Syllabus
PSC 504 - Causal Inference

Professor & Term: Anderson Frey, Fall Semester 2016
Room & Time: HARK 329, Wed 1400-1515, Fri 1030-1200
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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 405)

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

Grading
Report on an unpublished article (20%) - Due Nov 04
Homework assignments (30%) - 3 or 4 in total
Final project (35%)
Participation (10%) and presentation (5%)

Report on an Unpublished Article
Students should find an unpublished empirical article that addresses a causal claim, and write a referee report. The report should contain the following: (i) a brief summary (the question, the context, the empirical methodology, the results, etc.); (ii) a description of the data, the identification strategy, and the empirical methodology; (iii) a critique; and (iv) a recommendation. The critique should focus on the major (and minor) issues related to the identification strategy and empirical methodology. The recommendation should contain suggestions on how to improve the article. Chris Blattman offers a tips on how to critique an empirical paper (http://chrisblattman.com/files/2009/07/PLSC508-Syllabus-Spring2010.pdf).

Assignments
The assignments consist of a mix of analytical problems, computer simulations, and data analysis. 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. Lyx is a good user interface for Latex, as it has the looks and functionality of a regular word processor. It can be downloaded for free from www.lyx.org.

**Final Project**

Students are expected to 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.

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. Co-authored projects are allowed and encouraged. I do not encourage you to write replication papers. If you decide to do so, 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. Presentations will be no more than 10 minutes in length. 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.

By 11/11, you should email the instructor a short description of your proposed project (i.e. half a page).

By 12/16, you should email the instructor the final version of your project.

**Presentation and Participation**

In addition to presenting their final project, students will also present (once during the semester) a paper from the reading list. This is a brief ~15-20min presentation that will focus on the empirical methodology employed in the paper.

**Schedule**

No class on 9/9, 9/30, 11/23 and 11/25 (Thanksgiving week).

**Books**


**Other Useful Books and Summary Articles**


Preliminary Schedule

Introduction

The Potential Outcome Model

- Angrist and Pischke: Chapter 1*
- Morgan and Winship: Chapter 1-2*

Randomized Experiments

- Angrist and Pischke: Chapter 2*
- List, John A. and Steven Levitt. 2006. *What Do Laboratory Experiments Tell Us About the Real World?* University of Chicago and NBER.

Examples


### Matching and Propensity Score

- Morgan and Winship: Chapter 4-5 *


### Examples


**Regression, Clustering, Bootstrap (Week 4)**

*Regression*

- Angrist and Pischke: Chapter 3 *
- Morgan and Winship: Chapter 6 *

*Standard Errors (Bootstrap, Clustering)*

- Angrist and Pischke: Chapter 8 *
- Cameron and Trivedi: Chapter 11 **

**Synthetic Controls (Week 6)**


*Examples*


**Differences-in-Differences (Week 7)**

- Angrist and Pischke: Chapter 5.2-5.4*


**Examples**


**Panel Data (Week 8)**

- Angrist and Pischke: Chapter 5.1*

- Cameron and Trivedi: Chapter 21*

- Imbens and Wooldridge: Sections 1-4


**Examples**


**Instrumental Variables**

- Angrist and Pischke: Chapter 4*

- Morgan and Winship: Chapter 9*


Examples


Regression Discontinuity (Weeks 10-11)

- Mostly Harmless Econometrics: Chapter 6.*


**Examples**


**Multivariate RDD**


**Can Non-Experimental Methods be Trusted?**


Sensitivity Analysis

- Morgan and Winship: Chapter 12*


Examples
