Instructor: Scott Cunningham

Meeting Dates:

August 9 to August 13, 2021

Monday to Friday, 6:00am to 2:00pm Central Standard Time

Teaching assistants:

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Platform:

Twitch channel at <https://www.twitch.tv/causalinf_did>

Github repo:

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

Textbook:

Causal Inference: the Mixtape by Scott Cunningham. Free version at:

<https://mixtape.scunning.com>

Email: [scunning@gmail.com](mailto:scunning@gmail.com)

Description of class:

This class provides a foundation and review of a statistical framework within econometrics and other branches of the social sciences called “causal inference”. Causal inference is a practice which attempts to determine whether given two events, one event caused the other. It is commonly used in program evaluation as well as research aimed to evaluate the empirical content of certain scientific theories such as estimates of the price elasticity of demand and returns to schooling. This class is meant to be a primer and so will cover the potential outcomes model, directed acyclic graphs, regression discontinuity, instrumental variables, difference in differences, synthetic control and matching. It will be accompanied by efforts to introduce students to basic practices in programming as well as good research practices more generally.

Aims of the class:

1. To help students become more familiar with the field of causal inference
2. To empower students to apply research designs more competently to their own research
3. To direct students towards better programming practices so that they are better able to perform quantitative forms of research

Expectations:

The Remote Student Exchange is a platform that provides students from low and middle income countries with access to graduate coursework in economics and other fields. Because of its low price (free), classes tend to be large. As such, intensive and thorough grading of assignments is not possible. Therefore, most of what is expected is that students be self motivated and use the resources provided to them to grow and perfect their own understanding of the material as well as solve programming challenges on their own. This is largely because of resource constraints on the teaching side. I expect each student to attend class and spend time working through assignments, and although they will not be graded, I nonetheless expect students to spend as much time on the course as I have in developing it which is substantial. Please feel free to contact me and our teaching assistants, but know that we may not be able to answer all your questions given the sheer volume of students engaged in the class. I expect nonetheless for you to devote yourself to mastering this material to the best of your ability so that you can maximize the opportunity provided by this week’s class.

Assignments:

I have provided several assignments throughout the week which I hope you will do. Our teaching assistants sole job is to give a pass/fail on each assignment. You will email all four with these assignments by the start of class the day after they are assigned with an *update* on how it is going. You are only graded based on “good faith effort”, not output, as it is impossible to complete these assignments in one week’s time. If there are exceptions to that, we will clearly communicate it to you.

Participation:

Our class will be at Twitch, a streaming platform. The URL for this is at the top of this document. Twitch videos will remain up so that you can watch them again over the next month. One of the main advantages of Twitch is the chat stream. Please use the chat stream to talk to one another, talk to me, ask and answer questions. I highly encourage you to treat it as your space. You won’t distract me with your questions – I want to hear your thoughts, and if I can’t answer your questions directly, then I expect someone else will.

Schedule:

Each day, I will lecture for 45 minutes followed by a 15 minute break. At around 9:45 CST, we will take a one hour break for lunch. Class starts promptly at 6:00am CST and you will simply need to go to the Twitch account.

Monday August 9th:

* Introductions
* Hidden curriculum and mental health
* Hidden curriculum, research and professional development
* Potential outcomes
* Randomization inference
* Directed acyclic graphs

Tuesday August 10th

* Sharp regression discontinuity
* Review of Hansen’s drunk driving paper
* Replicate Lee, Moretti and Butler (2004)

Wednesday August 11th:

* Instrumental variables
* Two stage least squares
* Weak and strong instruments
* Multiple instrument estimators: LIML, Jackknife, unbiased jackknife and double selection methods
* Just identified versus multiple instruments
* Heterogenous treatment effects and the local average treatment effect
* Four basic IV designs

Thursday August 12th:

* Difference in differences

Friday August 13th:

* Difference in differences
* Synthetic control
* Matching if possible