



Department of Economics  
University of Southern California

### **ECON 513: Practice of Econometrics**

#### **Course Information**

**Time and Location:** Monday, Wednesday: 8:00 - 9:20 am

**Location:** SSL 202

**Instructor:** Dong Woo Hahm ([dongwooh@usc.edu](mailto:dongwooh@usc.edu))

**Office Hours:** Mondays 10 am-12 pm at KAP 304 or via Zoom

#### **Teaching Assistant**

**TA:** Hai Zhou

**Office hours:** TBD

**Email:** haizhou@usc.edu

#### **Course Overview**

This course is an introduction to econometrics at a master's level. Econometrics refers to statistical tools used by economists to measure the relationships between various economic variables using data. After completing this course, students should be able to model econometric relationships, estimate and test these models, and interpret and use the estimation results for prediction and policy evaluation. After reviewing basic probability theory and statistics, we will start with the classical linear regression model, which is commonly used and forms the basis for many different econometric models. Next, we will address the endogeneity problem, which affects the causal interpretation of regression estimates in many applied economics studies. Then, we will discuss the Instrumental Variables (IV) approach, which is designed to tackle the endogeneity problem. We will then move on to various topics, including nonlinear regression models, time series and panel models, moment condition models, nonparametric regression models, and bootstrapping. The final part of the course will cover causal inference methods, designed to estimate treatment effects. This course assumes a basic knowledge of undergraduate-level econometrics, linear algebra, and statistics. However, all necessary linear algebra, statistics concepts and tools will be covered during the first part of the lectures.

#### **Course Requirements**



- Assignments (20%): Problem sets will include analytical problems and sometimes empirical problems that involve computing using Stata.<sup>1</sup> Your lowest problem set grade will be dropped, allowing you to miss one with no questions asked. However, it is recommended that you attempt all the problem sets. Suggested solutions to all problems will be provided and uploaded one week after the due date. Late submissions (after the due date and before the solution is uploaded) will be discounted by 30%. Any submission after the solution is uploaded will be ungraded and receive ZERO points. You are permitted to work in groups (up to two) on the problem sets and hand in ONE submission for the group. You must indicate the names of group members on your assignment. The problem sets will be graded by the TA on a 0-100 scale. I will randomly pick a few of the questions on each problem set for detailed grading. The remaining problems will be graded based on completion rather than correctness.
- Midterm examination (40%): Closed book. Scheduled on **10/9 Wed during regular class.**
- Final examination (40%): Closed book. Scheduled on **12/11 Wed 8-10 a.m.**<sup>2</sup>

**Textbooks**

I recommend having at least one graduate level econometrics textbook. The following three are pretty popular. The first two books are more formal and the third is more informal. None of the books cover all course material.

- *Econometric Analysis*, 8th edition, Pearson (March 30, 2017), William H. Greene
- *Econometric Analysis of Cross Section and Panel Data*, Second Edition, The MIT Press (October 1, 2010), Jeffrey M. Wooldridge
- *Mostly Harmless Econometrics: An Empiricist’s Companion*, Princeton University Press (Jan 4, 2009), Joshua D. Angrist and Jörn-Steffen Pischke

**Lecture Slides**

I will use slides for our classes, which will be uploaded prior to each lecture. In case of typos and errors, announcements will be made, and I will re-upload the slides. All materials covered in class and on the slides are subject to being asked on exams.

**Course Outline** (Note: subject to change throughout the semester.)

Week	Date	Topic	PS Due	Reference
Week 1	8/26	Introduction and review of probability and statistics, and basic linear algebra		Greene Ch. 1, App. A, B
	8/28			Wooldridge Ch. 2, 3

<sup>1</sup> You must submit the results AND the code you used to obtain your results. Stata is installed in all USC computing centers. See <https://itservices.usc.edu/how-to-stata/>. If you have other programs that you prefer (e.g. R or Python), you may use those.

<sup>2</sup> <https://classes.usc.edu/term-20243/final-examinations-schedule/>

Week 2	9/2	<b>Labor Day</b>		
	9/4	Classical Linear Regression Model I: Basics		Greene Ch. 2, 3, 4 Wooldridge Ch. 4
Week 3	9/9	Classical Linear Regression Model II: Finite-sample and asymptotic properties		Greene Ch. 4
	9/11		PS 1	
Week 4	9/16	Classical Linear Regression Model III: Robust estimation and inference		Greene Ch. 4, 5
	9/18			
Week 5	9/23	When Classical Linear Regression Model Fails – Endogeneity: measurement error, omitted variable bias, simultaneous equations		Greene Ch. 8 Wooldridge Ch. 5, 9
	9/25			
Week 6	9/30	Instrumental Variable Methods	PS 2	
	10/2	Maximum Likelihood Estimation (MLE)		Greene Ch 14 Wooldridge Ch. 13
Week 7	10/7	Nonlinear regression models: logit, probit, discrete choice, multinomial logit		Greene Ch. 7, 17, 18 Wooldridge Ch. 15, 16
	10/9	<b>Midterm Exam</b>	PS 3	
Week 8	10/14	Time series models		Greene Ch. 20
	10/16			
Week 9	10/21	Panel regression		Greene Ch. 11 Wooldridge Ch. 10
	10/23			
Week 10	10/28	Moment condition models		Greene Ch. 13 Wooldridge Ch. 14
	10/30		PS 4	
Week 11	11/4	Nonparametric regression models		Greene Ch. 7
	11/6			
Week 12	11/11	<b>Veterans Day</b>		
	11/13	Bootstrap	PS 5	Horowitz, J.L., 2001. The bootstrap. In Handbook of econometrics (Vol. 5, pp. 3159-3228). Elsevier.
Week 13	11/18	Causal inference: Estimating Average Treatment Effects		Wooldridge Ch. 21
	11/20			
Week 14	11/25	Regression Discontinuity Design	PS 6	Wooldridge Ch. 21
	11/27	<b>Thanksgiving Holidays</b>		
Week 15	12/2	Difference-in-Difference Regression		Greene Ch. 6 Wooldridge Ch. 6
	12/4	Review session	PS 7	
	12/11	<b>Final Exam (8-10 am)</b>		



