PPHA 421:
APPLIED ECONOMETRICS II

Spring 2016: Mondays and Wednesdays 10:30 – 11:50 pm, Room 140C

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Office hours: Mondays 3-4pm

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Course Description

The goal of this course is for students to learn a set of statistical tools and research designs that are useful in conducting high-quality empirical research on topics in applied microeconomics and related fields. Since most applied economic research examines questions with direct policy implications, this course will focus on methods for estimating causal effects. This course differs from many other econometrics courses in that it is oriented towards applied practitioners rather than future econometricians. It therefore emphasizes research design (relative to statistical technique) and applications (relative to theoretical proofs), though it covers some of each.

Prerequisites

PPHA42000 (Applied Econometrics I) is the prerequisite for this course. Students should be familiar with graduate school level probability and statistics, matrix algebra, and the classical linear regression model at the level of PPHA420. In the Economics department, the equivalent level of preparation would be the 1st year Ph.D. econometrics coursework.

In general, I do not recommend taking this course if you have not taken PPHA420: Applied Econometrics I or a Ph.D. level econometrics coursework.

This course is a core course for Ph.D. students and MACRM students at Harris School. Those who are not in the Harris Ph.D. program, the MACRM program, or the economics Ph.D. program need permission from the instructor to take the course.
No electric device policy:

I ask you not to use electric devices, including laptops, phones, and smart pads in class. Please seek permission from the instructor if you need to use an electric device for a special reason (e.g. a medical reason).

Assignments and Grading

I will assign 4 problem sets during the course. I highly encourage you to work as a group of up to 4 students. Make sure to write everyone’s name and student ID for each problem set. You can work as a group, but each student must submit his/her problem set individually.

There will also be a final. Grades will be based on performance on problem sets (40%), final exam (50%), and class participation (10%). Late problem sets will incur a penalty of 10% per day late with no exception.

Statistical Software

You may use any software that you wish, but solutions for problem sets will be handed out in Stata. Demonstrations during lectures will also be conducted in Stata.
### Tentative Schedule (subject to change)

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<th>Topic</th>
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<td>Introduction to the Course, Causality</td>
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<tr>
<td>3/30</td>
<td>Randomized Controlled Trials</td>
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<td>4/4</td>
<td>Randomized Controlled Trials</td>
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<td>4/6</td>
<td>Regression Discontinuity Design</td>
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<td>4/18</td>
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<td>Problem Set #1 due</td>
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<td>4/25</td>
<td>Selection on Observables and Lalonde’s Critique</td>
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<td>4/27</td>
<td>Matching</td>
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<td>5/4</td>
<td>DID, Fixed Effects, Synthetic Controls</td>
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<td>5/16</td>
<td>Clustering and Bootstrapping Standard Errors</td>
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<td>5/18</td>
<td>Introduction to Maximum Likelihood Estimation</td>
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<td>5/23</td>
<td>Limited dependent variables</td>
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<td>5/25</td>
<td>Introduction to GMM</td>
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<td>Discrete Choice Methods with Aggregated Data</td>
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<td>6/7</td>
<td><strong>Final exam</strong> (1:30 pm – 4:30 pm at room 289A)</td>
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Textbooks and Notes

The main materials for this course will be my lecture slides. The lecture slides are mainly based on two textbooks for this course: 1) the econometrics notes at NBER econometrics courses written by Imbens and Wooldridge [WNE] and 2) the econometrics textbook by Cameron and Trivedi [CT]. The relevant chapters to these two sources are required readings.

In addition, Angrist and Pischke [AP] provide intuitive, practical, and less mathematical explanations for some topics. Woodridge [JW] is at the same level of WNE and CT. For each topic, I reference chapters from these sources.


References to each topic

** The main textbook-style material used for the lecture (required readings)
* Other references used for the lecture
# A textbook or paper for those who want to see more theoretical aspects

1. Causality

** WNE Lecture 1, Section 2.

* AP Chapters 1 - 2.

# CT Chapter 2.


2. RCT

** Sections 1,2,4,5,6 in:


3. Regression Discontinuity Designs


** WNE Lecture 3.

CT Chapter 25.6.
* AP Chapter 6.


4. Advanced Topics in Instrumental Variables

A. The IV Estimator

** CT Chapter 4.8.

** AP Chapter 4.1 - 4.3.

JW Chapter 5.


B. Heterogeneous Treatment Effects

** CT Chapter 25.7.
** AP Chapter 4.4 - 4.5.

** WNE Lecture 5.

JW
Chapter 18.4.


C. 2SLS and Weak Instruments

** CT Chapter 4.9.

** AP Chapter 4.6.

* WNE Lecture 13.


5. Selection on Observables, Lalonde’s Critique, Matching, Propensity Score Matching


** CT Chapter 25.

** AP Chapter 3.
** WNE Lecture 1.


5. DID, Fixed Effects, Synthetic Controls

** WNE Lecture 10.

** CT Chapter 25.

** AP Chapter 5.


6. Clustering and Bootstrapping Standard Errors

** CT Chapter 24.5.

** AP Chapter 8.2.


** CT Chapter 11.


7. Maximum likelihood Estimation

A. Introduction to Maximum likelihood Estimation

** CT Chapters 5.1 - 5.3, 5.6, 5.7

JW Chapter 13.

B. Limited Dependent Variables Models

** CT Chapters 14.1 - 14.5, 16

JW Chapter 15, 16.


C. Multinomial Discrete Choice

** CT Chapter 15.

** WNE Lecture 11.

JW Chapter 15.9.

** KT Chapters 1, 2, 3, 5

8. GMM

** CT Chapter 6.

** WNE Lecture 15.