Course Description

This course will cover the design, implementation, and interpretation of statistical methods used for establishing causal relationships in political science and the social sciences more generally. Building on the first course (POL 501), which covered basic principles of research design, statistics and probability, this second class will provide a survey of advanced empirical tools. We will focus on statistical methods for causal inference. These are methods designed to answer research questions about the effect or the impact of a cause (e.g., an intervention, an economic shock, the adoption of a new policy) on an outcome (e.g., vote choice, levels of violence, political attitudes).

We will cover a variety of causal inference designs, including randomized, survey, and natural experiments, instrumental variable estimation, regression discontinuity designs, difference-in-differences, synthetic control methods, and matching. We will discuss the strengths and weaknesses of these empirical strategies, and students will learn how to apply and interpret them.

In this course, we will use R for computation and data analysis. However, students do not need to know this language in advance to take this class. The first problem set is designed to get students started with R. I strongly believe that the best way to learn statistics is by doing statistics, and therefore the homework will provide an opportunity to apply the empirical tools discussed in class.

Readings

We will read chapters from the following textbooks. Most of the readings will be posted in My Blackboard.


Course Requirements

• Participation (10%): Students should actively participate in class.

• Problem sets (20%): There will be six problem sets during the semester. The problem sets provide an opportunity for students to implement the empirical tools discussed in class. Collaboration is permitted, but students must write up the code and answers on their own.

• Midterm exam (20%): There will be one open-book in-class midterm exam. Students will have to applied concepts and tools discussed in class and use R to analyze data.

• Final exam (20%): There will be one open-book in-class final exam. Students will have to applied concepts and tools discussed in class and use R to analyze data. This exam will only cover the materials discussed in the second part of the semester.

• Research proposal (30%): The final (and most important) assignment for this class will be a short research proposal using one (or combining more than one) of the empirical strategies discussed in class. Students will present their proposal in week 15, and the final version should be submitted no later than two weeks after that presentation.

Schedule

Week 1: Introduction


Week 2: Review of Statistical Concepts


Week 3: Potential Outcome Framework


Week 4: Randomized Experiments


Week 5: Survey Experiments


Week 6: Natural Experiments


Week 7: Instrumental Variables


Week 8: Regression Discontinuity Designs


Week 9: Midterm

Week 10: Spring Break
**Week 11: Difference-in-Differences**


**Week 12: Synthetic Control Methods**


**Week 13: Design of Observational Studies**

Week 14: Matching Methods and Sensitivity Analysis


Week 15: Presentations Research Proposals

Week 16: Final exam (in class)