THE UNIVERSITY OF HONG KONG
FACULTY OF BUSINESS AND ECONOMICS

ECON3284: Causal Inference

GENERAL INFORMATION

Instructor: Dr. Yanhui Wu

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Consultation times: TBD

Teaching assistant/Tutor: Yixin Mei
Pre-requisites: An introductory course in statistics or econometrics; and an introductory course in microeconomics.

COURSE DESCRIPTION

This course introduces students to fundamental ideas and important methods in causal inference. Combining statistical theory, scientific principles of research design, and hands-on experience with real data, this course will provide students with a solid basis for being good consumers and practitioners of empirical research in economics and other quantitative social sciences. The course will draw on applications from development, labor, political, and business economics. Other than methodology and computational skills, students will also learn how to think critically through guided reading of original academic papers and extensive class discussion.

The primary focus of this course is on application instead of methodological rigor. Hence, the use of mathematics will be limited to elementary algebra and probability. However, students are expected to have taken introductory courses in econometrics/statistics. Because of the emphasis on hands-on data experience, students are expected not to be scared by data and coding. Previous experience with statistical software and knowledge about computer programming is an advantage but not required. Homework assignments are designed to familiarize students with the necessary programing language.

The official programming language in this course is R. However, it is acceptable if students want to use Python instead. Both R and Python are freely available. Tutorials about both languages will be offered.

COURSE OBJECTIVES

1. Provide students a broad overview of the popular empirical methods in economics and social sciences
2. Enhance students' analytical ability to apply appropriate methods in different contexts
3. Equip students with a basic toolkit that can be directly used for their own research

Faculty Goals

Goal 1: Acquisition and internalization of knowledge of the programme discipline

Goal 2: Application and integration of knowledge

Goal 3: Inculcating professionalism and leadership

Goal 4: Developing global outlook

Goal 5: Mastering communication skills

Goal 6: Cultivating leadership

COURSE LEARNING OUTCOMES

Course Learning Outcomes	**Aligned Faculty Goals**
On completion of this course, students should be able to	

CLO1. Gain a solid understanding of the scientific principle of experimental design	FLG 1, FLG 2
CLO2. Articulate the logic of causal inference	FLG 1, FLG 2, FLG 5
CLO3. Describe and differentiate between a variety of common research designs that aim to draw causal inference in a wide range of social science applications	FLG 1, FLG 2, GLG 4, FLG 5
CLO4. Demonstrate facility with implementing the techniques covered in the course using statistical software on real-world datasets	FLG 1, FLG 2, FLG 3, FLG 6

COURSE TEACHING AND LEARNING ACTIVITIES

Course Teaching and Learning Activities	**Expected contact hour**	**Study Load (% of study)**
T&L1. Twelve weeks of three-hour lectures/lab sessions to cover basic topics in causal inference and their applications in social science research T&L2. Weekly problem sets that allow students to practice using the methods and techniques covered in the course T&L3. Regular tutorial sessions to facilitate the learning of methods and the implementation of techniques T&L4. A term project (in the form of presentation) to demonstrate students' understanding of a particular method and the ability of implement the relating techniques		
T&L1. Lectures	36	30%
T&L2. Weekly problem sets	36	30%
T&L3. Tutorial/self-learning sessions	36	30%
T&L4. Term project (presentation)	12	10%
Total	120	100%

Assessment Methods	**Brief Description (Optional)**	**Weight**	**Aligned Course Learning Outcomes**
A1. Problem sets	Four problem sets, each accounting for 5% of the final grade	20%	LO1, LO5
A2. Class participation	5% for attendance; 5% for discussion	10%	LO1, LO2, LO3, LO4
A3. Term project	Students form a team (up to 4 members) to work on a research project, which will be assessed by a presentation (15%) and a final report (15%).	30%	LO1, LO2, LO3, LO4, LO5
A4. Final exam	a two-hour written exam	40%	LO1, LO2, LO3, LO4
	Total	100%	

STANDARDS FOR ASSESSMENT

Course Grade Descriptors

A	Strong evidence of superb ability to fulfill the intended learning outcomes of the course at all levels of learning: describe, apply, implement, evaluate and synthesis.
B	Strong evidence of ability to fulfill the intended learning outcomes of the course at all levels of learning: describe, apply, implement, evaluate and synthesis.
C	

	Evidence of adequate ability to fulfill the intended learning outcomes of the course at low levels of learning; such as describe and apply, but not at high levels of learning such as evaluate and synthesis.
D	Evidence of basic familiarity with the subject.
F	Little evidence of basic familiarity with the subject.

