

ECON 491 (D3)
Decision-making
MSPE, Department of Economics
Fall 2025

Instructor:
Alex Bartik (abartik@illinois.edu)
DKH 101-E
Office Phone: (217)-300-6027

Lectures: Monday/Wednesday, 9:30am-10:50am in DKH 123

Office Hours:

- Individual office hours: Mon 3:30-5:00pm CT, Tues 1:30-4:00pm CT. Schedule time [here](#). Can also schedule alternative appointment if necessary. Office hours are an opportunity to discuss questions you have about the class, problems with the assignments, or broader topics related to the course material and economics/econometrics more broadly. Individual office hours are available in DKH 101-E or on zoom. The zoom room invite will be sent to you when you schedule a meeting through my website.
- Group office hours: 4:00-5:00pm CT Tuesdays in DKH 101E. No appointment necessary.

Course Description: This course will help students think about how data and economics can be used to inform decision-making in policy, business, and life. Economists combine data with assumptions to draw conclusions about the impact of different actions that governments, firms, or people can take. The strength and credibility of these conclusions depend on the data and assumptions used, as well as the type of analysis conducted. This course studies key methodological and conceptual challenges in decision-making and provides students with some basic tools to conduct their own analyses. Concepts and skills will be illustrated through real world examples.

Course Goals: This course has four goals:

- 1) Learn about what combination of data + assumptions are needed to make decisions in different circumstances
- 2) Give students experience conducting data analysis themselves.
- 3) Communicate findings and policy implications clearly to others
- 4) Make students informed consumers of research and discussions of economic policy and personal decisions involving data.

Prerequisites: Econ 202 and 203 are required for individuals taking this course. Please schedule a meeting with me if you have not completed these courses. Econ 471 (or an equivalent statistics class) is also recommended, but is not required. The course assumes that students have knowledge of calculus, basic statistics and econometrics. In particular, students should be familiar with basic multivariate calculus (first and second derivatives and how to obtain them), basic properties of random variables, calculating expectations, variances, correlations, conditional expectations and conditional variances, and multiple linear regression.

Relationship to other economics courses: This course is designed to be complementary with the Econ 490 class that Professor Eunyi Chung teaches on the econometrics of causal inference. Students are allowed and encouraged to take both courses.

Credits: 3 credits (option for 4 credits for masters students with additional research assignment described below)

Course structure: The course will be a lecture, along with discussion and activities. Students are expected to attend all classes and participate in all discussions and activities. I will cold call throughout the semester. To facilitate in class discussions, I will provide name placards on the first day that you all are expected to bring to class every day. Computers and phones are not allowed out during class unless the student has received prior approval from the instructor.

Readings

Posted readings are required. I will post readings for the subsequent week each Monday on Canvas.

Additional materials, as well as assignments and practice materials will be available on Illinois Canvas (Illinois.canvas.edu). Announcements about assignments, readings, and other course items will be posted on Canvas.

This course will use R, which is a free statistical computing language. R can be downloaded at <http://www.r-project.org>. Additional background materials on R will be provided throughout the course.

Requirements:

- **Assignments:** There will be 9 assignments that together will count for 25% of the grade. I will drop your lowest assignment score when computing this grade. The assignments will be due on:
 - Assignment 1: Sep 8
 - Assignment 2: Sep 19
 - Assignment 3: Sep 29
 - Assignment 4: Oct 6
 - Assignment 5: Oct 15
 - Assignment 6: Oct 29
 - Assignment 7: Nov 12
 - Assignment 8: Dec 5
 - Assignment 9: Dec 10
- **In-class reading responses:** Will take place at the start of class every Monday on that week's assigned reading (excluding the first week of class, the week when there is a midterm exam, and the week of October 20, when the in-class reading response will be on Wednesday). The prompt will be provided by the instructor. These reading responses will make up 15% of the course grade. Students will be able to drop their 3 lowest scores on these reading responses.
- **Midterms:** There will be one midterm which will each count for 20% of the grade
 - Midterm: October 20
- **Final Exam:** There will be a closed book, 3-hour exam during finals week which will cover the entire course material and be worth 40% of the grade. The final exam is currently scheduled for 8:00-11:00am on Monday, Dec 15. Location TBD.

Extra Assignments for Those Taking for 4 Credits: Research proposal due on Nov 5, Final Analysis due on Dec 10. Talk to instructor for more details.

