SOSC 5340: Econometric Approaches to Social Science Research
Fall 2026

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Lecture

Time: Wednesday 9:00 am–11:50 am
Location: Academic Building 2610

Office Hours

Time: Tuesday 3 pm–4 pm, or by appointment
Location: Academic Building 3376 or Zoom

Course description

This course takes an estimand-centric approach (e.g., Lundberg, 2021) to classic methods in the social sciences. For any substantive research question, 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 to engaging in 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 (Wednesday 9:00 am), 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 one or two things you understand best from the week's readings and one or two things you do not understand very well. One or two paragraphs are sufficient. Reading memos are due on Canvas at 4:00 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

Sep 2. Lecture 1: Introduction and review of statistics

Sep 9. Lecture 2: Estimand-centric framework

Sep 16. Lecture 3: Graphical causal models

- Problem set 1 due

Sep 23. Lecture 4: Properties of estimators

Sep 30. Lecture 5: Average causal effects (ACEs) and ignorability-based identification

- Problem set 2 due

Oct 7. Lecture 6: More on ACEs: estimation

Oct 14. Lecture 7: More on ACEs: binary outcomes

- Problem set 3 due

Oct 21. Midterm exam

Oct 28. Lecture 8: Instrumental variables (IVs)

Nov 4. Lecture 9: More on IVs: regression discontinuity and marginal treatment effect

- Problem set 4 due

Nov 11. Lecture 10: Mediation analysis

Nov 18. Lecture 11: More on mediation analysis

- Problem set 5 due

Nov 25. Final exam