

University of San Francisco Department of Economics
Econ 620-03 : Graduate Econometrics I
Spring 2023
W 6:30-9:15pm
Th 5-5:55pm virtual lab

Instructor: Professor Jesse K. Anttila-Hughes

CLASS DESCRIPTION AND OVERVIEW:

Economics 620-03, Graduate Econometrics, is the first course in the three-semester MS-IDEA graduate econometrics sequence at USF. This class covers the foundational concepts and techniques of modern econometrics, the specialized subset of statistical techniques particularly useful to economists, with a particular eye on research design. The primary goal of this class is to introduce students to the work horse model of modern applied econometrics, the ordinary least squares or OLS regression model, and familiarize them with the basic issues related to applying it to real world problems and interpreting results. Special attention will be paid to issues surrounding research design, interpretation, causal inference, standard error pitfalls, and practical applications. I will presume that all students have at least a basic understanding of statistics and probability theory, though the beginning of the class will include refresher material on these topics. There is a one-hour lab in addition to lecture held every week that will focus on practical code-related implementation issues.

This class will move through a large body of material fairly quickly; please make sure that you keep up with readings and lectures, allow yourself plenty of time to complete problem sets and study for exams, etc. I meanwhile will try to make the process of doing so as engaging and enjoyable as possible. I am a firm believer in both constructive criticism and human fallibility, so I urge you to let me know if you have any questions, concerns, or suggestions regarding either the material we will cover or the class in general.

COURSE LEARNING OUTCOMES:

By the end of this course, students will be able to:

1. Evaluate the basic epistemological nature of statistical problems, and understand what kinds of questions statistical inference can and cannot be used to solve. This is achieved through both lecture slides guiding students through models and real-world examples from papers and case studies, as well as in the readings and on problem sets and exams.
2. Apply statistical models and techniques to answer econometric problems both in class, on problem sets, and on exams.
3. Critique empirical research and develop understandings of empirical research. This is done through using extensive specific examples of findings and papers to tie abstract conceptual problems in research design and statistical practice to specific, identifiable instance and problems.

4. Write code using the standard statistical software, STATA, to perform statistical analyses and data manipulation, and be introduced to doing the same in R. This is a heavily emphasized portion of the class and problem sets, and represents one of the major learning objectives of the IDEC program.
5. Build a solid foundation in econometric theory for the remainder of the IDEC program and following classes, including basic research design problems and understanding tensions in data analysis before going afield for summer thesis research

MS- IDEC PROGRAM LEARNING OUTCOMES:

Primary Program Goal: To train Master's students as empirical economic researchers so that they are capable of carrying out fieldwork, econometric analyses of policies and programs related to international and development economics, and displaying these competencies in high-quality research papers and oral presentations.

1. Students will be able to define an economics research question appropriate to a topic of interest.
2. Students will be able to review and synthesize the existing theoretical and empirical literature in a given field of research.
3. Students will be able to design appropriate field research strategies for collecting primary data on a topic related to international and development economics.
4. Students will acquire the econometric skills required to rigorously analyze a broad range of types of data, be able to run appropriate econometric tests, and diagnose statistical problems in estimation.
5. Students will be able to tie statistical methods to microeconomic and macroeconomic theory and the literature in international and development economics, interpret econometric results, and discern the conditions under which estimations are able to yield causal relationships.
6. Students will be able to infer implications and policy conclusions from their research for other international economists, policy makers, and development practitioners.
7. Students will be able to communicate at an excellent level, both in writing and verbally, recognizing that good economic research involves not only effective technical skills but effective means of listening and responding to criticism and communicating results.

READINGS AND RESOURCES:

Text: The primary material for this class is Jeffrey M. Wooldridge's Introductory Econometrics: A Modern Approach, 7th edition. It is available both in the USF bookstore and on Amazon.com. I will also draw heavily from a variety of PDFs that I will upload to Canvas, notably including James, Witten, Hastie, and Tibshirani's An Introduction to Statistical Learning with Applications in R.

Stata: A significant portion of class assignments will involve the analysis of actual data using Stata statistical software. I have arranged for student discount copies of Stata to be available for this course; they can be acquired by going to <http://www.stata.com/coursegp> and specifying the GradPlan ID "MJ320" in the Student ID field. Also note that although data for each problem set will

be posted with the problem set, all data files used in the textbook assignments can be found at this url: http://academic.cengage.com/resource_uploads/downloads/1111531048_364888.zip

Canvas: I will post assignments, papers, supporting material for the course, etc. on Canvas throughout the semester. Please remember to check Canvas regularly for announcements

COURSE REQUIREMENTS:

Class Attendance and Participation: Students are expected to attend all lectures and labs. Failure to attend class in a consistent manner may result in punitive measures, and more importantly will likely impact your success in the class. Econometrics is not an easy subject, and we will be covering material in class that is not covered in any of the texts or readings.

Class participation is expected and strongly encouraged. Please feel free to raise your hand and ask me a question at any point during my lectures, and don't be surprised if I ask you the occasional direct question. Conversely, I understand that students have different levels of comfort as far as public speaking is concerned, so if you feel intimidated asking a question in front of the class I ask that you please feel welcome to either come to my office hours or email me directly.

