Economics 715(L01) (Advanced Topics in Econometrics)

Instructor:	Atsuko Tanaka	Lecture Location:	SS 423
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Office Hours:	R 13:45-16:00	Winter 2016	

Required Textbooks:

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

Microeconometrics: Methods and Applications, A. Colin Cameron and Pravin K. Trivedi, Cambridge University Press, 2005

Book(s) on Reserve: N/A

Course Description:
This course explores how to use statistical procedures in empirical studies of economic models. We will cover a number of topics that are important in applied research. The main theme of the course is "Treatment Effects," as we will consider estimation of various types of treatment effects (e.g. causal effects of education on earnings).

The course consists of two parts: Reduced-form method (Part I) and structural method (Part II).

The first half of 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.

This book is essential to the course content.

The second half of the course teaches structural methods by emphasizing empirical implementation of theoretical models through the use of data and econometrics. To learn the structural approaches, we will carefully read several journal articles.

Course Objectives/Learning Outcomes:
The purpose of this course is to teach students how to use statistical procedures in empirical studies of economic models and master the "toolkit" of contemporary microeconometric practice.

Prerequisites/corequisites
In planning this course, 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.

Course Outline:

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

1. Introduction (L.1)
    a. Brief discussion on how to choose a research topic
    b. Reduced form analysis vs. Structural estimation
    c. Data

Part I: Reduced-form Method: Identification and Estimation of Causal Effects of a Program

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 Chapters 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 Chapters 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 - 6)
    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 I
    Textbook Readings: AP Ch. 5, Wooldridge Ch. 6, 10-11, 21, Manski Ch. 7.
6. Regression Discontinuity (L.7)
    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 II
Textbook Readings: AP Ch. 6, Wooldridge Ch. 21

7. Midterm (L.8) on Thursday, February 4th

Part II Structural Approaches

8. Introduction to Structural Estimation of Behavioral Models (L.9 - 10)
    a. Motivation: Why structural models? Estimation of a policy that has never been
        implemented
   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.
9. Estimation of Dynamic Models I (L.11 - 13)
    a. Forward Looking Dynamic Discrete Choice Models
    b. Dynamic Model of Female Labor Supply
    c. Problem Set III
   Journal Articles:
   • 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.
10. Estimation of Dynamic Models II (L.14 - 15)
    a. Reduced-form Approach
    b. Structural Approach
    c. Computational Issues
   Journal Articles:
   • Keane, Michael P., Kenneth I. Wolpin (1997) "The Career Decisions of Young Men," JPE.
11. Maximum Likelihood, GMM, and Indirect Inference (L.16 - 17)
    a. Motivation: Why and when use these?
    b. Relationship between GMM and MLE
    c. GMM versus Indirect Inference
    d. Standard Error Construction
    e. Testing
12. Calibration (L.18 - 19)
    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.
13. More topics on Structural Methods (L.20 - 21)
    c. Generalized Roy Model: Heckman 2 step
   Journal Articles:
   • Heckman, J. (1979). "Sample Selection Bias as a Specification Error". *Econometrica* 47 (1):
     153–61

14. Nonstandard Error Issues (L.22)
    Textbook Readings: AP Ch. 8
15. Special Lecture (L.23)
16. In-Class Presentation (L.24)
        a. Students present their project (Problem Set IV)
17. Final (L.25) on Thursday, April 13th

If time allows:
18. Heterogenous Treatment Effects
        a. Propensity Score Matching
        b. IV with Heterogenous Treatment Effects
    Textbook Readings: AP Ch. 3, Wooldridge Ch. 21

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 and Final Examination Details:

The requirements of the class are a midterm exam, problem sets, and an in-class presentation.

MIDTERM EXAM	20%
FINAL EXAMINATION	20%
ASSIGNMENTS	60%
	100%

Midterm (Thursday, February 4th):
Tests will be from the textbook "*Mostly Harmless Econometrics*."
Final (Thursday, April 13th):
The final exam is cumulative. You should review your previous problem sets and mid-term exams as a starting point for your study.

Problem sets with brief description:
- Problem Set I: Fixed Effects/Differences-in-Differences
  (Due Jan. 21)
  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 II: Regression Discontinuity
  (Due Feb. 16)
  Using the data set you organized in Problem Set I, you will estimate economic models using regression discontinuity.
- Problem Set III (the final project): Estimation
  (Due Mar 31)
  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 dynamic model of labor force participation. You may use Matlab, R, Fortran, or an equivalent to tackle

the problem. It will take at least 1 month.

