Econometric Data Science develops the knowledge and skills needed to understand empirical economic research and to plan and execute empirical projects. Topics include randomized trials, regression, instrumental variables, differences-in-differences, regression-discontinuity designs, and simultaneous equations models.

Prerequisites

Econometrics builds on the basic tools of probability and statistics, as taught in 14.30 or similar. Our econometrics journey begins with a brief prob-stats refresher (just in case).

Course requirements

Eighty percent of success is showing up – Woody Allen

Classroom work:

Two lectures (MW 10:30-12:00; E51-395 or virtual) and weekly recitation (F 9:00; E51-395 or virtual). Graduate and undergraduate recitations may meet separately. We’ll also schedule computer labs throughout the semester.

As an incentive to show up, we take roll, marking attendance for those online as well as in-class. Classwork includes four pop quizzes and randomly assigned opportunities to share your understanding of econometric research with the class.

Written work:

Six graded problem sets and ungraded review problem sets at the beginning and end of the course. Problem sets include theoretical and data-analysis questions. The latter are to be answered using Stata, the lingua franca of applied econometrics. Classes focus on concepts and econometric applications rather than programming. Help for new Stata users is provided in computer lab and office hours.

The mandatory in-class midterm is scheduled for class time MONDAY OCTOBER 19, 2020. We’ll have a registrar-scheduled final during exam week.

14.320 students are asked to complete an ungraded capstone project. This is due Monday, December 21.

Grades

Grades are based on a point score, computed as follows: 50 points for problem sets (5 each for the first two, 10 each thereafter), 20 points for the midterm, 30 points for the final, plus 25 bonus points.

Bonus points are awarded as follows: up to 9 points for showing up (.375 for each class attended after the first; on-time arrival required), 4 each for 4 pop quizzes (absent or late counts as zero).
The P-set Deal

Graded problem sets are mandatory; solutions must be submitted on time (with Stata logs) to receive credit. Consult with classmates or your instructors if you get stuck, but solutions must be your own work.

Comportment

Are you a strategically adept time-manager in the grand MIT tradition? If so, 14.32 is probably not for you. Like most things worth doing, econometrics requires focus and commitment.

In this spirit, I ask you not to bring food to class (whether you’re attending in-person or online) and to leave electronics shut off and put away except as needed for online participation.

Although lecture recordings will be posted, the class is offered synchronously. Online participants (this is everyone in the first and last weeks of term) are asked to join from a quiet, non-distracting location in full classroom dress. Online participants are required to have Zoom video on and should be prepared to participate as if attending in person.

Texts and readings

We rely heavily on instructor notes, distributed in class. Our text is:


Occasional, more advanced material comes from:


Journal articles and selected additional readings are posted on Canvas, our course management platform. We’ll also take advantage of Canvas’s integration with Piazza and Gradescope, using Gradescope for exams as well as problem sets.

Our texts are inexpensive paperbacks, and may be rented for less than $10 for the term.

Computer work

14.32 students can access cloud-based Stata. Please check with our TAs for info on set-up.

Staff

Clemence Idoux is our grad student TA, responsible for recitation and course management.

Kiara Wahnschafft will also TA, with special responsibility for technology as we pilot a new hybrid instructional model.

Luke Stewart is our Stata TA and Pset grader.

Staff will hold weekly office hours online.
COURSE OUTLINE FOR 14.32

What’s it all for? Look ahead by reading:

MM, Introduction
MHE, Chapter 1


A. STATISTICAL TOOLS

Lecture Note 1: Expectation and Moments
Lecture Note 2: Sampling Distributions
Lecture Note 3: Confidence Intervals
Lecture Note 4: Statistical Inference in Asymptopia

MM, Chapter 1 Appendix


B. ANALYSIS AND INTERPRETATION OF RANDOMIZED TRIALS

Lecture Note 5: Causality and Potential Outcomes

MM, Chapter 1
MHE, Chapter 2


C. REGRESSION BASICS

Lecture Note 6: Regression is a Many-Splendored Thing
Lecture Note 7: Intro to Multivariate Regression
Lecture Note 8: Multivariate Regression (cont.) – Omitted Variables, Short vs. Long
Lecture Note 9: The Sampling Distribution of Regression Estimates
Lecture Note 10: Residuals, Fitted Values, and Goodness of Fit

MM, Chapter 2
MHE, Sections 3.1 (through 3.1.3), 3.2 (through 3.2.2), and 3.4.3
ALO (2009) and AOW (2014) listed under Part A.


-- approximate midterm date --

**D. USING MULTIVARIATE REGRESSION**

Lecture Note 11: Modeling with Multivariate Regression Models

MM, Chapter 2 Appendix
MHE, Section 3.1.4


Lecture Note 12: Standard Standard Error Issues

MM, Chapter 2 Appendix
MHE, Section 3.4.1


**E. OMITTED VARIABLES SOLUTIONS**

Lecture Note 13: Instrumental Variables and 2SLS for Omitted-Variable Problems

MM, Chapters 3 and 6
MHE, Sections 4.1 and 4.6.1


Lecture Note 14: Panel Data, Fixed Effects, and IV for Measurement Error

MM, Chapter 6.


Lecture Note 15: Doing Diffs-in-diffs

MM, Chapter 5
MHE, Section 5.2


F: MORE ‘METRICS MAGIC (TIME PERMITTING)

Lecture Note 16: RD in Action

MM, Chapter 4
MHE, Chapter 6


Lecture Note 17: Simultaneous Equations Models