

Intro to Formal Reasoning and Decision Making

Rutgers University 01:730:109 02

Mike Deigan

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mike.deigan@rutgers.edu

MW 3:50 - 5:10

SC-220 / Zoom

<https://mikedeigan.com/teaching>

Description

It is often difficult to know what to think or what to do. Sometimes using mathematical tools can help us to reason better and to make better decisions.

This course introduces the basics of some of these tools, primarily decision theory and probability theory, and provides opportunities to practice applying them to real life issues as well as to explore some philosophical questions concerning their foundations and use.

Class meetings will primarily be devoted to small group discussions and practice problem solving, rather than lectures.

Prerequisites

There are no prerequisites for this course.

Core Curriculum

This course is certified for the Core Curriculum requirement

Cognitive Skills and Processes: Quantitative and Formal Reasoning [QQ], [QR].

Books

No book purchases necessary. All readings will be made available online.

Our primary texts will be

Sven Ove Hansson's [Decision Theory: A Brief Introduction](#) and

Jonathan Weisberg's [Odds & Ends](#).

Office Hours

I will be in the class Zoom room on Fridays from 9:00-10:30 AM EST each week for discussions with whoever wants to drop by. I enjoy talking with people about philosophy, so please feel welcome to come to these, even if you don't have any specific thing you feel you need to ask me about. You don't need to schedule a meeting to come to these.

If you need to meet with me one-on-one, you can either email me to find some time that works for us both or you can schedule an appointment online for for some time on Fridays between 1:00–2:30 PM EST here: <http://mikedeigan.com/meet>

One-on-one meetings will need to be scheduled at least a day in advance.

Assignments

1. *Readings & Perusall Discussion*: there will be readings assigned for each week. You will be required to read these carefully and discuss them on Perusall, an online social annotation platform accessed through Canvas.
2. *Weekly Reports*: at the end of each week you will complete a brief report answering some comprehension questions and writing about some of what you took away from the week's discussions.
3. *Papers*: you will write two ~1,000 word papers developing a case study applying the tools you've learned or exploring a philosophical issue they give rise to.

Grading

Perusall comments will be given pass/fail/0 grades based on completion with reasonable effort. I will give you a warning before failing an assignment for being completed without reasonable effort.

Weekly Reports and Papers will be given number grades based on comprehension, thoughtfulness, cogency, and creativity.

Your lowest grade weekly Perusall grade and lowest Weekly Report grade will be dropped.

Rubrics for each assignment type will be distributed in advance.

The final grade number will be determined with the following weights:

Perusall discussion:	20%
Weekly reports:	50%
Paper #1:	15%
Paper #2:	15%

The final grade number to letter conversion will be as follows:

A	92.5 – 100.0
B+	86.5 – 92.49
B	82.5 – 86.49
C+	76.5 – 82.49
C	72.5 – 76.49
D	59.5 – 72.49
F	00.0 – 59.49

Policies

Late Policy:

For papers and weekly write-ups, I'll take off two points for each day after the deadline it is turned in. No late credit for Perusall comments, except in special circumstances.

For all deadlines, I'm willing to be reasonably flexible. If you need an extra couple days because of other commitments or illness, just let me know a few days in advance and I don't mind giving an extension, even for non-emergency situations.

Longer extensions or last minute extensions require special circumstances.

Schedule

The assigned readings are subject to change. I will notify you of any such changes at least one week in advance and post an updated syllabus on the course webpage.

Decision Theory

Week 1	1/19	Franklin (1772) letter to Priestley
Week 2	1/24	Hansson §1. What is decision theory? Oster (2022) "Colleges Need to Catch Up to the Post-vaccine Reality" Schafer (2022) Reply to Oster
	01/26	Hansson §2. Decision Processes
Week 3	1/31	Hansson §3.1–3.5. Deciding and Valuing
	2/02	Hansson §3.6–3.7. Deciding and Valuing Stevens (1946) "On the Theory of Scales of Measurement"
Week 4	2/07	Hansson §4. The standard representation of individual decisions
	2/09	Hansson §5.1. Expected utility Weisberg §11. Expected Value
Week 5	2/14	Hansson §5.2. Expected Utility Weisberg §12. Utility
	2/16	Hansson §5.3–5.4. Expected Utility

Probability

Week 6	2/21	Weisberg §1, §4. The Monty Hall Problem and the Gambler's Fallacy
	2/23	Weisberg §5. Calculating Probabilities
Week 7	2/28	Weisberg §6. Conditional Probability
	3/02	Weisberg §7. Calculating Probabilities, Part 2
Week 8	3/07	Weisberg §8. Bayes' Theorem
	3/09	Hansson §6.1. Bayesianism Weisberg §18. The Problem of Priors

Spring break!

- Week 9 3/21 Your groupmates' paper drafts
 3/23 Your groupmates' paper drafts
 3/25 **Paper #1 due**

Limitations, Challenges, and Alternatives

- Week 10 3/28 Weisberg §13. Challenges to Expected Utility
 3/30 Weisberg §14. Infinity and Beyond
- Week 11 4/04 Hansson §10. The Demarcation of Decisions
 Ullmann-Margalit (2006) "Big Decisions: Opting, Converting, drifting"
 4/06 Ullmann-Margalit and Sunstein (1999) "Second-order Decisions" (selections)
- Week 12 4/11 Hansson §11. Decision Instability
 4/13 Nozick and Gardner (1974) - "Mathematical Games: Reflections on Newcomb's problem"

Deciding With Others: Game Theory, Jury Theorems, and Social Choice Theory

- Week 13 4/18 Resnick *Choices* Ch. 5-1, 5-4b, c. The Basic Concepts of Game Theory, The Prisoner's Dilemma
 4/20 Case "[The Evolution of Trust](#)"
 Hurley (1991) "Newcomb's Problem, Prisoners' Dilemma, and Collective Action" (selections)
- Week 14 4/25 Galton (1907) "Vox Populi"
 Anderson (2005) "The Epistemology of Democracy" (selections)
 Arrow et al. (2008) "The promise of prediction markets"
 4/27 Hansson §12. Social decision theory
 Pacuit "Voting Methods" §§1-3.1
- Week 15 5/02 Where to go next?

 5/10 **Paper #2 due**