Scott Cunningham, PhD

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**Class meetings:**

Monday June 8th 2020 to Wednesday June 17th 2020

* Monday through Friday: 4:00pm to 8:00pm
* Saturday: 9:00am to 1:00pm

**Office hours (available by Calendy):**

* Monday through Friday: 1:00pm to 3:00pm
* Saturday: 1:30pm to 3:30pm

<https://calendly.com/causalinf/bogota-office-hours?month=2020-06>

**Teaching assistant:**

Carolina Vélez Ospina [carolina\_v\_o@hotmail.com](mailto:carolina_v_o@hotmail.com)

**Course Description**

Confusing correlation and causality is a dangerous error. On the one hand, believing that naive correlations reflect a causal relationship can lead people to make incorrect decisions. Policymakers may eliminate programs, for instance, because they observe poor outcomes associated with the program, when in fact it is those with the poorest outcomes who are choosing the program in the first place!

But the opposite error is just as bad. An overly skeptical view of causality such that no correlation can ever be causal is also naïve and can also lead to incorrect decisions if only because the policymakers discounts the value of quantitative information altogether.

The purpose of this class is to correct both types of errors by introducing students to the modern field of “causal inference”. If I am successful, then you will have a better understanding of when and why it is justified to believe that discovered correlations are in fact a reflection of true causal effects, and when they are not.

The class is a very hands-on course. Students will learn to write programs in the econometrics software packages, Stata and R, in addition to learn the numerous research designs economists and statisticians have developed to estimate causal inference when randomized experiments are impossible, unethical or financially unreasonable. Students will also develop a basic understanding of the logic contained in directed acyclical graphical models, a powerful tool for thinking through causal relationships and planning your research projects.

We will cover some programming etiquette, regression, basic causality tools like potential outcomes and directed acyclical graphs, randomization inference, regression discontinuity, instrumental variables, panel methods, differences-in-differences, synthetic control, and matching/weighting/subclassification. The majority of the class will focus on selection bias and treatment assignment, and ways to address problems associated with both.

**Course Objectives**

The primary objective of this course is for students to understand a variety of econometric estimators and research strategies for inferring causal effects in observational data. But a secondary course objective is help the student develop some basic competency in programming in Stata and/or R.

**Credit**

Students will be evaluated based on one exam, regular assignments, the creation of github account, and joining slack channel.

**Textbooks and Readings**

There are two required textbooks for the class and one recommended. The main textbook we will use is my free online book Causal Inference: The Mixtape (contracted with Yale University Press). That can be downloaded from my website https:// www.scunning.com. I also will supply all of my slides which covers material not in the current free version.

The second book is entitled Mostly Harmless Econometrics Princeton University Press, 1st edition by Angrist and Pischke. It is not expensive. You can find a free .pdf online if you search for it.

A third book I like but which is not required is Counterfactuals and Causal Inference: Methods and Principles for Social Research. Cambridge University Press (2nd edition) by Morgan and Winship. It's particularly good at explaining the potential outcomes model, the directed acyclical graphical models, IV, matching, and partial identification, as well as something called the front door criterion. What I like about this book is the two authors are sociologists who are nonetheless conversant in the causal inference methodological toolkit, and probably because of their background as much as their talent, they're excellent communicators. They make a lot of this seem easy (which it is!).

We will also be discussing a lot of articles this semester. I will post links to these on Github as well as upload them. Some of the readings are technical pieces from economics journals. The degree to which a student needs to be familiar with the details of a paper will be clear from the emphasis given to the paper in lecture.

**Coursework, Grades, and Grading Policies**

Course credit is weighted equally across a final exam, semi-regular assignments, joining Slack channel and creating a Gihub account.

Final exam (40%)

Assignments (40%)

Slack channel by deadline (10%)

Github account (10%)

**Exams (40%)**

The final exam covers any material from the assigned readings in the text, as well as any additional material that I cover in lecture, including any articles I cover in class. The exam is due the day after the last day of class. Our last day of lecture is Tuesday June 16th and therefore the exam is **due Wednesday June 17th by 5:00pm.**  Because of COVID, this will be a takehome exam. You can use all of your notes, videos, and so forth. Your answers must be typed in Word or some other publishing software such as LaTeX.

**Assignments (40%)**

You will be required over the next week and half to complete several assignments ranging from easy to difficult. You will be given minimal to moderate guidance.

**Slack channel (10%)**

Once everyone is registered, I would like everyone to immediately register for Slack on your desktop and smart phone, and then join a Slack channel to be created. This is your main class participation credit. It’s worth 10% of your grade. I want you to have a way to start threads on different topics, including replications, because replications are hard and we need to be able to help one another as much as we can. You can also more easily reach me through direct message in Slack. I prefer in-time interactive communication over emails these days. The name of the Slack channel is bogotcausalin-odk5667. The join link is here:

<https://join.slack.com/t/bogotcausalin-odk5667/shared_invite/zt-exkehag5-yTam5ufTmC3~7jd~Jr7KIA>

**Github repository (10%)**

All class assignments and other materials will be distributed to you via our Github repository. You should clone it immediately and download the material to your desktop and/or simply access the files yourself remotely.

<https://github.com/scunning1975/causal-inference-class>

In addition, I expect you to create your own github account as well as create a new repository named after this class (causal-inference-course). This github repository is where you will store your programs and data, as well as your assignments.

**Additional Dropbox folder**

*Old videos:*

<https://www.dropbox.com/sh/qypd99l79k4393p/AAC8jbvaEkZJ_zLwU7nlLigqa?dl=0>