Problem Sets: Problem sets are due at or before the beginning of class on the day they are due. Problem sets are intended to help you learn the material and practice for the exams, so I strongly recommend that you devote sufficient time to them. Please feel free to talk with other students about problem set problems, review online resources related the questions, etc. but do not simply copy answers from other students or the internet. I consider this to be a form of academic honesty (see below) and take it very seriously.

Exams: Both the midterm and the final will be cumulative, and will echo the problem sets and quizzes in content and structure. There will be absolutely no make-up exams. If you miss the midterm due to a documentably legitimate absence, I will reweight your grade so as to exclude the midterm. If you miss the final you will be given an incomplete for the course. Exams start promptly at the beginning of class, so to ensure that you and your classmates have enough time to complete the exam I ask that you arrive at the classroom no later than 5 minutes before the start of class on the day of the exam. No extra time may be given to students who arrive late to class on the day of an exam.

Grading: The grade distribution for the class will be as follows:

- 10 - 12 Problem sets (drop lowest 2): 35%
- Class participation: 10%
- Midterm exam: 25%
- Final exam: 30%

I reserve the right to adjust final grades up or down by a reasonable amount for appropriate reasons.

ACADEMIC HONESTY: I take academic dishonesty very seriously. Cheating on exams, copying homework answers from other students, reproducing online or other material without citation, and similar offenses can result in penalties ranging from a zero grade for the assignment to a failing grade

for the class and referral to the Dean's office. If you are in doubt about the academic appropriateness of a given action, I encourage you to ask me.

GENERAL CLASSROOM ETIQUETTE:

- Please come to class on time. If you are consistently late to class or late then I will speak with you about the matter; repeat offenders may see their grades penalized.
- I expect everyone in the class to be polite and respectful of everyone else. Please feel free to approach me if you feel that anyone in the class (including myself or the TA) is not holding his or herself to this rule.
- 2021 is a historically unprecedented time. Please be extra patient and understanding with each other, and I will strive to do the same. Reach out if I can help with anything in class or out, and when in doubt, just email.
- This class is intended for live, in-person teaching. If you are unable to attend the class live over Zoom please let me know so we can work out a way to make sure you stay engaged and learning this difficult subject.

NOTABLE DATES:

Wed, Jan 25th : First day of class

Feb 10th : USF census date (*last day to drop classes with a refund*)

Mar 13-17th : Spring break, no class

Mar 22nd : **Tentative due date for take home midterm**

April 10th : drop / withdraw deadline

May 11th : Last Day of Classes

Mon, May 19th: **Tentative date for final exam**

LIST OF TOPICS:

Lecture 1 - Introduction to econometrics

Readings

Wooldridge Ch. 1

Angrist and Pischke – 2017 – Undergraduate Econometrics Instruction - Through Our Classes, Darkly

Supplemental

Gentzkow and Shapiro - 2014 - Code and Data for the Social Sciences

James et al. - ISLR Ch. 1

Lecture 2 - Review of probability

Readings

Wooldridge Appendix B

Seeing Theory: <https://seeing-theory.brown.edu/>

Supplemental

Wei Cai – Chapter 3 and 4 on Probability

Grinstead and Snell's Introduction to Probability

Lecture 3 - Review of Statistics

Readings

Wooldridge Appendix C

Supplemental

ISLR Ch. 2

Torres-Reyna - Stata Tutorial (2007)

R for Data Science – Section I – Explore <https://r4ds.had.co.nz/introduction.html>

Lectures 4-5 – Univariate and Multivariate OLS

Readings

Wooldridge Ch. 3

ISLR Ch. 3

Lecture 6 – Statistical Inference

Readings

Wooldridge Ch. 4

Rojas - 2010 - Why the Normal Distribution?

Lecture 7 – Asymptotic Inference

Readings

Wooldridge Ch. 5

Lectures 8-9 – Causal inference

Readings

Angrist and Pischke - 2010 - The Credibility Revolution in Empirical Economics

Romer - 2016 - The Trouble with Macroeconomics

Calin-Jageman and Cumming - 2018 - The New Statistics for Better Science

Lecture 10 – Functional Form I: Interpretation

Readings

Wooldridge Ch. 6

Lecture 11 - Functional Forms II: Indicator Variables and Fixed Effects

Readings

Wooldridge Ch. 7

ISLR Ch. 7

Blumenstock: <http://www.jblumenstock.com/files/courses/econ174/FEModels.pdf>

Lecture 12 – 13 - Heteroscedasticity and Specification Issues

Readings

Wooldridge Ch. 8, 9

ISLR Ch. 6

Shmueli - 2010 - To Explain or to Predict

Bertrand, Duflo and Mullainathan - 2004 - How Much Should We Trust Differences-In-Differences Estimates?

Athey and Imbens - 2019 - Machine Learning Methods Economists Should Know About

Lecture 14 –Basics of Panel Data and Times Series

Readings

Wooldridge Ch. 10

Stock and Watson - 2017 - Twenty Years of Time Series Econometrics in Ten Pictures

Torres-Reyna: <https://www.princeton.edu/~otorres/Panel101.pdf>

Lecture 15 - Review