Assessment Rubrics for Each Assessment (Please provide us the details in a separate file if the space here is not enough)

Please see the attached sheet.

COURSE CONTENT AND TENTATIVE TEACHING SCHEDULE

Week 1. Review of basic statistics and econometrics
Weeks 2-3. Randomized controlled trial (RCT)
Weeks 4-5. Instrumental variables (IV)
Week 6. Regression discontinuity (RD)
Weeks 7-8. Panel data and difference-in-differences (DID)
Weeks 9-10. Advanced applications
Weeks 11-12. Student presentation

REQUIRED/RECOMMENDED READINGS & ONLINE MATERIALS (e.g. journals, textbooks, website addresses etc.)

(SC-Mixtape) Cunningham, Scott. 2021. Causal Inference: The Mixtape. Yale University Press. (Book notes are freely available on https://mixtape.scunning.com/.)

(AP-MM) Angrist and Pischke. 2014. Mastering Metrics: The Path from Cause to Effect. Princeton, NJ: Princeton University Press.

MEANS/PROCESSES FOR STUDENT FEEDBACK ON COURSE

X conducting mid-term survey in additional to SETL around the end of the semester

X Online response via Moodle site

○ Others: _____ (please specify)

COURSE POLICY (e.g. plagiarism, academic honesty, attendance, etc.)

1. This is an active learning course, and attendance and participation are extremely important. Please observe appropriate classroom etiquette and be considerate to others. In particular, laptop use should be limited to course-related activities, and cell phones are not allowed in class.

2. Students are encouraged to work together in groups to solve the problem sets. However, each student must turn in his or her own homework. Copying another student's answers is not permitted even with consent. All assignments including the term project report must be typewritten.

3. Plagiarism and cheating in exams are serious academic offenses.

ADDITIONAL COURSE INFORMATION (e.g. e-learning platforms & materials, penalty for late assignments, etc.)

Assessment Rubrics for Each Assessment

	Grade A	Grade B	Grade C	Grade D	Grade F
Problem sets (20%)	Demonstrate strong evidence of mastering the methods and techniques to solve problems; turn in all problem sets with clear answers in due course	Demonstrate reasonable evidence of mastering the methods and techniques to solve problems; turn in all problem sets with clear answers in due course	Demonstrate some evidence of the capability of applying the methods and techniques to solve problems; turn in most problem sets in due course	Demonstrate limited evidence of the capability of applying the methods and techniques to solve problems; turn in most problem sets in due course	Demonstrate little evidence of the capability of applying the methods and techniques to solve problems; Fail to turn in most problem sets in due course
Class participation (10 %)	Attend class regularly; active engagement in class discussion	Attend class regularly; some engagement in class discussion	Attend class regularly; limited engagement in class discussion	Attend most of the classes; limited engagement in class discussion	Fail to attend most of the classes; little engagement in class discussion
Term project (30%)	Examines the question/issue/ problem from all important perspectives. Overall logic is clear.	Examines the question/issue/ problem from most of the important perspectives. Overall logic is clear.	Examines the question/issue/ problem from some of the important perspectives.	Examines the question/issue/ problem from some perspective.	Fail to examine the question/issue/problem from an important perspective.
Final Exam (40%)	A solid understanding of concepts and super ability of solving problems.	A solid understanding of concepts and good ability of solving problems.	A good understanding of concepts and reasonable ability of solving problems.	A fair understanding of concepts but limited ability of solving problems.	Limited understanding of concepts and little ability of solving problems.