

Department of Economics, University of Southern California  
ECONOMICS 513, Practice of Econometrics

**Units:** 4  
**Term—Day—Time:** Fall 2022, Mon, Wed 4:00-5:50 pm.  
**Location:** LVL-17  
**Instructor:** Manochehr Rashidian, Personal zoom ID# 594 296 5704  
**Office Hours:** Mon, Wed 2:30-3:30 pm, KAP-116B  
If my office hours are not convenient for you, I am also available by appointment.  
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**TA:** TBD  
**Office hours:**

**Email:**

### Course Description and Overview

Econometrics is about quantifying economic relationships using mathematical methods and statistical inference. It involves using economic data to reveal economic relationships. Econometrics techniques have been increasingly used in macroeconomics and applied microeconomics. Macroeconomics data are used to test for theories, evaluate the impacts of public policies, estimate economic relationships, and forecast economic variables such as inflation rate, GDP growth rate, and interest rate. The application of econometrics to microeconomic is concerned with estimating relationships such as demand functions, cost functions, and profit functions. It also involves testing for underlying microeconomics theories and evaluating and forecasting the impacts of business decisions.

We will start with a brief overview of simple and multiple linear regression models. The main focus of the first part will be on assumptions of linear regression, estimation, interpretation of the parameter estimates, the goodness of fit, and testing for restrictions on parameters. I will present the necessary statistical theory for this part in the class. You can also find the topics in any of the following recommended introductory books:

Wooldridge, Jeffrey, *Introductory Econometrics, a Modern Approach* (5<sup>th</sup> or newer edition) \*  
Damodar Gujarati, *Econometrics by Examples* (2<sup>nd</sup> edition)\*  
Stock, and Watson, *Introduction to Econometrics*.  
Hill, C., W. Griffiths, and G. Judge. *Undergraduate Econometrics*.  
Ramanathan, Ramu, *Introductory Econometrics with Applications*.

The second part of the course will be modeling and estimating more advanced econometric relationships. This part will focus on models with discrete choice and limited dependent variables, models with multiple equations, and models for panel data. The second part will also discuss different estimation methods such as nonlinear least squares, maximum likelihood, the general method of moments, and nonparametric regression. I will review the theoretical part of each topic in class but not in great detail. My lecture will be mostly on estimation and interpretation of the results. For a more detailed explanation of the theory and a wide range of references, you should rely on any of the following advanced textbooks:

Greene W, H. *Econometric Analysis* (7<sup>th</sup> edition)\*  
Wooldridge, Jeffrey *Econometric Analysis of Cross Section and Panel Data*\*  
Maddala G, S. *Econometrics*

### Learning Objectives

This course is designed to provide the students with comprehensive knowledge of widely used econometrics models and estimation methods. After completing this course, students will be able to perform data collection tasks, modeling econometrics relationships, estimating and testing the model, and interpreting and using the estimation results for prediction and policy evaluation.

## USC Technology Support Links

If deteriorating covid conditions force the university to move the classes online, we will use Zoom for lectures and office hours and the Blackboard for exams and homework assignments. If you need help with Zoom or Blackboard, use the following technology support links:

[Zoom information for students](#)

[Blackboard Help for students](#)

[Software available to USC Campus](#)

## Computer Software Information

If you are familiar with any well-known software such as SAS, STATA, R, EVIEWS, SPSS, or R, you may use it for your assignments and classwork. Most of these software programs and instructions about using them are available on the network at USC. I will use STATA program for class demonstrations. If you like to have a copy of the STATA software, the student version (STATA/IC) is available on STATA website: <http://www.stata.com/order/new/edu/gradplans/student-pricing/#>

## Description and Assessment of Assignments and exams

The homework assignments and their due dates will be posted on the Blackboard. Homework assignments must be submitted on time (and preferably typewritten). In addition, a computer printout of the estimation results must be attached to the homework for all empirical assignments. There will be no credit for any late homework submitted after posting the solutions on the Blackboard. Students must turn in their assignments as instructed by their TA. Please let me know in advance if you need any special accommodations for submitting your assignment or taking the exam.

Students are also required to participate in a group project (term paper). The project involves data collection, model building, model estimation, and presenting the results. I will provide you with more information about the group project and its requirements in class. The group project is due two weeks before the final exam day.

We will also have two short exams and a final exam. The short exams are usually during the 5<sup>th</sup> and 10<sup>th</sup> weeks of instruction. The exact dates of the short exams will be announced in class at least two weeks in advance. The final exam is on **Wednesday, May 11<sup>th</sup>, 2:00-4:00 pm.**

## Grading Breakdown

<u>Activity</u>	<u>Percentage of Grade</u>
Assignments	20%
Exam 1	15%
Exam 2	15%
Group Project	20%
<u>Final exam</u>	<u>30%</u>
Total	100%

