or a B. Calculating your base participation grade can be done with a calculator. The formula is as follows:

$$\begin{aligned} \text{Base Participation Grade} = & [(Average Quiz Grade \times 0.20) + \\ & (Unit Exam \#1 Grade \times 0.20) + \\ & (Unit Exam \#2 Grade \times 0.20) + \\ & (Final Exam Grade \times 0.30)] \div \\ & 0.90. \end{aligned}$$

At the end of the semester, I will calculate your base participation grade this way. After that, I will then take into consideration the items below in order to raise or lower this grade.

Absences, tardy arrivals, and distracting behavior impact your participation grade in the following ways: each class absence will lower your participation grade by 1.0 point (one letter grade), while each time you are tardy will lower it by 0.5 points (one-half letter grade). Being caught sleeping in class, chatting with the person sitting next to you, using your cell phone, leaving the classroom, or similar behavior will be treated as an absence or as tardiness depending on the particulars of the circumstances.

Active and productive class participation, on the other hand, boosts your participation grade by up to 2.0 points (two letter grades). Also, if you have perfect attendance with no tardy arrivals, your participation grade will be automatically boosted an additional 1.0 point (one letter grade).

Note that it is possible that your participation grade can go negative because of penalties. On the other hand, it is also possible that your participation grade could go well above 5.0 points. Strive for the latter!

Quizzes (20% of Final Grade)

Throughout the semester, there will be 23 short quizzes, with the lowest 3 dropped and your highest 20 each counting for 1% towards your final course grade. Quizzes assess your understanding of both the reading and what we have covered in class. Quizzes will generally emphasize material covered since the previous quiz.

Quizzes will be given promptly at the start of class at 1:00PM and collected ten minutes later. If you come in late before they are collected, you will not be given extra time. If you come in after they are collected, you will have missed your chance to take the quiz. *So arrive promptly for class.* Quizzes are announced in advance, but cannot be made up. The reason that 3 of your quizzes are dropped is so you have the freedom to miss or do poorly on a quiz with no questions asked. To summarize: *there will be no make-up quizzes* without either a prior reasonable accommodation from me or a signed letter from the Dean of Academic Affairs.

Unit Exams (40% of Final Grade)

There will be 2 unit exams, each of which will count for 20% towards your final course grade. Each unit exam will test your comprehension of the course material with problems similar to those seen on the quizzes while digging more deeply into the underlying concepts. Unit exams will be not be cumulative, instead emphasizing the material covered since the previous exam.

Final Exam (30% of Final Grade)

There will be 1 final exam, which will count for 30% of your final course grade. The final exam will test your comprehension of the course material, with some problems similar to those seen on the quizzes and unit exams while other problems aim to push you to apply your knowledge in addressing more advanced issues. The final exam will be cumulative, though with some emphasis on the material covered since the previous exam.

