Economics 2059: Decision Theory

Fall 2023
Lecture: Tue, Thur 1:30–2:45pm, Location Littauer M16

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Office Hours: Thursday 2:45-3:30 and by appointment

Description:

Most economic theories start from a model of individual decision making and then use it as a building block to model interaction between agents, groups of agents and firms, the economy as a whole, etc. In this course, we begin with a rigorous treatment of the classical models: utility maximization, expected utility, discounted utility, Bayesian updating, dynamic consistency, option value.

We then delve into a number of modern topics inspired by the observed violations of the classical models: hyperbolic discounting, prospect theory, ambiguity aversion. We will also talk about some "exotic preferences" used in macroeconomics, such as those of Epstein–Zin and Hansen-Sargent. Another part of the course explores the literature on stochastic choice, which is a growing field at the intersection of decision theory, discrete choice econometrics, and behavioral economics.

I hope this course will be of interest not only to high-brow theorists, but to all of you who want to learn decision theory well enough to use it in your own research, be it theoretical or empirical.

Prerequisites:

Economics: **Ec 2010a** or equivalent, e.g., Ch 1, 3, and 6 of MWG.

Mathematics: A certain level of mathematical literacy and sophistication. Proving theorems should be a comfortable and enjoyable activity, not something scary.

Grading:

This class does not have a final exam; instead the course grade will be based on 12 assigned problem sets. You may work together on the problems in groups no larger than 3. Students should acknowledge their collaborators and describe the extent of their collaboration at the top of the relevant assignments. While collaboration is allowed, directly copying someone else's work is not. Problem sets may be discussed, but they should be written up independently. You should not discuss the problems with anyone outside of your group, except for me.

You need to typeset your work in LaTeXor Overleaf. Learning how to do this is part of becoming a theorist.

You are free to look at books, lecture notes, journal articles, and working papers for help and hints but you should follow standard academic norms and acknowledge your sources.

You are not allowed to copy from past 2059 solutions or any other solutions. Not only that, if you look at such solutions instead of wrestling with the problems yourself you are basically wasting your time because you cannot learn theory without getting your hands dirty, or as Euclid said, "there is no royal road to geometry."

You are allowed to use GPT or any other LLM, but I want to see all of your work. You need to post any prompts, custom instructions, etc.

You are allowed to use Lean or any other theorem prover, but again I need to see all of your work.

If you turn your problem set late, I will not grade it and give you half of the points. I want to post the official solutions early so that people can study them and get feedback right away. This is a crucial step in learning new material.

Email:

Because I receive many emails it typically takes me a day or two to respond. In order to help me see your message in time, include the words "ECON 2059" in the subject line of every email you send to me.

Date of this document:

This version: November 9, 2023. As the semester progresses I may modify this syllabus.

Course Timing:

Date	Lecture	Pset due
Sep 5	L1. Static Choice	
Sep 7	L2. Static Choice	
Sep 12	L3. Dynamic Choice	PS1
Sep 14	L4. Dynamic Choice	
Sep 19	L5. Separability	PS2
Sep 21	L6. Time Preferences	
Sep 26	L7. Time Preferences	PS3
Sep 28	L8. Risk Preferences	
Oct 3	L9. Risk Preferences	PS4
Oct 5	L10. Risk Preferences	
Oct 10	L11. Risk and Time	PS5
Oct 12	L12. Risk and Time	
Oct 17	L13. Uncertainty	PS6
Oct 19	L14. Uncertainty	
Oct 24	L15. Updating	PS7
Oct 26	L16. Updating	
Oct 31	L17. Option Value	
Nov 2	L18. Cancelled	
Nov 7	L19. Ambiguity – Choquet	PS8
Nov 9	L20. Ambiguity – MEU and variational	
Nov 14	L21. Ambiguity – Sources	PS9
Nov 16	L22. Learning	
Nov 21	L23. Learning under Ambiguity	PS10
Nov 23	Thanksgiving	
Nov 28	L24. Stochastic Choice – Static	
Nov 30	L25. Stochastic Choice – Bayes	
Dec 5	L26. Stochastic Choice – Active Learning	PS11

Books:

Lectures will be based on my two books, available on the course website:

- Strzalecki, T., *Decision Theory*
- Strzalecki, T., *Stochastic Choice Theory*

A classic reference that you probably want to have on your bookshelf is:

- Kreps, D., *Notes on the Theory of Choice*, Westview Press, 1988. You can order it from the Coop online: `https://tinyurl.com/Place-Fall-Book-Order-Here`

Other books you might find useful are:

- Aleskerov F., D. Bouyssou, and B. Monjardet *Utility maximization, choice and preference* Springer, 2007
- Backus, D., B. Routledge, and S. Zin, *Exotic Preferences for Macroeconomists* `http://www.nber.org/chapters/c6672`
- Chambers, C., F. Echenique, *Revealed Preference Theory* Econometric Society Monographs, 2016
- Fishburn, P., *Utility Theory for Decision Making*, Wiley, 1970. `http://handle.dtic.mil/100.2/AD708563`
- Gilboa, I., *Theory of Decision under Uncertainty*, Cambridge, 2009.
- Krantz, D., D. Luce, P. Suppes, and A. Tversky, *Foundations of Measurement*, Vol 1–3, Dover, 2006
- Ok, E., *Elements of Order Theory*, in preparation
- Rubinstein, A., *Lecture Notes in Microeconomic Theory*, Princeton, 2005. `http://arielrubinstein.tau.ac.il/Rubinstein2007.pdf`
- Rubinstein, A., *Modeling Bounded Rationality*, MIT Press, 1998. `http://arielrubinstein.tau.ac.il/br/br.pdf`
- Vind, K., *Independence, Additivity, Uncertainty*, Springer, 2003
- Wakker, P., *Additive Representations of Preferences, A New Foundation of Decision Analysis*, Kluwer, 1989
- Wakker, P., *Prospect Theory: For Risk and Ambiguity*, Cambridge, 2010