

Economics 715(L01) (Advanced Econometrics II)

Instructor: Atsuko Tanaka
Phone: 403-220-6709
Email: atanaka@ucalgary.ca

Lecture Location: SS 423
Lecture Days/Time: TR 14:00-15:15

Office: SS 432
Office Hours: Thursday 15:20-16:20

Winter 2020

Course Description:

This is the second course in the PhD sequence in econometrics. The course will focus on identification, estimation of and inference about treatment effects.

Course Outcomes:

By the end of the course students should be able to formulate credible identification, estimation and inferential strategies to be applied to economically interesting causal questions.

Course Outline:

This course will closely follow the path set by the following required text:

Mostly Harmless Econometrics: An Empiricist's Companion, Joshua Angrist and Jorn-Steffen Pischke, Princeton University Press, 2008.

It is essential that you own this book.

I assume students are prepared to work with graduate-level mathematical, economic, and econometric concepts. Familiarity with Stata AND another programming language such as GAUSS, R, or Matlab is required. A programming tutorial will not be provided.

N.B. The details of outline are subject to change.

Identification and Estimation of Causal Effects of a Program

1. Introduction (L.1)
 - a. Brief discussion on how to choose a research topic
 - b. Reduced form analysis vs. Structural estimation
 - c. Data
 - d. Problem Set I
2. Review of Key Concepts in Econometric Theory (L.2)
 - a. What is the "problem of identification"?
 - b. Identification and Statistical Inference: Definitions and contrasting examples.
 - c. Causal Relationships in Economics: The "Experimental Ideal."
 - d. Selection bias. Reflection Problem.

Textbook Readings: AP Chapter 1-2. Manski pp 1-11. Wooldridge Ch. 1
3. Regression (L.3)
 - a. What is regression? Foundations.

- b. Why regression? Treatment effects.
- c. Identification.
- d. Matching estimators.
- e. Standard Errors.
- f. Partial Identification and Estimation of Bounds
- g. Applications.
- h. Issues: Heterogeneous treatment effects, Omitted variables, Measurement error.

Textbook Readings: AP Chapter 3 and 8. Wooldridge Ch. 4,

4. Instrumental Variables (L.4)

- a. Motivation: When and Why use IV?
- b. Identification.
- c. Estimation and Inference.
- d. Other Issues: Binary instruments and continuous instruments. Weak Instruments, many instruments. Placebo tests. Heterogeneity. Heckman and Urzua vs Angrist and Imbens (LATE) debate

Textbook Readings: AP Chapter 4, Wooldridge Ch. 5

5. Panel Data/Fixed Effects/Differences-in-Differences (L.5)

- a. Motivation:
 - i. Why is Panel Data Useful? Identification.
 - ii. Why and when use these methods? Relation between DID and FE, Relation between RD and IV.
- b. Estimation and Inference.
- c. Other Issues.
- d. Problem Set II

Textbook Readings: AP Ch. 5, Wooldridge Ch. 6, 10-11, 21, Manski Ch. 7.

6. Regression Discontinuity (L.6)

- a. Motivation: Why and when use these? Relation between DID and FE, Relation between RD and IV.
- b. Identification.
- c. Estimation and Inference.
- d. Other Issues.
- e. Problem Set III

Textbook Readings: AP Ch. 6, Wooldridge Ch. 21

7. Nonstandard Error Issues (L.7)

Textbook Readings: AP Ch. 8

8. Introduction to Structural Estimation of Behavioral Models (L.8)

- a. Reduced-form Approach
- b. Structural Approach
- c. Forward Looking Dynamic Discrete Choice Models
- d. Dynamic Model of Female Labor Supply
- e. Computational Issues
- f. Problem Set IV

Journal Articles:

- Chetty, R. (2008) "Sufficient Statistics for Welfare Analysis: A Bridge between Structural and Reduced-Form Methods". Annual Review of Economics, Annual Reviews, vol. 1(1), pages 451-488, 05.
- Keane, Michael P., Kenneth I. Wolpin, and Petra Todd (2010) "The Structural Estimation of Behavioral Models: Discrete Choice Dynamic Programming Methods and Applications" in Handbook of Labor Economics, Vol. 4, ed. by O. Ashenfelter, and D. Card. Elsevier Science, Amsterdam.

