ARE 213 Syllabus
Applied Econometrics

Department of Agricultural and Resource Economics
University of California, Berkeley
Fall 2021

Lectures: Mon/Wed/Fri 1:00-2:00, 247 Cory
Section: Mon 12:00-1:00, 240 Mulford

Course Website: https://bcourses.berkeley.edu/

Instructor: Michael Anderson
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Office Hours: M 9:30-10:30 am, Th 10:30-11:30 am
Office hours are remote (Zoom). Link available in bCourses announcements.
Sign up online at https://are.berkeley.edu/~mlanderson

GSI: Joel Ferguson
Contact: joel_ferg@berkeley.edu
Office Hours: Tu 1:00-3:00 pm (Giannini 241), Th 12:00-1:00 pm (Giannini 238)

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

Students should be familiar with basic probability and statistics, matrix algebra, and the
classical linear regression model at the level of ARE 212 (in Economics the equivalent level of
preparation would be some strange combination of ECON 140, 141, 240A, and 240B).

Assignments and Grading

We will assign 5 to 7 problem sets during the course of the semester. You must work
cooperatively on the problem sets in groups of 2 to 5. There will also be a final examination.
Grades will be based on performance on problem sets (50%), final exam (45%), and class
participation (5%). Late problem sets will incur a penalty of –10% per day late. The last problem
set must be submitted on-time; it will not be accepted if late.
Information regarding the schedule and location of the final exam will be available at https://registrar.berkeley.edu/scheduling/academic-scheduling/final-exam-guide-schedules. Please do not ask me or the GSI when or where the final is. We assume no responsibility for erroneous information if you ask us when/where the final is, as any information we give you on this matter can only be weakly less accurate than what is on the Registrar website.

Statistical Software

You may use any software that you wish, but solutions for problem sets will be handed out in Stata and R. Demonstrations during lectures will also be conducted in Stata or R. In the long run, if you are doing applied microeconometrics, you will almost surely end up using one of these two packages. However, in some problem sets it will be recommended that you use Stata’s or R’s more primitive commands, or the Mata language, rather than the “canned” commands.

Textbooks and Notes

The course is not based on any one text, but Guido Imbens’ formal econometrics notes (both from a previous iteration of ARE 213 and from a NBER econometrics course) will form a core reference. The course will also make reference to the three textbooks listed below. At a minimum, I recommend purchasing the Mostly Harmless Econometrics text. It is mostly harmless.

- [WNE] Imbens, Guido and Jeffrey Wooldridge (2007). What’s New In Econometrics, NBER Summer Course.

Classroom Climate

We are all responsible for creating a learning environment that is welcoming, inclusive, equitable, and respectful. If you feel that these expectations are not being met, please consult your instructors, or seek assistance from campus resources (please see Academic Accommodations).

Accommodations

Students with DSP accommodations should have the DSP office inform the instructor within the first three weeks of classes. In general it is logistically infeasible to grant
last-minute requests for accommodations just prior to exams or assignment due dates. The purpose of academic accommodations is to ensure that all students have a fair chance at academic success. Disability, or hardships such as basic needs insecurity, uncertain documentation and immigration status, medical and mental health concerns, pregnancy and parenting, significant familial distress, and experiencing sexual violence or harassment, can affect one’s ability to satisfy particular course requirements. Students have the right to reasonable academic accommodations, without having to disclose personal information to instructors, and thus arrangements should be made via DSP. For more information about accommodations, scheduling conflicts related to religious creed or extracurricular activities, please see Academic Accommodations.

**Course Outline**

1. Introduction

   A. Ordinary Least Squares and Agnostic Regression (8/25 & 8/27)

      *CT Chapters 4.1 - 4.5.*

      *JW Chapter 2.*

      *AP Chapter 3.1.*


   B. Introduction to Causality and Research Design (8/30 & 9/1)

      *CT Chapter 2.*

      *AP Chapters 1 - 2.*

      *WNE Lecture 1, Section 2.*


C. Cautionary Notes (9/3 & 9/8)


2. Selection on Observables Designs

A. Regression Adjustment (9/10, 9/13, & 9/15)

*CT* Chapters 4.1 - 4.5.

*AP* Chapter 3.2.

*WNE* Lecture 1, Section 3.1.

*JW* Chapters 4, 18.3.1.


CT Chapter 9.


B. Nonparametric regression (9/17, 9/20, & 9/22)

CT Chapter 9.


C. The Propensity Score and Dimensionality Reduction (9/24, 9/27, 9/29, & 10/1)

CT Chapter 25.4.

AP Chapter 3.3.

WNE Lecture 1, Sections 3.2 - 3.4 and 5 - 7.

JW Chapter 18.3.2.


3. Selection on Unobservables Designs

A. Panel Data Models

i. Classical Panel Data Models (10/4, 10/6, 10/8, & 10/11)

*CT* Chapter 21.

*AP* Chapter 5.1.

*JW* Chapter 10.


ii. Double/Triple Differences and Event Studies (10/13, 10/15 & 10/18)

*CT Chapter 22.6, 25.5.*

*AP Chapter 5.2.*

*WNE Lecture 10.*


iii. Case Studies with Synthetic Controls (10/20 & 10/22)


B. Instrumental Variables Models

i. The IV Estimator (10/25 & 10/27)

*CT Chapter 4.8.*

*AP Chapter 4.1 - 4.3.*

*JW Chapter 5.*


ii. Heterogeneous/Marginal Treatment Effects (10/29, 11/1, & 11/3)

*CT* Chapter 25.7.

*AP* Chapter 4.4 - 4.5, 4.6.3.

*WNE* Lecture 5.

*JW* Chapter 18.4.


iii. 2SLS and Weak Instruments (11/5 & 11/8)

*CT* Chapter 4.9.

*AP* Chapter 4.6.4.

*WNE* Lecture 13.


iv. Control Function Approaches (11/10)

*CT* Chapter 25.3.4.

C. Regression Discontinuity Designs (11/12, 11/15, & 11/17)


4. The Problem of Statistical Inference

A. Temporal and Spatial Dependence (11/19 & 11/22)

*CT* Chapter 24.5.

*AP* Chapter 8.2.


B. Randomization Inference (11/29)


C. Resampling (12/1)

*CT* Chapter 11.


D. Multiplicity Adjustment (12/3)


5. Additional Topics (not covered in lecture)

A. Maximum Likelihood Estimation

*CT* Chapters 5.1 - 5.3, 5.6, 5.7.

*JW* Chapter 13.

B. Duration Models

*CT* Chapter 17.

*JW* Chapter 20.