Assignments: Will be mixture of problem sets, policy briefs, and essays.

Grading: Overall Grades will be on a +/- scale and may follow a curve.

Assessment Policies:*Assignment Policies:*

Student grades on their lowest assignments will be dropped. All assignments are to be turned in on time on canvas in the format specified in the assignment. Late assignments receive *no* credit without an instructor approved excuse. Acceptable excuses include physical and mental illness, and personal or family emergencies. A written request for an extension must be submitted at least 48 hours in advance.

Assignments can be turned in early on canvas. You are encouraged to work as a group with your classmates on problems sets, although you have to hand in your own solutions.

Note that we cannot grade assignments that we cannot read. Consequently, please be careful to make all assignments legible (if they are not typed up, please make sure they are in legible handwriting and scanned clearly).

Exam Policy:

In the event that a student misses one of the exams, the instructor reserves the right to give the student a zero on that exam. There are no make-up exams without an instructor approved excuse. Instructor approved excuses include 1) medical reasons, in which case you should bring a letter from a medical professional describing your reason for missing the exam, 2) death or serious illness of an immediate family member or close friend (documentation required), or 3) conflict with a religious holiday. Requests for exam make-ups should be made as far in advance as possible.

We will follow the University guidelines on student conflicts with final exams. For this year's student code, see http://admin.illinois.edu/policy/code/article3_part2_3-201.html.

Regrades:

All regrade requests must be submitted in writing no more than one week after the assignment or exam is returned. The request must be written and include a detailed summary of why the student believes the grade they received was incorrect. I generally regrade the entire exam or assignment, so the grade may go up or down. Consequently, students should only request a regrade if they are very confident that the original grade they received was incorrect.

Statement on Academic Integrity

We will follow Articles 1-401 through 1-406 of the *Student Code* (beginning at http://studentcode.illinois.edu/article1_part4_1-401.html). This rule defines infractions of academic integrity, which include, but are not limited to, cheating, fabrication, and plagiarism. You are responsible for following these guidelines (ignorance is no excuse). If you have any questions about whether something would be an infraction, consult with the instructor before proceeding.

Accessibility and Requests for Special Accommodations:

This is a classroom committed to access. If there are any changes that can be implemented to facilitate your greater participation and learning, please don't hesitate to contact me so that we can make arrangements.

To obtain disability-related adjustments and/or auxiliary aids, students with disabilities must contact the course instructor and the Disability Resources and Educational Services (DRES) as soon as possible. To contact DRES, you may visit 1207 S. Oak St., Champaign, call (217)-333-4603, email disability@illinois.edu or go to the DRES website.

Please also schedule a private meeting with the course instructor to discuss your needs and requirements. The instructor will attempt to meet all reasonable course accommodations once the student self-identifies. Please note that accommodations are not retroactive to the beginning of the semester, but begin the day you contact the instructor with a current letter of accommodation from DRES.

Emergency Response Recommendations:

The university maintains guidelines for emergency responses. A list of recommendations when to evacuate and when to find shelter are available at:

http://illinois.edu/cms/2251/general_emergency_response_recommendations_8_16_13_final.docx

Floor plans for specific buildings are available at: <http://police.illinois.edu/emergency-preparedness/building-emergency-action-plans/>

Course Schedule (tentative)

1	Aug 25	Course overview, logistics, and introduction
	Aug 27	Decision theory I: basics
2	<i>Sep 1</i>	<i>Labor Day (No Class)</i>
	Sep 3	Decision theory II: example
3	Sep 8	Decision theory III: Objective and Subjective Probabilities and Decision-making
	Sep 10	Decision theory IV: More on Decision Criteria
4	Sep 15	Decision theory V: Updating
	Sep 17	Causal inference I: potential outcomes framework
5	Sep 22	Causal inference II: decision-making example
	Sep 24	Causal inference III: empirical approaches to causal inference
6	Sep 29	Introduction to R: R Basics
	Oct 1	Introduction to R II: Decision-making example using R
7	Oct 6	Prediction I: prediction and decisions
	Oct 8	Prediction II: prediction statistics
9	Oct 13	Prediction III: approaches to prediction
	<i>Oct 15</i>	<i>Descriptives I: descriptives and decision-making</i>
10	Oct 20	Midterm
	Oct 22	Descriptives II: descriptive example in R
11	Oct 27	External validity and extrapolation I
	Oct 29	External validity and extrapolation II
12	Nov 3	Dynamic decision-making I: basics and the explore versus exploit tradeoff
	Nov 5	Dynamic decision-making II: multi-armed bandit lecture I: basic setup