Schedule

wk	Date	Topic/Readings	# Pages	Assignments
1	1/16 (Mon)	Introduction		
	1/18 (Wed)	Prologue: Blaise Pascal, The First Decision Theorist <i>An Introduction to Decision Theory</i> , Introduction to Chapter 2, Sections 2.1–2.3, and Box 2.1. Blaise Pascal, "The Wager" (handout).	18	Quiz #1.
2	1/23 (Mon)	Choice Under Certainty (Unit #1) David Kreps, "Preference Relations and Revealed Preference" (handout).	6	Quiz #2.
	1/25 (Wed)	Choice Under Certainty <i>An Introduction to Decision Theory</i> , Introduction to Chapter 8, Sections 8.1 and 8.2, and Box 8.2.	7	Quiz #3.
3	1/30 (Mon)	Choice Under Certainty Amartya Sen, "Maximization and the Act of Choice" (handout).	12	Quiz #4.
	2/1 (Wed)	Choice Under Certainty <i>An Introduction to Decision Theory</i> , Introduction to Chapter 5, Section 5.1, and Box 5.1.	5	Quiz #5.
4	2/6 (Mon)	Choice Under Certainty <i>An Introduction to Decision Theory</i> , Section 8.3.	5	Quiz #6.
	2/8 (Wed)	Choice Under Ignorance (Unit #2) <i>An Introduction to Decision Theory</i> , Introduction to Chapter 3 and Sections 3.1–3.4.	13	Quiz #7.
5	2/13 (Mon)	Choice Under Ignorance <i>An Introduction to Decision Theory</i> , Sections 3.5, 3.6, and 2.4, and Boxes 3.2 and 2.2.	11	Quiz #8.
	2/15 (Wed)	Choice Under Ignorance Michael D. Resnik, "An Application in Social Philosophy: Rawls vs. Harsanyi" (handout).	4	Quiz #9.
6	2/20 (Mon)			Unit Exam #1.
	2/22 (Wed)	Choice Under Risk (Unit #3) <i>An Introduction to Decision Theory</i> , Introductions to Chapter 4 and Chapter 6, and Sections 6.1–6.3.	13	
7	2/27 (Mon)	Choice Under Risk <i>An Introduction to Decision Theory</i> , Section 5.2.	9	Quiz #10.
	2/29 (Wed)	Choice Under Risk <i>An Introduction to Decision Theory</i> , Sections 4.1–4.3.	12	Quiz #11.
	3/5, 7	 Spring Break		
8	3/12 (Mon)	Choice Under Risk <i>An Introduction to Decision Theory</i> , Sections 4.4–4.7, and 8.4.	15	Quiz #12.
	3/14 (Wed)	Choice Under Risk <i>An Introduction to Decision Theory</i> , Sections 8.5, 14.1, and 14.2.	11	Quiz #13.
9	3/19 (Mon)	Choice Under Risk <i>An Introduction to Decision Theory</i> , Section 14.3.	3	Quiz #14.
	3/21 (Wed)	Choice Under Risk Amos Tversky, Paul Slovic, and Daniel Kahneman, "The Causes of Preference Reversal" (handout). Sarah Lichtenstein and Paul Slovic, "Transcript from Post-Experimental Interview" (handout).	21	Quiz #15.
10	3/26 (Mon)	Choice Under Risk Hal R. Arkes and Peter Ayton, "Sunk Cost and Concorde Effects: Are Humans Less Rational Than Lower Animals" (handout).	10	Quiz #16.
	3/28 (Wed)			Unit Exam #2.

wk	Date	Topic/Readings	# Pages	Assignments
11	4/2 (Mon)	Bayesian Decision Theory (Unit #4) <i>An Introduction to Decision Theory</i> , Introduction to Chapter 10 and Sections 10.1–10.3.	11	
	4/4 (Wed)	Bayesian Decision Theory <i>An Introduction to Decision Theory</i> , Introduction to Chapter 7 and Sections 7.1–7.4.	11	Quiz #17.
12	4/9 (Mon)	Bayesian Decision Theory <i>An Introduction to Decision Theory</i> , Section 6.4, pages 143–146 of Section 7.5, and Box 7.1.	13	Quiz #18.
	4/11 (Wed)	Bayesian Decision Theory <i>An Introduction to Decision Theory</i> , Sections 7.5.1 and 9.1.	7	Quiz #19.
13	4/16 (Mon)	Bayesian Decision Theory <i>An Introduction to Decision Theory</i> , Section 7.5.2.	4	Quiz #20.
	4/18 (Wed)	Bayesian Decision Theory Thomas Gilovich, Robert Vallone, and Amos Tversky, "The Hot Hand in Basketball: On the Misperception of Random Sequences" (handout).	20	Quiz #21.
14	4/23 (Mon)	Epilogue: The Normative Force of Principles of Rationality Herbert Simon, "A Behavioral Model of Rational Choice" (handout).	20	Quiz #22.
	4/25 (Wed)	Epilogue: The Normative Force of Principles of Rationality Isaac Levi, "Rationality and Commitment" (handout).	19	Quiz #23.
	TBA			Final Exam.

Policies

Reasonable Accommodations

I recognize that you are a human being with occasional human problems associated with human finitude. Illness, family emergencies, job interviews, other professors, etc. . . will inevitably lead to legitimate conflicts over your time. If you expect that you will be missing class or be unable to take a quiz or an exam as scheduled, please notify me (either in class or via email) *in advance* and we can agree on a reasonable accommodation. Please recognize that most reasonable accommodations will still carry a penalty: your grade on the assignment may be reduced (since you may be given more time than your classmates), or you may have to do additional work not required of your classmates. So when proposing a reasonable accommodation be prepared to state what you take to be a fair penalty for that accommodation. I will then decide whether to accept or reject your proposal. Any arrangements after the fact require a signed letter from the Dean of Academic Affairs.