9. Maximum Likelihood, GMM, and Indirect Inference (L.9)

- a. Motivation: Why and when use these?
 - b. Relationship between GMM and MLE
 - c. GMM versus Indirect Inference
 - d. Standard Error Construction
 - e. Testing
10. Calibration (L.10)
- a. Motivation: Why calibrate not estimate
 - b. Value Function Iteration
- Journal Articles:
- Mark Huggett (1993). "The risk-free rate in heterogeneous-agent incomplete-insurance economies," *Journal of Economic Dynamics and Control* 17: 953-969.
11. Presentation (L.11)
- a. Students submit their project (research proposal or replication projects) to D2L.
 - b. We all look at the submissions and comments on each using D2L Discussion Forum.

The requirements of the class are a midterm exam, a final exam, 4 problem sets, and a presentation (using D2L Discussion Forum).

Midterm (**Thursday, February 13th in class**):

Problem sets with brief description:

- Problem Set I: Data
(Due Friday Jan. 24)
You are asked to document a fact from a micro-data set. You can refer to notes by Olivetti et al. (2010) to access some of the survey data. References: Notes "How to Access Standard Data Sources" Claudia Olivetti, Dan Silverman, Jay Hong, David Wiczer (2010)
- Problem Set II: Fixed Effects/Differences-in-Differences
(Due Friday Feb. 7)
Using the data set you organized in Problem Set I, you will estimate economic models using reduced-form methods such as fixed-effects regression and differences-in-differences.
- Problem Set III: Regression Discontinuity
(Due Friday Feb. 28)
Using the data set you organized in Problem Set I, you will estimate economic models using regression discontinuity.
- Problem Set IV: Calibration/Estimation
(Due Friday Mar. 27)
For this problem set, you will create a project that you will present to the class at the end of this course. The purpose of this exercise is to construct and calibrate/estimate a model. You may use Matlab, R, Fortran, or an equivalent to tackle the problem.

Prerequisites/corequisites:

ECON 705

Required Textbook(s):

Mostly Harmless Econometrics (Angrist and Pischke)

Recommended Textbook(s):

Causal Inference: The Mixtape (Cunningham)

Econometric Analysis of Cross Section and Panel Data (Wooldridge)

Econometric Analysis (Greene)

Microeconometrics (Cameron and Trivedi)

Books on Reserve:

Mostly Harmless Econometrics (Angrist and Pischke)

Desire2Learn:

This course will make use of the Desire2Learn (D2L) platform. Students who are registered in the course can log on at <http://d2l.ucalgary.ca> through their student centre. Please note that D2L features a class e-mail list that may be used to distribute course-related information. These e-mails go to your University of Calgary e-mail addresses only.

Grade Determination/Assessment:

MIDTERM EXAMINATION	15%
FINAL EXAMINATION	35%
PROBLEM SET	40%
PRESENTATION	<u>10%</u>
	100%

Grade Determination and Final Examination Details

Department of Economics Criteria for Letter Grades. Economics professors use the following criteria when assigning letter grades:

Grade	Grade Point Value	Description
A+	4.00	Outstanding
A	4.00	Excellent-superior performance, showing-comprehensive understanding of subject matter
A-	3.70	Very good performance
B+	3.30	Good performance
B	3.00	Satisfactory performance
B-	2.70	Minimum pass for students in the Faculty of Graduate Studies
C+	2.30	All grades below "B-" are indicative of failure at the graduate level and cannot be counted toward Faculty of Graduate Studies course requirements. Individual programs may require a higher passing grade.

A passing grade on any particular component of the course is not required for a student to pass the course as a whole.

There will be a department scheduled final examination, held in a classroom, lasting 2 hours. Non-programmable calculators WILL be allowed during the writing of tests or final examinations.

Tests and exams WILL NOT involve multiple choice questions.

Absence from a Test/Exam

THERE WILL BE NO MAKEUP OR DEFERRED QUIZZES under any circumstances, nor may the quizzes be written early. Students unable to write the quizzes because of documented illness, family

emergency, religious observance, or university-sanctioned event will have the weight shifted to the final examination; otherwise a grade of zero will be assigned. If a student cannot write their final exam on the date assigned by the Department, they need to arrange for a deferred exam with the department.

Reappraisal of Grades and Intellectual Honesty:

For reappraisal of graded term work, see Calendar I.2

<http://www.ucalgary.ca/pubs/calendar/current/i-2.html>

For reappraisal of final grade, see Calendar I.3

<http://www.ucalgary.ca/pubs/calendar/current/i-3.html>

Statement of Intellectual Dishonesty, see Calendar K.4

<http://www.ucalgary.ca/pubs/calendar/current/k-4.html>

Plagiarism and Other Academic Misconduct, see Calendar K.5

<http://www.ucalgary.ca/pubs/calendar/current/k-5.html>

Academic Accommodations:

Students seeking an accommodation based on disability or medical concerns should contact Student Accessibility Services; SAS will process the request and issue letters of accommodation to instructors. Students who require an accommodation in relation to their coursework based on a protected ground other than disability should communicate this need in writing to their Instructor. The full policy on Student Accommodations is available at <http://www.ucalgary.ca/policies/files/policies/student-accommodation-policy.pdf>.