## Statement on Academic Conduct and Support Systems

### Academic Integrity:

The University of Southern California is a learning community committed to developing successful scholars and researchers dedicated to the pursuit of knowledge and the dissemination of ideas. Academic misconduct, which includes any act of dishonesty in the production or submission of academic work, compromises the integrity of the person who commits the act and can impugn the perceived integrity of the entire university community. It stands in opposition to the university's mission to research, educate, and contribute productively to our community and the world.

All students are expected to submit assignments that represent their own original work, and that have been prepared specifically for the course or section for which they have been submitted. You may not submit work written by others or "recycle" work prepared for other courses without obtaining written permission from the instructor(s).

Other violations of academic integrity include, but are not limited to, cheating, plagiarism, fabrication (e.g., falsifying data), collusion, knowingly assisting others in acts of academic dishonesty, and any act that gains or is intended to gain an unfair academic advantage.

The impact of academic dishonesty is far-reaching and is considered a serious offense against the university. All incidences of academic misconduct will be reported to the Office of Academic Integrity and could result in outcomes such as failure on the assignment, failure in the course, suspension, or even expulsion from the university.

For more information about academic integrity see [the student handbook](#) or the [Office of Academic Integrity's website](#), and university policies on [Research and Scholarship Misconduct](#).

### Students and Disability Accommodations:

USC welcomes students with disabilities into all of the University's educational programs. [The Office of Student Accessibility Services \(OSAS\)](#) is responsible for the determination of appropriate accommodations for students who encounter disability-related barriers. Once a student has completed the OSAS process (registration, initial appointment, and submitted documentation) and accommodations are determined to be reasonable and appropriate, a Letter of Accommodation (LOA) will be available to generate for each course. The LOA must be given to each course instructor by the student and followed up with a discussion. This should be done as early in the semester as possible as accommodations are not retroactive. More information can be found at [osas.usc.edu](http://osas.usc.edu). You may contact OSAS at (213) 740-0776 or via email at [osasfrontdesk@usc.edu](mailto:osasfrontdesk@usc.edu).



## **Support Systems:**

[Counseling and Mental Health](#) - (213) 740-9355 – 24/7 on call

Free and confidential mental health treatment for students, including short-term psychotherapy, group counseling, stress fitness workshops, and crisis intervention.

[988 Suicide and Crisis Lifeline](#) - 988 for both calls and text messages – 24/7 on call

The 988 Suicide and Crisis Lifeline (formerly known as the National Suicide Prevention Lifeline) provides free and confidential emotional support to people in suicidal crisis or emotional distress 24 hours a day, 7 days a week, across the United States. The Lifeline is comprised of a national network of over 200 local crisis centers, combining custom local care and resources with national standards and best practices. The new, shorter phone number makes it easier for people to remember and access mental health crisis services (though the previous 1 (800) 273-8255 number will continue to function indefinitely) and represents a continued commitment to those in crisis.

[Relationship and Sexual Violence Prevention Services \(RSVP\)](#) - (213) 740-9355(WELL) – 24/7 on call

Free and confidential therapy services, workshops, and training for situations related to gender- and power-based harm (including sexual assault, intimate partner violence, and stalking).

[Office for Equity, Equal Opportunity, and Title IX \(EEO-TIX\)](#) - (213) 740-5086

Information about how to get help or help someone affected by harassment or discrimination, rights of protected classes, reporting options, and additional resources for students, faculty, staff, visitors, and applicants.

[Reporting Incidents of Bias or Harassment](#) - (213) 740-5086 or (213) 821-8298

Avenue to report incidents of bias, hate crimes, and microaggressions to the Office for Equity, Equal Opportunity, and Title for appropriate investigation, supportive measures, and response.

[The Office of Student Accessibility Services \(OSAS\)](#) - (213) 740-0776

OSAS ensures equal access for students with disabilities through providing academic accommodations and auxiliary aids in accordance with federal laws and university policy.

[USC Campus Support and Intervention](#) - (213) 740-0411

Assists students and families in resolving complex personal, financial, and academic issues adversely affecting their success as a student.

[Diversity, Equity and Inclusion](#) - (213) 740-2101



Information on events, programs and training, the Provost's Diversity and Inclusion Council, Diversity Liaisons for each academic school, chronology, participation, and various resources for students.

[USC Emergency](#) - UPC: (213) 740-4321, HSC: (323) 442-1000 – 24/7 on call

Emergency assistance and avenue to report a crime. Latest updates regarding safety, including ways in which instruction will be continued if an officially declared emergency makes travel to campus infeasible.

[USC Department of Public Safety](#) - UPC: (213) 740-6000, HSC: (323) 442-1200 – 24/7 on call

Non-emergency assistance or information.

[Office of the Ombuds](#) - (213) 821-9556 (UPC) / (323-442-0382 (HSC)

A safe and confidential place to share your USC-related issues with a University Ombuds who will work with you to explore options or paths to manage your concern.

[Occupational Therapy Faculty Practice](#) - (323) 442-2850 or [otfp@med.usc.edu](mailto:otfp@med.usc.edu)

Confidential Lifestyle Redesign services for USC students to support health promoting habits and routines that enhance quality of life and academic performance.