BUSN 7710
Causal Inference for Business Analytics

Chris Cornwell

Fall 2022
(updated 22 August 2022)

Class Room: Correll 321   Class Hours: TR, 935a and 1110a

Instructor contact

email	web	Zoom	Office hours
cornwl@uga.edu	cornwl.github.io	chriscornwell	W, 200-300p & by appointment

Course Description

ECON 7710 is a course in causal inference for business analytics students, focusing on regression analysis and the quasi-experimental methods of difference-in-differences, regression discontinuity and instrumental variables. Each of these techniques is developed in the context of a formal framework for counterfactual thinking and compared with the experimental ideal of a randomized trial.

Course Objectives

After completing this course, you should understand

1. The distinction between correlation and causation
2. The potential outcomes model
3. The randomization ideal
4. Regression estimation and inference for causal analysis
5. How to implement and interpret difference-in-differences, regression discontinuity and instrumental variables research designs
6. How to apply the techniques covered in this course in R

Topical Outline

1. Correlation vs causation
2. Potential outcomes
3. Regression fundamentals
4. Regression discontinuity
5. Instrumental variables
6. Difference in differences

Prerequisites

Students enrolling in ECON 7710 must have completed the MSBA summer statistics boot camp or its equivalent.

Recommended Texts

Angrist, J. and Pischke, S., *Mastering 'Metrics*, Princeton University Press.

Cunningham, S., *Causal Inference: The Mixtape*, Yale University Press.

Wooldridge, J., *Introductory Econometrics*, Cengage, 7e.

Software

The software of choice for this class is R, a free and open-source language for statistical computing and graphics. RStudio is a popular integrated development environment (IDE) for R that will greatly enhance your R experience. First, download and install R; then download and install RStudio. Follow these instructions.

Terry Analytics Lab

The TAL is a resource supported by the Department of Economics for all Terry students enrolled in business analytics and econometrics courses. The lab is managed by Matt Wilson (william. wilson2@uga.edu). His team provides free tutoring in course concepts and R coding. TAL will operate from early/mid afternoon to early evening, Mon-Thu, beginning the second week of the semester. The TAs for this course are experienced TAL staff members with a dedicated assignment to ECON 7710 students. I strongly encourage you to seek their assistance as you work on homework assignments and prepare for exams. TAL has its own eLC course page to which you will be subscribed.

Course Policies

Performance evaluation

Your performance will be evaluated on the basis of homework assignments, *Dailies* and a final project weighted as follows:

Assessment	Number	Weight	Total
Homework	5	.12	.60
Daily	10	.01	.10
Project	1	.20	.30

Homework assignments will be completed in teams. Homework assignment due dates are included in the weekly schedule given below. *Late assignments will not be graded.*

Dailies are short active-learning exercises that you will participate in each class period. Only the best 10 Daily scores will count toward your course grade. *If you are absent from class you cannot participate in the Daily.*

You will be ranked relative to other students in the class according to your overall performance and grades assigned based on your class rank. I will use the plus/minus system to make distinctions within grade categories.

Attendance

Regular class attendance is essential for success and therefore strongly encouraged. There is no explicit penalty assessed for missing class, but missing class means missing a Daily, which could be costly. In any event, repeated absences will send a clear negative signal.

All instruction will be fully in-person. Class lectures and discussion will not be recorded.

Electronic devices

Cell phones *must* be muted or turned off and stowed away during class.

Laptops may be used in class, but only for purposes directly related to the course (e.g., taking notes, live coding and viewing course materials).

Communication

My communications to the class will generally come through the eLC Announcements tool, which functions like an instant messaging system. You should set your notifications preferences to receive Announcements postings in the manner that suits you. I strongly encourage the SMS option.

Weekly Schedule

Week 1 :: Correlation, causation & potential outcomes

Readings: Angrist & Pischke, ch 1; Cunningham, pp 1-15, 119-148 (chs 1,4)
IRL: "The Importance of Being Causal", *HDSR* (2020).
Assignment due: Aug 30

Weeks 2-3 :: Regression fundamentals

Readings: Angrist & Pischke, ch 2; Cunningham, pp 36-95 (ch 2)
IRL: "Causal ML at Microsoft", Microsoft Research Summit 2021.
Assignment due: Sep 9

Weeks 4-5 :: Regression discontinuity

Readings: Angrist & Pischke, ch 4; Cunningham, pp 241-312 (ch 6)
IRL: "Does Advertising Actually Work? Part I", Freakonomics Radio, Episode 440.
Assignment due: Sep 21

Weeks 5-6 :: Instrumental variables

Readings: Angrist & Pischke, ch 3; Cunningham, pp 315-384 (ch 7)
IRL: "Two-Stage Least Squares for A/B Tests", Twitch Blog, 30 June 2017.
Assignment due: Sep 30

Weeks 6-7 :: Difference in differences

Readings: Angrist & Pischke, ch 5; Cunningham, pp 406-509 (ch 9)
IRL: "Does Advertising Actually Work? Part II", Freakonomics Radio, Episode 441.
Assignment due: Oct 7

Other Course Policies and Statements

UGA student Honor Code

"I will be academically honest in all of my academic work and will not tolerate academic dishonesty of others." A Culture of Honesty, the University's policy and procedures for handling cases of suspected dishonesty, can be found at https://www.uga.edu/ovpi. Every course syllabus should include the instructor's expectations related to academic honesty.

Mental health and wellness resources

If you or someone you know needs assistance, you are encouraged to contact Student Care and Outreach in the Division of Student Affairs at 706-542-7774 or visit https://sco.uga.edu. They will help you navigate any difficult circumstances you may be facing by connecting you with the appropriate resources or services.

UGA has several resources for a student seeking mental health services (https://www.uhs.uga.edu/bewelluga/bewelluga) or crisis support (https://www.uhs.uga.edu/info/emergencies).

If you need help managing stress anxiety, relationships, etc., please visit BeWellUGA (https://www.uhs.uga.edu/bewelluga/bewelluga) for a list of FREE workshops, classes, mentoring, and health coaching led by licensed clinicians and health educators in the University Health Center.

Additional resources can be accessed through the UGA App.

Diversity, equity and inclusion

The Terry College is committed to promoting diversity, equity, inclusion, and belonging among its students, faculty, and staff. This class welcomes the open exchange of ideas and values freedom of thought and expression. This class provides a professional environment that recognizes the inherent worth of every person. It aims to foster dignity, understanding, and mutual respect among all individuals in the class.

Coronavirus information for students

For the latest on UGA policy, you can visit `https://coronavirus.uga.edu/`.

Changes to the syllabus

The course syllabus is a general plan for the course; deviations announced to the class by the instructor may be necessary.