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Course Description

This course covers the most important econometric methods beyond the use of the ordinary least squares (OLS) estimator with cross-sectional data. Particular attention is paid to econometric methods for estimating causal impacts. The course begins by reviewing sampling distributions of estimators and a simple regression model. The course then outlines a simple framework (potential outcomes model) for thinking about causality, and the challenge of solving selection bias with non-experimental data. Various methods for tackling selection bias are then presented including multivariate regression, panel data methods, instrumental variables, and regression discontinuity. The course also introduces students to the major data structures encountered in economics beyond cross-sectional data including panel (longitudinal) data and hierarchical/multi-level data. Students will receive regular assignments—and complete a major project— which require use of a statistical software package to apply the methods learned in class to real-world data.

Textbook

Jeffrey Wooldridge. *Introductory Econometrics: A Modern Approach (7th edition)*, South-Western Cengage Learning, 2019.
Note: earlier versions are acceptable

This course also uses my own customized readings for certain topics.

Office Hours

Monday and Wednesday 1pm to 2pm

Assignments and Software (Mini-Assignments, Major Project, In-class Questions)

Students will be required to complete regular, short data assignments, which I label "mini-assignments". All mini-assignments are submitted @ LEARN using the Dropbox. See policies below for other important submission information. Mini-assignments are graded out of 10 based on the following: i) a grade of 0 when a mini-assignment is not submitted on time, ii) a grade of 5 when a mini-assignment is competed on time, but does not meet expectations, and iii) a grade of 10 when a mini-assignment is submitted on time and meets expectations.

A major project using data from the renowned class-size experiment Project STAR is also a course requirement. Please note that the major project is expected to be completed independently.

Some classes will also have questions to be completed in-class. These are submitted to the Dropbox @ LEARN and constitute the participation grade.

The mini-assignments and project require the use of statistical software. The course lectures will use the software package Stata. Stata is available in the PAS computer lab, which can also be accessed remotely on your laptop. If a student wants their own copy of the Stata software for their personal computer, a 6-month educational subscription is available for University of Waterloo students for $50 (see: https://www.stata.com/order/new/edu/profplus/student-pricing/). If you purchase your own copy, choose the "Stata/BE" version.

Evaluation

Participation	5%
Mini-Assignments	15%
Project (due: July 11)	30%
Exam 1 (June 13)	25%
Exam 2 (July 25)	25%

Schedule

*Please note that this schedule is *tentative*

Date Posted	Topic
May 2	Introduction, Review of Binomial Model, CLT, and a Sampling Distribution Model
May 4	Constructing Confidence Intervals, 2 Group Hypothesis Test
May 9	2 Group Hypothesis Test, Dummy Variables and Simple Regression

May 11	Simple Regression
May 16	Causal Inference, Selection Bias and the Potential Outcomes Model
May 18	Regression with Experimental Data
May 23	Multivariate Regression
May 25	Victoria Day
May 30	No Class
June 1	Multivariate Regression
June 6	Interaction Terms and Sub-sampling
June 8	Review
June 13	Exam 1
June 15	Pooled Cross-sectional Time Series Data
June 20	The Difference-in-Differences Estimator
June 22	The Difference-in-Differences Estimator
June 27	Panel Data
June 29	Panel Data
July 4	Instrumental Variables
July 6	IV and the Local Average Treatment Effect
July 11	IV with Experimental Data
July 13	Regression Discontinuity
July 18	Regression Discontinuity
July 20	Review
July 25	Exam 2

Policies

Late Assignment/Project Policies

All mini-assignments, including the Project, are submitted at LEARN. For mini-assignments, late submissions are not accepted under any circumstances. For the Major Project, late submissions incur a penalty of 2 points per day (the Major Project is graded out of 100). Students should count on a mini-assignment being due most weeks once the review material is complete. Mini-assignments are always due by 11:59pm on Sunday.

Institutional-required statements for undergraduate course outlines approved by Senate Undergraduate Council, April 14, 2009

Economics Department Deferred Final Exam Policy
Deferred Final Exam Policy found at
https://uwaterloo.ca/economics/undergraduate/resources-and-policies/deferred-final-exam-policy

Academic Integrity

Academic Integrity: In order to maintain a culture of academic integrity, members of the University of Waterloo are expected to promote honesty, trust, fairness, respect and responsibility.

Discipline: A student is expected to know what constitutes academic integrity, to avoid committing academic offences, and to take responsibility for his/her actions. A student who is unsure whether an action constitutes an offence, or who needs help in learning how to avoid offences (e.g., plagiarism, cheating) or about "rules" for group work/collaboration should seek guidance from the course professor, academic advisor, or the Undergraduate Associate Dean. When misconduct has been found to have occurred, disciplinary penalties will be imposed under Policy 71 – Student Discipline. For information on categories of offenses and types of penalties, students should refer to Policy 71 - Student Discipline (https://uwaterloo.ca/secretariat-general-counsel/policies-procedures-guidelines/policy-71)

Grievance: A student who believes that a decision affecting some aspect of his/her university life has been unfair or unreasonable may have grounds for initiating a grievance. Read Policy 70 - Student Petitions and Grievances (https://uwaterloo.ca/secretariat-general-counsel/policies-procedures-

guidelines/policy-70), Section 4.

Appeals: A student may appeal the finding and/or penalty in a decision made under Policy 70 - Student Petitions and Grievances (other than regarding a petition) or Policy 71 - Student Discipline if a ground for an appeal can be established. Read Policy 72 - Student Appeals (https://uwaterloo.ca/secretariat-general-counsel/policies-procedures-guidelines/policy-72).

Other sources of information for students:
Academic Integrity website (Arts)
https://uwaterloo.ca/arts/current-undergraduates/student-support/ethical-behaviour

Academic Integrity Office (UWaterloo) https://uwaterloo.ca/academic-integrity/

Accommodation for Students with Disabilities

Note for students with disabilities: The AccessAbility Services office (https://uwaterloo.ca/disability-services), located on the first floor of the Needles Hall extension (NH 1401), collaborates with all academic departments to arrange appropriate accommodations for students with disabilities without compromising the academic integrity of the curriculum. If you require academic accommodations to lessen the impact of your disability, please register with the AS office at the beginning of each academic term.