Syllabus
PSC 405/504 - Causal Inference

Professor & Term: Anderson Frey, Spring 2020
Room & Time: HARK 329, TR 9:40-10:55am
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Overview The goal of this course is to give students a comprehensive toolbox for reading and producing cutting-edge applied empirical research, with focus on the theory and practice behind causal inference in social sciences. We will cover methods such as experiments, differences-in-differences, instrumental variables, regression discontinuity, matching and others. Students will read applied papers from both political science and economics, and write review reports examining research designs, identification strategies, and causal claims. They will also produce research proposals that will be presented in class.

Prerequisites In addition to introductory statistics and probability, the course assumes a good knowledge of linear regression. You should have taken at least one graduate class on this subject (such as PSC 404).

Computation I teach the course in R, which is an open-source computing language that is widely used, and easy to learn. The software can be downloaded for free from *www.r-project.org*. I also recommend downloading RStudio (www.rstudio.com), a very good (and free) user interface for R.

Grading

- Review of an unpublished article (15%)
- Homework assignments (30%)
- Final project (40%)
- Participation and presentation (15%)

Review of an Unpublished Article Students should find an unpublished empirical article that addresses a causal claim, and write a 2-3 page referee report on it. The report should explain the article's research design, and also present the student's assessment of the identification strategy.

Most commonly, referree reports also address the article's fit for the journal, and its contribution to the literature. This is not necessary for the purpose of this assignment.

Assignments The assignments consist of a mix of computer simulations, data analysis, and paper replications. All sufficiently attempted work will be graded on a (+,-) scale. Assignments should be typed on the computer. I strongly advise students to use Latex, as it has a much better handling of mathematical equations than the average word processor.

Final Project Students will write a short empirical paper that applies methods learned in this class to a research question of their choice. The paper should be 5-10 pages in length and focus on the research question, data, empirical strategy, results, and conclusions. You also need to submit a copy of your code, allowing me to replicate the main results. Students are free to choose any topic they want, as long as they have a clear research question that concerns the causal effect of some institution, policy, or event on some outcome of interest. If you decide write a replication paper, you should go beyond the original analysis in some significant way by applying the techniques learned in the course. Students will present their project to the class. Two days before the presentation, students should email the first draft of the project to the entire class. Everyone is expected to read all these submissions prior to the student presentations that follow. After the presentations, there will be time for questions and discussion.

Books

- Angrist, Joshua D. and Jorn-Steen Pischke. 2008. *Mostly Harmless Econometrics: An Empiricist's Companion*. Princeton University Press.
- Morgan, Stephen L. and Christopher Winship. 2014. *Counterfactuals and Causal Inference: Methods and Principles for Social Research*. Cambridge University Press. 2nd Edition.

Other Useful Books and Summary Articles

- Imbens, Guido W. and Jefrey Wooldridge. 2009. *Recent Developments in the Econometrics of Program Evaluation*. Journal of Economic Literature 47(1): 5-86.
- Hansen, Bruce. 2019. Econometrics. www.ssc.wisc.edu/ bhansen/econometrics/Econometrics.pdf
- Imbens, Guido W. and Donald B. Rubin. 2015. *Causal Inference for Statistics, Social, and Biomedical Sciences An Introduction*. Cambridge University Press.
- Wooldridge, Jefrey M. 2002. *Econometric Analysis of Cross Section and Panel Data*. MIT Press.
- Cameron, A. Colin and Pravin K. Trivedi. 2005. *Microeconometrics Methods and Applications*. Cambridge University Press.