



## Department of Economics Course Outline

**Course:** Economics 715  
[Advanced Topics in Econometrics]

**Term:** Fall 2014

**Time:** TR 12:30-13:45

**Section:** 01

**Instructor:** Atsuko Tanaka

**Place:** SS 423

**Office:** SS 432

**Telephone:** 403 (220) 6709

**Office Hours:** R 13:45-15:00

**E-mail:** [atanaka@ucalgary.ca](mailto:atanaka@ucalgary.ca)

**Course Website:**

<https://sites.google.com/site/econ7152014>

### Course Description:

This course explores how to use statistical procedures in empirical studies of economic models. 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 microeconomic practice. 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.

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.

It is essential that you own this book.

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.

Please Note: 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.

**Evaluation:**

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

Midterm (Thursday, October 2<sup>nd</sup>):  
Tests will be from the textbook.

Problem sets with brief description:

- Problem Set I: Data  
(Due Sep. 25)  
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 Oct. 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 Oct. 21)  
Using the data set you organized in Problem Set I, you will estimate economic models using regression discontinuity.
- Problem Set IV (the final project): Estimation  
(Due Nov. 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 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.

**Detailed Course Outline:**

N.B. The dates and 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
  - d. Problem Set I

**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 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 - 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 II

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 III

Textbook Readings: AP Ch. 6, Wooldridge Ch. 21
  7. Midterm (L.8) on Thursday, October 2<sup>nd</sup>

## 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 IV
- 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)

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If time allows:

17. Heterogenous Treatment Effects
- a. Propensity Score Matching
  - b. IV with Heterogenous Treatment Effects
- Textbook Readings: AP Ch. 3, Wooldridge Ch. 21

**Grade Determination Details:**

The grade breakdown is as follows:

Midterm Examination	Oct. 2	30 percent
Problem Sets (including the final project)		40 percent
In-class Presentation		30 percent

Note that assignments submitted late will be accepted, but marked down by 10%. Assignments more than two weeks later will not be accepted (no exceptions).

Your course grade will be calculated using the weights indicated above. The following letter grade equivalences apply:

A+	97 – 100	B	82 – 85	C-	70 – 72
A	93 – 96	B-	79 – 81	D+	67 – 69
A-	89 – 92	C+	76 – 78	D	60 – 66
B+	86 – 88	C	73 – 75	F	0 – 59

**Course Policies**

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

Tests and exams will not involve multiple-choice questions.

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 problem sets. Documentation **MUST** be provided.

Students seeking reappraisal of a piece of graded term work should discuss their work with the instructor *within fifteen days* of work being returned to class.

**Recommended Textbooks**

- Econometric Analysis of Cross Section and Panel Data, Jeffrey Wooldridge, MIT Press, 2010.
- Microeconometrics, A. Colin Cameron and Pravin K. Trivedi, Cambridge, Harvard University Press, 2005.
- Econometrics, Fumio Hayashi, Princeton University Press, 2000.
- Identification for Prediction and Decision, Charles Manski, Cambridge, Harvard University Press, 2007.

I do not expect you to buy these texts because they are not cheap. However, these are standard works of scholarship in the profession. Manski is the book in identification, and Wooldridge is the go-to reference book for empirical researchers. If you are planning to do empirical work in

economics, you will want to own these books at some point in the near future.

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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> using or through their student centre. Please note that D2L features a class e-mail list that may be used to distribute course-related information. It is your responsibility to ensure that D2L uses the e-mail address of your choice. The default is your University of Calgary e-mail address.

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

*Faculty of Arts Program Advising and Student Information Resources*

- Have a question, but not sure where to start? The Faculty of Arts Program Information Centre (PIC) is your information resource for everything in Arts! Drop in at SS102, call them at 403-220-3580 or email them at [artsads@ucalgary.ca](mailto:artsads@ucalgary.ca). You can also visit the Faculty of Arts website at <http://arts.ucalgary.ca/undergraduate> which has detailed information on common academic concerns.
- For program planning and advice, contact the Student Success Centre (formerly the Undergraduate programs Office) at 403-220-5881 or visit them on the 3<sup>rd</sup> Floor of the Taylor Family Digital Library.
- 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.
- Online writing resources are available at <http://ucalgary.ca/ssc/writing-support/online-writing-resources>

Notes:

- 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 403-220-8237. 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.
- Students seeking reappraisal of a piece of graded term work should discuss their work with the instructor *within fifteen days* of work being returned to class.

Safewalk / Campus Security: 403-220-5333  
 Emergency Assembly Point: Professional Faculties Food Court

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