You may work in pairs or groups of three. I suggest that students remain on the same team for all the problem sets.

In-class Presentation:
Students will present their analysis from Problem Set IV.

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		Grade	Grade Point Value	Description
A+	4.00	Outstanding		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	4.00	Excellent-superior performance, showing-comprehensive understanding of subject matter		C	2.00	the subject matter
A-	3.70	Very good performance		C-	1.70	
B+	3.30	Good performance		D+	1.00	
B	3.00	Satisfactory performance		D	1.00	
B-	2.70	Minimum pass for students in the Faculty of Graduate Studies		F	0	

Grading Scale

A+	95 – 100	B	73 – 76	C-	60 – 62
A	85 – 94	B-	70 – 72	D+	56 – 59
A-	80 – 84	C+	67 – 69	D	50 – 55
B+	77 – 79	C	63 – 66	F	0 – 49

Tests and final exams are marked on a numerical (percentage) basis, then converted to letter grades. The course grade is then calculated using the weights indicated above.

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

Non-programmable calculators WILL be allowed during the writing of tests or final examinations.

There will be a Department scheduled final examination, held in a classroom, lasting 2 hours.

Tests and exams WILL NOT involve multiple choice questions.

Notes:

- Students seeking reappraisal of a piece of graded term work (term paper, essay, etc.) should discuss their work with the Instructor *within fifteen days* of the work being returned to the class.

- It is the student's responsibility to request academic accommodations. If you are a student with a documented disability who may require academic accommodation and have not registered with the Disability Resource Centre, please contact their office at 220-8237. Students who have not registered with the Disability Resource Centre are not eligible for formal academic accommodation. You are also required to discuss your needs with your instructor no later than fourteen (14) days after the start of this course.

- All students must comply with the regulations published in the University Calendar concerning "Intellectual Honesty," "Examinations," etc.

- Students who are unable to write the midterm because of an illness, family emergency or religious observance will have the midterm weight shifted to the final examination. Documentation MUST be provided.

Reappraisal of Grades

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

A student who feels that a piece of graded term work (e.g., term paper, essay, test) has been unfairly graded, may have the work re-graded as follows. The student shall discuss the work with the instructor within 15 days of being notified about the mark or of the item's return to the class; no reappraisal of term work is permitted after the 15 days. If not satisfied, the student shall immediately take the matter to the Head of the department offering the course, who will arrange for a reassessment of the work within the next 15 days. The reappraisal of term work may cause the grade to be raised, lowered, or to remain the same. If the student is not satisfied with the decision and wishes to appeal, the student shall address a letter of appeal to the Dean of the faculty offering the course within 15 days of the unfavourable decision. In the letter, the student must clearly and fully state the decision being appealed, the grounds for appeal, and the remedies being sought, along with any special circumstances that warrant an appeal of the reappraisal. The student should include as much written documentation as possible.

Plagiarism and Other Academic Misconduct
Intellectual honesty is the cornerstone of the development and acquisition of knowledge and requires that the contribution of others be acknowledged. Consequently, plagiarism or cheating on any assignment is regarded as an extremely serious academic offense. Plagiarism involves submitting or presenting work in a course as if it were the student's own work done expressly for that particular course when, in fact, it is not. Students should examine sections of the University Calendar that present

a Statement of Intellectual honesty and definitions and penalties associated with Plagiarism/Cheating/Other Academic Misconduct, http://www.ucalgayr.ca/pubs/calendar/current/k.html

Academic Accommodation
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. For additional information on support services and accommodations for students with disabilities, Visit www.ucalgary.ca/access/.

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 www.ucalgry.ca/policies/files/policies/student-accommodation-policy_0.pdf

Students who have not registered with the Disability Resource Centre are not eligible for formal academic accommodation. You are also required to discuss your needs with your instructor no later than 14 days after the start of this course.

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 Registrar's Office, they need to apply for a deferred exam www.ucalgary.ca/registrar/exams/deferred_final Under no circumstance will this be accommodated by the department.

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/

Evacuation Assembly Point

In case of an emergency evacuation during class, students must gather at the designated assembly point nearest to the classroom. The list of assembly points is found at www.ucalgary.ca/emergencyplan/assemblyponts
Please check this website and note the nearest assembly point for this course

Safewalk

The safewalk program provides volunteers to walk students safely to their destination anywhere on campus. This service is free and available 24 hrs/day, 365 days a year.
Call 403-220-5333

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