PSCI 2301

Quantitative Political Science II: Statistics

Vanderbilt University — Professor Brenton Kenkel

Spring 2025

Can you increase voter turnout by telling people how often they and their neighbors voted in past elections? How much does holding a seat in the British Parliament increase a politician's future earning potential? When a country signs a nuclear nonproliferation agreement, does it actually slow down their development of nuclear weapons? These are *causal questions*—critical for a scientific understanding of politics and public policy, yet notoriously difficult to answer.

This course will give you an introductory overview of the statistical approach to causal inference as used in political science research. Along the way, you will primarily develop two skills.

1. *Evaluation of causal claims.* Discourse about politics, from everyday conversation to journalistic reporting to academic journal articles, is full of causal claims. You will come out of this class well equipped to evaluate the evidence people use to back up those claims. Though no causal claim about politics is unquestionable, you will learn to distinguish those that merit mild skepticism from those that are highly suspect.
2. *Undertaking statistical research.* It's easier to critique research than to do it yourself. You'll get practice doing both. In doing the final project for this course, you will learn how to formulate research questions, collect and clean relevant data, draw statistical conclusions from data, and write a persuasive report of your findings.

You can email me at brenton.kenkel@gmail.com. I try to respond to all student questions within one business day, though be aware that I don't usually reply to emails at night or on weekends. And if you have a question about course material where the answer would be useful to others, please post it to the Brightspace discussion forum instead of emailing me!

My office hours are Tuesdays from 2:00–4:00pm in Commons Center 326. You don't need to make an appointment—just show up during my office hours. If you have a question but can't meet during my office hours, email me first. From there we can decide if we can work out the issue over email or if we need to meet.

Topics and Schedule

You need to acquire a copy of the textbook *Mastering 'Metrics* by Joshua D. Angrist and Jörn-Steffen Pischke. All other readings will be posted on Brightspace.

January 6 and 8: Introduction to the course and reintroduction to R.

- No required reading this week.
- Install/update R, RStudio Desktop, and Quarto.

January 13 and 15: Causal questions and research design.

- Nick Barrowman, "Correlation, Causation, and Confusion" (*The New Atlantis*, 2014).
- Matheus Facure, "Introduction to Causality" (chapter 1 of *Causal Inference for the Brave and True*).

January 22: The potential outcomes model.

- *Mastering 'Metrics*, chapter 1, pages 1–11.
- Paul Holland, "Statistics and Causal Inference" (*Journal of the American Statistical Association*, 1986).
- Problem Set 1 due Friday, January 24.

January 27 and 29: Randomized experiments.

- *Mastering 'Metrics*, chapter 1, pages 12–33.
- Alan S. Gerber, Donald P. Green, and Christopher W. Larimer, "Social Pressure and Voter Turnout" (*American Political Science Review*, 2008).

February 3 and 5: Statistical inference.

- *Mastering 'Metrics*, chapter 1, pages 33–46.
- Matheus Facure, "The Most Dangerous Equation" (chapter 3 of *Causal Inference for the Brave and True*).
- Problem Set 2 due Friday, February 7.

February 10 and 12: Matching.

- *Mastering 'Metrics*, chapter 2, pages 47–55.
- Elizabeth A. Stuart, "Matching Methods for Causal Inference" (*Statistical Science*, 2010).
- Andrew C. Eggers and Jens Hainmueller, "MPs for Sale?" (*American Political Science Review*, 2009).

February 17 and 19: Regression.

- *Mastering 'Metrics*, chapter 2, pages 56–81.

- Larry Bartels, "Beyond the Running Tally" (*Political Behavior*, 2002).
- Problem Set 3 due Friday, February 21.

February 24 and 26: Regression, continued.

- Catch up on last week's readings if you're not done with them.
- Project proposal memo due Friday, February 28.

March 3 and 5: Instrumental variables.

- *Mastering 'Metrics*, chapter 3.
- Ana L. De La O, "Do Conditional Cash Transfers Affect Electoral Behavior?" (*American Journal of Political Science*, 2013).
- Problem Set 4 due Friday, March 7.

March 17 and 19: Regression discontinuity designs.

- *Mastering 'Metrics*, chapter 4.
- Andy Hall, "What Happens When Extremists Win Primaries?" (*American Political Science Review*, 2015).

March 24 and 26: Research project workshops.

- Final project draft due Friday, March 28.

March 31 and April 2: Differences-in-differences.

- *Mastering 'Metrics*, chapter 5.
- Anna Getmansky, Guy Grossman, and Austin L. Wright, "Border Walls and Smuggling Spillovers" (*Quarterly Journal of Political Science*, 2019).
- Problem Set 5 due Friday, April 4.

April 7 and 9: Synthetic control.

- Scott Cunningham, "Synthetic Control" (chapter from *Causal Inference: The Mixtape*).
- Bradley C. Smith and William Spaniel, "Do Nonproliferation Agreements Constrain?" (*Journal of Peace Research*, 2021).

April 14 and 16: Student research presentations.

April 21: Wrapping up.

- Final paper and revision memo due Wednesday, April 23.

Assessment

Your grade will be based on three components:

- *Problem sets (50%).* There are five problem sets spaced out over the semester. Your lowest problem set score is dropped, and the remaining four are each worth 12.5% of your grade.
- *Final project.* Over the course of the semester, you will develop an original research project using statistics to analyze a causal question about politics.
  - *Project proposal (10%).* A brief memo outlining at least two ideas for causal questions to study, an proposal for the design to study each question, and a detailed identification of the data you would use.
  - *First draft (10%).* A complete draft of the research paper, including statistical analysis and substantive conclusions.
  - *Presentation (5%).* A roughly 15-minute class presentation of your question, design, and findings as of the first draft.
  - *Final paper (20%) and revision memo (5%).* I will provide detailed feedback on your first draft. Alongside the final version of the paper, you will submit a memo outlining the changes you have made to respond to that feedback.
- *Participation (up to 3% extra credit).* Attendance is not mandatory, but you will earn extra credit if you regularly ask questions in class. You can also earn extra credit by posting questions to the Brightspace discussion boards.

I encourage you to work with other students to work out problem solutions and develop ideas. That said, anything you turn in should be your own work—no rote copying from others.

You may use generative AI tools like ChatGPT or `vanderbilt.ai` in any capacity you see fit on the problem sets and final project. In my experience, generative AI is good at helping produce R code and all right at correcting/critiquing prose that I've written, but not so good at generating prose on its own. You are ultimately responsible for what you turn in.