Causal Inference and Public Policy

MA/MSc Political Science

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Description

How do economic downturns affect elections? Can climate policy design increase public support for clean-energy reforms? Does exposure to immigration strengthen the popularity of right-wing parties? Questions like these lie at the core of political science theories as well as policy evaluation projects. They require rigorous and transparent quantitative methods to identify causal relationships. This course equips students with the analytical foundations of modern causal inference. We first revisit statistical foundations, including sampling, hypothesis testing, and regression analysis. We then discuss the potential outcomes framework, focusing on counterfactual reasoning, the assumptions required to identify causal effects, and common challenges in empirical research. The course introduces students to a range of widely used research designs, including natural and survey experiments, instrumental variables, regression discontinuity designs, differences-in-differences, the synthetic control method, and matching. The course alternates between substantive sessions and lab sessions that apply these concepts in practice. Students engage critically with state-of-the-art empirical research, learn to conduct their own analyses using R, and practice visualizing data and results effectively.

Time and Room

Time and Date: Tue 8-11.30: April 14/21/28, May 5/12/19, Jun 15
Note: May 12 via Zoom: (via Zoom: https://uni-koeln.zoom.us/j/99614958625?pwd=rbOuHUc6YSeRCtZ4GTIdjBTLoEK3qP.1, Meeting ID: 996 1495 8625, Password: 512742)

Room: IBW 3.40

Learning Objectives

Students…

- understand how to estimate cause-and-effect relationships and construct counterfactual scenarios.
- have experience using computational methods to evaluate and predict the impacts of policies, interventions, and events, while understanding limitations.
- have the methodological skills needed to conduct their own research projects.

Key Skills

The course seeks to develop or enhance the following key skills:

- **Communication:** writing clearly and to the point, presenting ideas and arguments orally.

- **Working with others:** making and challenging contributions, listening to others, exchanging interpretations, and engaging in respectful discussions.
- **Improving learning and performance:** discriminating reading, accepting and responding to criticism, developing own opinions.
- **Information technology:** use of R and RStudio, use of AI, word processing, and library searches.
- **Problem-solving and networked thinking:** conceptualization of issues, identification and evaluation of research designs, analysis and synthesis of evidence, evaluation of credibility of causal evidence, assessing the validity of conclusions.
- **Research design and research logic:** experimental reasoning, quasi-experimental research designs, regression analysis, and statistical inference.

Prerequisites

Students are expected to be familiar with basic statistical methods for data analysis and inference (e.g., the ability to estimate and interpret a linear regression). Students must have a basic familiarity with R. Students in need of a refresher, they must work through widely available online tutorials.

Software: Before the first class, all students must install R and RStudio on their computers and ensure that both programs are working properly.

Requirements and Coursework

This is an interactive course designed to facilitate learning and the development of transferable methods skills. The final grade is computed as follows:

Research Project

(Short Paper and Presentation): up to 100 points.

- Read King (1995) and Alvarez et al. (2018) before beginning to work on the replication.
- Each student selects one of the following options.
    - Option 1: Replication
        - Identify one article published in AJPS, APSR, or JOP that applies a causal inference method and for which a replication archive is available online.
        - The replication project replicates the main result reported in the article and proposes an alternative and effective way of visualizing the main data (e.g., the main dependent variable and/or independent variable) and the key results. If replication fails, students should make this transparent.
        - The replication project considers one theoretically motivated and interesting extension of the replicated results. This could be performed using only the data available as part of the replication archive or by collecting and merging other data.
        - The all results are communicated in a short term paper (at most 10 pages). The focus is on the empirics. The paper should be accompanied by a full replication

archive that follows best current practice. Replication code needs to be written and commented effectively and efficiently.
        - Incorporating additional literature is not required.
    - Option 2: Survey Research
        - Develop a short research question, develop a survey instrument including an experimental item, and program the survey in Qualtrics
        - Analyze the data and prepare results tables and figures.
        - All results are communicated in a short term paper (at most 10 pages). The focus is on the empirics. The paper should be accompanied by a full replication archive.
- All students will submit the term paper and three slides used to communicate the main results before the final session. Students are asked to volunteer presenting their replication using these slides. The focus should be on visuals and effective communication of the results. The term paper should demonstrate the ability to competently analyze data and interpret the results in an accessible fashion.
- Send one copy of your report to the graduate TA. Confirm that this you are submitting your own work.

Bonus points

- Course evaluation survey(s): 0.5 bonus points if 80% of all enrolled students participate in all surveys; 0.75 bonus points if 90% participate; 1 bonus point if 100% participate.

Student presentation: up to 5 points

Grade Scale:

Grade	Point Total
1,0	95–100
1,3	90–94
1,7	85–89
2,0	80–84
2,3	75–79
2,7	70–74
3,0	65–69
3,3	60–64
3,7	55–59
4,0	50–54
5,0	< 50

Academic Integrity

Plagiarism, cheating, fabrication of data and records, and other types of dishonesty and misconduct constitute breaches of academic integrity. For violations such as cheating on an exam, the grade penalty is failure of the course.

Resources for Students

The University has several institutions offering support for students in various areas (e.g., general study guidance, administration, discrimination, sexualized violence, and bullying). The WiSo Student Service Point (WiSSPo) serves as a first point of contact for questions about studying at the WiSo Faculty.

Textbooks

- Angrist, Joshua D., and Jörn-Steffen Pischke (2009). *Mostly Harmless Econometrics: An Empiricist's Companion.* Princeton: Princeton University Press.
- Cunningham, Scott. 2021. *Causal Inference: The Mixtape.* New Haven, CT: Yale University Press. [freely available at: https://mixtape.scunning.com/]
- Imbens, G. W., & Rubin, D. B. (2015). *Causal Inference for Statistics, Social, and Biomedical Sciences: An Introduction.* Cambridge: Cambridge University Press.
- Huntington-Klein, N. (2025). *The Effect: An Introduction to Research Design and Causality.* Boca Raton: CRC Press [freely available at https://theeffectbook.net/]

Additional Reading

- Alvarez, M.R., Key E. M., & Núñez L. 2018. Research Replication: Practical Considerations. *PS: Political Science & Politics*. 51(2):422–426. doi:10.1017/S1049096517002566
- Kastellec, J.P., and Leoni E.L. 2007. Using Graphs Instead of Tables in Political Science. *Perspectives on Politics* 5(4), 755–771.
- King, G. 1995. Replication, Replication. *PS: Political Science* 28(3):444–452. doi:10.2307/420301