### Weekly readings and References

Week	Topics	References
Week 1	Review of basic concepts Random variables and their probability distribution, Joint, marginal and conditional distributions Review of continuous and discrete distributions	<i>Wooldridge intro- Appendix B</i> <i>Green- Appendix B</i>
Week 2	Random sampling and Sampling distribution Review of statistics Small and large sample properties of estimators. Review of hypothesis testing and confidence intervals Alternative methods of estimation  Introduction to econometrics modeling, the structures of economic data	<i>Wooldridge intro- Appendix C</i> <i>Green- Appendix C</i>  <i>Wooldridge intro- chapter 1</i> <i>Gujarati- Chapter 1</i> <i>Green- Chapter 1</i>
Week 3	The classical simple linear regression model Assumptions and properties of the simple linear regression model  Classical multiple linear regression Least-squares estimation Multiple linear regression assumptions Small sample properties of least square	<i>Wooldridge intro- Chapter 2</i>  <i>Wooldridge intro- Chapters 3</i> <i>Gujarati- Chapter 2</i> <i>Green- Chapter 2, and 3.1-3.2</i>
Week 4	Multicollinearity and its consequences  Inference in multiple linear regression Testing multiple restrictions (Wald, LM, and LR)	<i>Wooldridge intro- Chapter 3</i> <i>Gujarati- Chapters 4</i>  <i>Wooldridge intro- Chapter 4</i> <i>Gujarati- Chapter 2</i> <i>Green- 5.1-5.6</i>
Week 5	Econometrics modeling using logarithmic and other functional forms Making predictions	<i>Wooldridge intro-Chapter 6</i> <i>Gujarati- Chapter 2</i> <i>Green- Chapter 6</i>
Week 6	Models with qualitative independent variables Testing for the structural break Linear probability model	<i>Wooldridge intro-Chapter 7</i> <i>Gujarati- Chapter 3</i> <i>Green- Chapter 6</i>
Week 7	Regression issues IV estimation, and 2SLS Omitted variables Endogeneity problem Measurement errors Stochastic Regressors	<i>Wooldridge intro- Chapter 15</i> <i>Gujarati- Chapters 5 and 7</i> <i>Green- Chapters 8</i>
Week 8	Heteroskedasticity and its consequences Robust inference Tests of heteroscedasticity Estimation with heteroscedasticity (WLS and FGLS) Generalized regression model	<i>Wooldridge intro- Chapter 8</i> <i>Gujarati- Chapters 5</i> <i>Green- Chapters 9</i>

Week 9	Time series analysis Time series assumptions Trend, seasonality, and spurious regression  Serial correlation and properties of OLS Testing for serial correlation, Correcting for serial correlation, FGLS, and iterative FGLS methods Testing and correcting for higher-order serial correlation Robust inference with serial correlation	<i>Wooldridge intro- Chapters 10 Gujarati- Chapters 14</i>  <i>Wooldridge intro- Chapters 12 Green- Chapter 20</i>
Week 10	Heteroscedasticity in time series Autoregressive conditional Heteroskedasticity (ARCH and GARCH) models	<i>Green- Chapter 20 Gujarati- Chapters 15</i>
Week 11	System of equations, Seemingly unrelated regression (SUR) system, OLS and GLS estimation of SUR System	<i>Green- Chapters 10 Gujarati- Chapters 21 Woodridge- Chapters 7</i>
Week 12	Simultaneous equation models Dealing with the identification problem Single equation estimation of the simultaneous equation model System methods of estimation	<i>Wooldridge intro- Chapter 16 Green- Chapters 10 Woodridge- Chapters 8, 9</i>
Week 13	Models of panel data, Pooled regression model, Fixed and random-effects models	<i>Wooldridge intro- Chapter 14 Gujarati- Chapter 17 Green- Chapter 11 Woodridge- Chapter 10</i>
Week 14	Binary response models, Logit and Probit model, Discrete choice Models, Multinomial logit model, Limited dependent variable models	<i>Wooldridge intro- Chapter 17 Gujarati- Chapters, 8, 9, 10 Woodridge- Chapter 15 Green- Chapters (17, 18 and 19 applied to panel data. Very advanced treatment)</i>
Week 15	Nonparametric estimation	<i>Green- Chapter 20 Handouts</i>

### **Policy on Missed Exams**

Students must take the exams as scheduled. There will be no make-up exams unless the student has a valid medical excuse and can provide documentation for such a reason, or if a student cannot take the exam because of extenuating circumstances, and prior arrangements are made with the instructor. Students will receive zero credit for unexcused missed exams. The student will receive an F for the course if the final exam is missed for unexcused absence regardless of the student's performance during the semester. If a student has a valid reason for missing the final exam and can document it, they will receive an incomplete grade.

### **Academic Conduct**

Plagiarism – presenting someone else's ideas as your own, either verbatim or recast in your own words – is a serious academic offense with serious consequences. Please familiarize yourself with the discussion of plagiarism in *SCampus* in Section 11, *Behavior Violating University Standards* <https://scampus.usc.edu/1100-behavior-violating-university-standards-and-appropriate-sanctions/>. Other forms of academic dishonesty are equally unacceptable. See additional

information in *SCampus* and university policies on scientific misconduct, <http://policy.usc.edu/scientific-misconduct/>.

Discrimination, sexual assault, and harassment are not tolerated by the university. You are encouraged to report any incidents to the *Office of Equity and Diversity* <http://equity.usc.edu/> or to the *Department of Public Safety* <http://capsnet.usc.edu/department/department-public-safety/online-forms/contact-us>. This is important for the safety of whole USC community. Another member of the university community – such as a friend, classmate, advisor, or faculty member – can help initiate the report, or can initiate the report on behalf of another person. *The Center for Women and Men* <http://www.usc.edu/student-affairs/cwm/> provides 24/7 confidential support, and the sexual assault resource center webpage [sarc@usc.edu](mailto:sarc@usc.edu) describes reporting options and other resources.

### **Support Systems**

A number of USC's schools provide support for students who need help with scholarly writing. Check with your advisor or program staff to find out more. Students whose primary language is not English should check with the *American Language Institute* <http://dornsife.usc.edu/ali>, which sponsors courses and workshops specifically for international graduate students. *The Office of Disability Services and Programs* [http://sait.usc.edu/academicssupport/centerprograms/dsp/home\\_index.html](http://sait.usc.edu/academicssupport/centerprograms/dsp/home_index.html) provides certification for students with disabilities and helps arrange the relevant accommodations. If an officially declared emergency makes travel to campus infeasible, *USC Emergency Information* <http://emergency.usc.edu/> will provide safety and other updates, including ways in which instruction will be continued by means of Blackboard, teleconferencing, and other technology.