SOSC 5340: Econometric Approaches to Social Science Research
Spring 2026

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Lecture

Time: Thursday 6:30 pm–9:20 pm
Location: Academic Building 5566

Office Hours

Time: Thursday 11 am–12 pm, or by appointment
Location: Academic Building 2365 or Zoom

Course description

This course takes an estimand-centric approach (e.g., Lundberg, 2021) to classic methods in the social sciences. We will first define the estimand (formalized substantive target of the research). If the estimand is causal (involving counterfactual quantities not directly observable), we will then identify the estimand under explicit assumptions. Finally, we will introduce estimators for the identified estimand, focusing on their modeling assumptions and statistical properties.

Who should take this course?

This course should be useful for any social science student who wishes to rigorously understand, evaluate, and develop their own empirical research. For conceptual rigor, formal expressions and derivations are sometimes unavoidable and, in fact, immensely helpful. Hence, you should be open-minded about formal/mathematical reasoning.

The formal prerequisite of this course is SOSC 5090. You should be familiar with basic statistical constructs such as expectation, variance, covariance, and convergence. For example, you should know what the law of iterated expectations is and what it means for a statistic to be unbiased. There is no coding prerequisite.

Grading

1. Problem sets: 40% (10% each)
2. Reading memos: 10% (1% each)
3. Midterm exam: 25%
4. Final exam: 25%

Problem sets

Problem sets are designed to help you gain a better understanding of the materials covered in previous weeks. They are due on Canvas at the beginning of class (Thursday 6:30 pm), according to

the schedule below. Late submissions will be accepted only under exceptional circumstances. There are five problem sets, but only the four with the highest scores will count toward your final grade. You may discuss the problem sets with your classmates or consult AI tools, but each student is responsible for completing their own answers.

Reading memos

In each reading memo, you will summarize two things you understand best from the week's readings and two things you do not understand very well. One or two paragraphs are sufficient. Reading memos are due on Canvas at 10:00 pm on the day before each class. A reading memo is due every week except for the first week and the two exam weeks.

Exams

Both the midterm and final exams are closed-book and held in class. Each exam lasts 1.5 hours.

Course schedule

Feb 5. Introduction and review of statistics

Feb 12. Estimand-centric framework

- Problem set 1 due

Feb 26. Graphical causal models

Mar 5. Properties of estimators

Mar 12. Average causal effects and their identification

- Problem set 2 due

Mar 19. Average causal effects and their estimation

Mar 26. Average causal effects with binary outcomes

- Problem set 3 due

Apr 2. Midterm exam

Apr 9. Instrumental variables (1)

Apr 16. Instrumental variables (2)

- Problem set 4 due

Apr 23. Mediation analysis (1)

Apr 30. Mediation analysis (2)

- Problem set 5 due

May 7. Final exam