13	Nov 10	Dynamic decision-making III: multi-armed bandit lecture I: Gittins indices and other solutions
	Nov 12	Dynamic decision-making IV: option value lecture 1
14	Nov 17	Dynamic decision-making V: option value lecture 2
	Nov 19	Rational Inattention
15	Nov 24	<i>Thanksgiving Break (No Class)</i>
	Nov 26	<i>Thanksgiving Break (No Class)</i>
16	Dec 1	Rare outcomes I
	Dec 3	Rare outcomes II
17	Dec 8	Expert Advice
	Dec 10	Course recap

Reading List:

Week 1

- Manski, "Policy Analysis with Incredible Certitude" — Ch. 1, *Public Policy in an Uncertain World*
- Manski, "Partial Knowledge" — Ch. 4, *Public Policy in an Uncertain World*

Week 2

- Frank P. Ramsey, "Truth and Probability" (1926), pp. 5–31

This is a somewhat different kind of reading. It is the original work by Frank Ramsey, the renowned economist, mathematician, and philosopher who made many seminal contributions before his early death at the age of 26. Truth and Probability is a short work that played a key role in the development of modern decision theory and Bayesian statistics. In it, Ramsey tried to develop and formalize the idea of subjective probability. This is an old (almost 100 years old) work and so it may be a little trickier to read than a broader textbook. You can skim the mathematical proofs and notation (totally fine if those are tricky to figure out) and just focus on the core ideas about how to think about probability.

Week 3

- Christian & Griffiths, "Bayes's Rule: Predicting the Future" — Ch. 6, *Algorithms to Live By*

Week 4

- Angrist & Pischke, "The Experimental Ideal" — Ch. 2, *Mostly Harmless Econometrics*
- Manski, "Predicting Policy Outcomes" — Ch. 2, *Public Policy in an Uncertain World*

Week 5

- Download and install [RStudio](#) on your laptop. RStudio is a free and open source development environment for R, the open source statistical programming software. You will be welcome to follow along in RStudio on your laptop the next couple of classes as we get acquainted with R.
- Install the [swirl package](#) and complete the following courses: R Programming; Getting and Cleaning Data; Regression Models (time permitting).
- For the reading response, please bring your computer on Monday — I will check that you (a) have RStudio installed and (b) have the swirl package installed. Having both installed will receive full credit.

Week 6

- James et al., Ch. 2, *Introduction to Statistical Learning*

- Kleinberg, Ludwig, Mullainathan & Obermeyer, "Prediction Policy Problems" (*AER Papers & Proceedings*, 2015)

Week 7

- James et al., Ch. 5, "Resampling," pp. 175–186, *Introduction to Statistical Learning*
- James et al., Ch. 6, "Regularization," pp. 203–244, *Introduction to Statistical Learning*

Week 8

- Kieran Healy, "Look at Data" — Ch. 1, *Data Visualization: A Practical Introduction*
- Jonathan Schwabish, "The Data Visualization Slide" — Ch. 5, *Better Presentations*

Week 9

- Manski, "Prediction and Extrapolation" — Ch. 3, *Public Policy in an Uncertain World*

Week 10

- Christian & Griffiths, "Explore/Exploit" — Ch. 2, *Algorithms to Live By*
- Manski, "Diversified Treatment Choice" — Ch. 5, *Public Policy in an Uncertain World*

Week 11

- Christian & Griffiths, "Optimal Stopping" — Ch. 1, *Algorithms to Live By*
- Josh Barro interviews Annie Duke on *Quit* (*Very Serious* podcast transcript, Oct. 7, 2022)

Week 12

- Jeff Bezos, 2016 Letter to Amazon Shareholders
- Greg Howard, "A Check for Rational Inattention" (2023)

Week 13

- Weitzman, "Fat-Tailed Uncertainty in the Economics of Catastrophic Climate Change" (2020)

Week 14

- Ruth Chang, "How to Make Hard Choices" (TED Talk transcript/video)