

EPSE 581C: Causal Inference for Applied Researchers

Summer 2018/19 Term 1

Instructor: Ed Kroc

Neville Scarfe Building, Room 2526 (5th floor)

2125 Main Mall

Email: ed.kroc@ubc.ca

Website: ekroc.weebly.com

Office hours: Mondays & Wednesdays 1:30-2:30 PM

Credits and prerequisites:

Credits: 3

Prerequisite: EPSE 592 or 596 or equivalent (both recommended)

Meeting time and location:

Mondays & Wednesdays, 9:30 - 12:30 AM, Scarfe 204A

Course webpage:

All course notes and other handouts will be posted on the course webpage accessible from my main webpage:

<https://ekroc.weebly.com>

Email policy:

Email is the best way to get ahold of me outside of class. I generally respond within 24 hours; however, I will usually *not* respond to messages on weekends and statutory holidays. Thus, if you send me a message Friday evening, don't expect to receive a reply until Monday morning (or until Tuesday morning if Monday is a holiday).

Course overview:

This course will cover modern techniques in causal inference. We will study the main causal models in use and their derivative statistical techniques. Criticism of these models and techniques will be heavily emphasized. Mathematical foundations will form a component of the material, though our main focus will be on practical applications for researchers in a variety of disciplines.

Software:

We will use **R** in this class for our statistical analyses, via the **RStudio** interface. Please note: **this is not a programming course**. Even though you will have to input some code sometimes, I will not expect you to write it yourself. Master code will be provided that will be easily adaptable to your particular needs.

Assessment:

***In-class quizzes: 30%**

- We will start each class (except the first) with a short 1-2 question quiz covering material from the previous class. You will have 10 minutes to complete these quizzes. There will be 10 quizzes total and your individual best 7 scores will be used to calculate this component of your final grade.

***Written homeworks: 60%**

- There will be three written homework assignments throughout the term. Each assignment will be worth about 20% of your final grade. New questions (1-3) that are germane to the material just covered will be added each class. Tentative due dates are as follows:

-Class 5: May 22

-Class 8: June 10

-Finals Period: June 26

***Participation: 10%**

- Come to most of the classes and participate in class discussion to receive the full 10%.

Tentative schedule of classes:

- Class 1: Fundamentals of causality; the Fisherian ideal
- Class 2: Correlation vs. causality; confounding and Simpson's paradox
- Class 3: Experimental designs: restricted randomization, blocking
- Class 4: Discontinuity designs, wedge designs
- Class 5: The Neyman-Rubin causal model and limitations
- Class 6: Matching, propensity scores
- Class 7: Pearl's causal framework
- Class 8: Pearl's do-calculus, limitations of the theory
- Class 9: SEMs; mediation analysis
- Class 10: Instrumental variables
- Class 11: More instrumental variables; non-stationary causality

Recommended textbook(s):

There is ***no*** required textbook for this course; however, there will be several required readings. These will be posted online, freely available. In addition to these and to our course notes, I will post other useful resources on course topics from various open sources.

Academic integrity:

***Make sure you are familiar with standard UBC policy. See the below website for more details*:**

<http://www.calendar.ubc.ca/Vancouver/index.cfm?tree=3,54,111,959>

Academic honesty is essential to the continued functioning of the University of British Columbia as an institution of higher learning and research. All UBC students are expected to behave as honest and responsible members of an academic community. Breach of those expectations or failure to follow the appropriate policies, principles, rules, and guidelines of the University with respect to academic honesty may result in disciplinary action.

It is the student's obligation to inform himself or herself of the applicable standards for academic honesty. Students must be aware that standards at the University of British Columbia may be different from those in secondary schools or at other institutions. If a student is in any doubt as to the standard of academic honesty in a particular course or assignment, then the student must consult with the instructor as soon as possible, and in no case should a student submit an assignment if the student is not clear on the relevant standard of academic honesty.

If an allegation is made against a student, the Registrar may place the student on academic hold until the President has made his or her final decision. When a student is placed on academic hold, the student is blocked from all activity in the Student Service Centre.