Syllabus
PSC 405 - Quantitative Methods 2

Professor & Term: Anderson Frey, Spring 2026
Room & Time: HARK 329, TR 11:05am-12:20pm, W 2:00-3:00pm (Recitation)
Office & Hours: HARK 313A, W 10:15am-12:15pm
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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.

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• Review of an unpublished article (15%)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Review and Presentation of an Unpublished Article
Students should find an unpublished empirical article that addresses a causal claim, and write a 2-3 page referee report on it.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, referee 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. Students will then prepare a brief (20min max) presentation of their review to the

class. The presentation should include both a summary of the article (enough that the class can understand the analysis) and the students critique.

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. Students should also submit a copy of the code used in the solutions, allowing the TA to easily replicate the results.

Final Project

Students will write a short research proposal that applies methods learned in this class to a research question of their choice. The paper should focus on the research question, design, identification strategy (and its potential violations), data, and empirical strategy. If possible, students might present preliminary results.

You are free to choose any topic, 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 to do a replication analysis, 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, they should email the first draft of the project to the entire class. Everyone is expected to read all these submissions prior to the 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.