Challenging an Assignment Grade

Please recognize that I am human also: mistakes may occasionally occur when grading your assignments. Therefore, you have *one week* after an assignment is handed back to challenge its grade. To do so, you must return the assignment to me along with a clearly written explanation of your reason for challenging its grade. I will promptly and seriously consider all such requests and meet with you, if necessary, to resolve them. Assignments without a written explanation with not be considered. After one week, no challenges will be accepted. Of course, if you are not satisfied with your grade, but recognize that it was not due to a fault in the grading, I encourage you to talk with me to learn how to improve on future assignments.

Students with Disabilities

In compliance with university policy and equal access laws, I am available to discuss appropriate academic accommodations that you may require as a student with a disability. Request for academic accommodations should be made during the first week of the term, except for unusual circumstances, so arrangements can be made. Students are required to register for disability verification and for determination of reasonable academic accommodations. For more information, visit

<http://www.cmu.edu/hr/eos/disability/students/index.html>

Sexual Harassment Policy

It is the policy of the university that no male or female member of the university community (i.e., students, faculty, administrators, or staff) may sexually harass any other member of the community. Sexual advances, requests for sexual favors, and other verbal or physical conduct of a sexual nature constitute harassment when:

- Submission to such conduct is made or threatened to be made, either explicitly or implicitly, a term or condition of an individual's employment or education; or
- Submission to or rejection of such conduct is used or threatened to be used as the basis for academic or employment decisions affecting that individual; or
- Such conduct has the purpose or effect of substantially interfering with an individual's academic or professional performance or creating what a reasonable person would sense as an intimidating, hostile, or offensive employment, educational, or living environment.

For more information, visit

<http://www.cmu.edu/policies/documents/SexHarass.html>

A Note on Classroom Courtesy

Class begins promptly at 1:00PM. You are expected to be seated by that time and to remain seated until the class is dismissed. If you must leave before the class ends because of a medical appointment, or similar commitment, notify me before class begins and sit near the door. Students who leave without providing such notice and have not suddenly taken ill will be expected to drop the course and not to return.

Video Taping and Audio Recording

Your classmates and I have a reasonable expectation to not be recorded in this course. Therefore, videotaping and audio recording are prohibited without our expressed, unanimous permission.

Cell Phones, Laptops, and Related Technologies

Student interactions with portable technology devices can harm the dynamics of the classroom. Therefore, I expect you to silence your cell phones prior to class and to not text-message during class. *All laptops should be closed unless you have made prior arrangements with me and have demonstrated that using a laptop is necessary for your learning.*

Academic Integrity

Academic integrity is embodied by commitments to honesty, respect, trust, diligence, and rigor in the pursuit of knowledge. As a student in this class, academic integrity means following all directions on assignments, clearly distinguishing your own original work from the work done by others in your papers, and seeking help whenever you feel that you are struggling.

Most violations of academic integrity in this class involve cheating on a quiz or an exam by copying the answers from a neighbor or using an unauthorized "cheat sheet". Quizzes and exams assess your proficiency with the course material, so you must do them on your own. In real life, you may have a textbook to refer to when making a decision, but my goal is to train you better than that. I want you to internalize the skills that you are learning, being able to quickly and efficiently employ the tools of formal decision theory while also thoughtfully assessing their implications. Ultimately you should not need a textbook to help you. This will make it far more likely that your decision-making and problem solving skills will retain their critical edge.

While I treat violations of academic integrity on a case-by-case basis, there are some basic patterns I follow. When I suspect a violation, I will first meet with the student for an explanation. If I remain convinced that there is a violation, I will write a letter to the Dean of Students indicating that the student in question violated the academic standards for the class. Beyond that, I typically impose a penalty that exceeds the penalty of not having done the assignment at all. For instance, the penalty for cheating on a quiz is worse than for not having done the quiz at all. Such an action is also a violation of the community standards at Carnegie Mellon University. As such, there may be further penalties imposed by a University Academic Review Board. For more information, see the section on "University Policies" in the most recent edition of *The Q Word: Undergraduate Student Handbook & Planner*.

If you ever find yourself tempted to violate these standards of academic integrity, please find an alternative course of action! Email me for a reasonable accommodation, or turn in partially completed work. I assure you that the impact on you will be far gentler in these ways.