Freedom of Information and Protection of Privacy (FOIP) Act:

Personal information is collected in accordance with FOIP. Assignments can only be returned to the student and will be accessible only to authorized faculty and staff. For more information, see <http://www.ucalgary.ca/legalservices/files/legalservices/faq-students.pdf> and http://www.ucalgary.ca/legalservices/files/legalservices/faq-faculty_0.pdf.

Internet and Electronic Communication Device information:

The use of cell phones for any purpose in class is prohibited. Computers and tablets may be used for note taking only unless otherwise authorized by the instructor.

Copyright Legislation:

See the University of Calgary policy on Acceptable Use of Material Protected by Copyright at www.ucalgary.ca/policies/files/policies/acceptable-use-of-material-protected-by-copyright.pdf. Students who use material protected by copyright in violation of this policy may be disciplined under the Non-Academic Misconduct Policy.

Important Dates:

Please check: <http://www.ucalgary.ca/pubs/calendar/current/academic-schedule.html>

Student Organizations:

Faculty of Grad Studies website: <http://grad.ucalgary.ca/home>

Graduate Students Association: <http://gsa.ucalgary.ca/>

Professional Development for Grad Students

Workshops and resources can be found at <http://www.ucalgary.ca/mygradskills/>

Economics Graduate Association: <http://econ.ucalgary.ca/ega/>

Student Support and Resources:

- See <https://www.ucalgary.ca/registrar/registration/course-outlines> for information on campus mental health resources, the Student Ombuds' Office, Student Success Centre, Safewalk, and Emergency Evacuation and Assembly.
- Online writing resources are available at <https://ucalgary.ca/student-services/student-success/writing-support>.
- For registration (add/drop/swap), paying fees and assistance with your Student Centre, contact Enrolment Services at 403-210-ROCK [7625] or visit them in the MacKimmie Library Block.

Notes:

1. Students are responsible for all assigned material, e.g., supplementary material posted on D2L, regardless of whether or not the material was covered in class.
2. The final exam is harder than the midterm exams. Try not to miss the midterm exams.
3. Submit your assignments to the D2L Dropbox before the due.
4. Late assignments, assignments sent by e-mail, placed in my mailbox or placed under my office door will not be accepted.
5. You are encouraged to work with your classmates. However, you need to write in your own words.
6. Assignments Formatting Requirements:
 - Submit your assignments to the D2L Dropbox as ONE file unless specified otherwise. If you are uploading photos of your work, please transform them into a format recognized by Windows (e.g. JPEG, PNG or PDF format). *Please do not submit files with .heic extension.*
 - Include your family name and the assignment number in the name of the file you upload to Dropbox in the following form: LASTNAME_hw# where you will substitute the assignment number for the # in the filename.
 - You can scan your written homework with a scanner or your device's camera to create scanned pdf files. Before you submit your scanned homework be sure to verify that the scan is easily readable.
 - Make sure that the pages are in the correct order; that is, the first page of the document should be the first page of your work and so on. Make sure that the pages are aligned properly; that is, pages are not in a landscape position.
 - I recommend that you submit a draft at least one day before the due. If you want to make a change, you can upload the whole file as a new submission in the same folder--**your grade will be based on the most recent submission.**

Changes (Effective on Thursday, March 19):

- There will be no one-on-one performance instruction.
- The main interaction is through office hours.
- Before each lecture, I post reading material and associated quizzes (starting on March 19) and discuss over the material on D2L Discussion Forum.
- The final exam is an open-book take-home exam (2 hours at the originally scheduled time).
- In-class presentation is now replaced by an open discussion on D2L. Each student is asked to submit a research proposal (Option 2) or a replication project (Option 1,3) to D2L Dropbox (it will be accessible to all the other students), followed by an open discussion using the Discussion Forum. More detailed instructions on online (written) presentation will be posted on D2L News Feed as the date approaches.
- My office hours take place in the regular hours using emails, Skype, Google and the Discussion Forum on D2L. Send me an email in advance to choose a communication tool used for discussion.
- I will ask the TA to actively help the students to learn the course material using emails and other online communication tools. I will also ask him to share helpful resources for self-learning the material.
- These arrangements are subject to change. I will adjust and improve the delivery as I experiment with the online course. I will post the changes on D2L and email to the class mailing list when I make important/major changes.

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2020-03-17