UC San Diego

Economics 120B: Econometrics B
Summer Session 1, 2020

Lectures: Tuesdays/Thursdays 5-7:50pm
Discussions: Wednesdays 5-6:50pm

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Office Hours: Tuesdays/Thursdays 1-2pm and by apt, through Zoom via Canvas

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Office Hours: Fridays 10-noon**,** through Zoom via Canvas

Course Description

Basic econometric methods, including the linear regression, hypothesis testing, quantifying uncertainty using confidence intervals, and distinguishing correlation from causality. ***Prerequisites:*** ECON 120A or ECE 109 or MAE 108 or MATH 180A or MATH 183 or MATH 186.

This course aims to prepare students for practical empirical research in an academic or business setting. It covers the fundamentals of regression analysis, including estimation and hypothesis testing in a multivariate framework. The course also briefly covers advanced concepts such as heteroskedasticity, fixed effects, and omitted variable bias. An emphasis will be placed on determining when causal relationships can be inferred from data.

The material can be difficult and the workload substantial, particularly for people who find math courses challenging. However, your payoff for all this work is a set of skills and analytical tools that are extremely useful and in high demand. And remember, we're here to make sure everyone has the resources and support to succeed!

Course Outline

Lectures will be organized by the following sections. We will spend 1 to 2 lectures on each section, with guidance on exact timing as we progress. The relevant reading and EVH (explained below) videos are listed.

Section 1: Introduction, Why Study Econometrics, Review of Probability and Statistics

Reading: Stock & Watson Chapters 1, 2, 3
EVH sections: A-D
Topics: Who needs data anyway? If you had some, what would you do with it? Econometric models, parameter estimates, prediction and the testing of

economic theories. Probability, random variables, the normal distribution and the central limit theorem, inference, confidence intervals and hypothesis testing. Asymptotics of the sample mean.

Section 2: Single Variable Regression

Reading: Stock & Watson Chapter 4
EVH sections: E1 (particularly h)
Topics: Fitting a line through a cloud of points. Least squares, unbiased estimates, consistent estimates, R^2.

Section 3: Regression Hypothesis Testing and Confidence Intervals

Reading: Stock & Watson Chapter 5
EVH sections: F4
Topics: Confidence intervals and hypothesis testing of regression coefficients, heteroskedasticity.

Section 4: Causality and Multivariate Regression

Reading: Stock & Watson Chapters 6, 13
EVH sections: E2, F5.a-F5.d (except F5.e-F5.g)
Topics: Omitted variable bias, an ideal experiment, the second explanatory variable, interpreting coefficients, causality.

Section 5: Multivariate Hypothesis Testing and Confidence Intervals

Reading: Stock & Watson Chapter 7
EVH sections: F5.e-F5.g
Topics: Confidence intervals for multivariate parameters and predictions, hypothesis testing, single (t) vs multiple (F) tests, reporting results.

Section 6: Nonlinear Regression Functions

Reading: Stock & Watson Chapter 8
Topics: Modelling nonlinear functions, interaction terms between independent variables.

Section 7: Threats to Causality

Reading: Stock & Watson Chapters 9, 10
Topics: OVB, measurement error, fixed effects, sample selection, simultaneity.

Assessments

Assessment	Percent of Grade
2 Homework Assignments	20%
4 Quizzes	80%

Homework

Homework assignments are due July 17 and 31; questions and submission details are posted on Canvas. Assignments will be graded 0-3 as: 0 (no submission), 1 (minimal progress), 2 (substantial progress but incomplete), 3 (complete). You don't have to get all question right to get full credit, but you do need to make a substantive effort on each question.

While you're encouraged to discuss your approach to homework problems with peers, you are expected to draft and submit your own solutions. Submitting work done by other students or from outside sources is not acceptable.

Quizzes

Quizzes will be held live on Canvas. Aside from the intro quiz, the 4 main quizzes will be equally weighted and we will drop your lowest score. So your 3 best quizzes (not including the intro) will each be worth 26% of your grade. We will be proctoring via a group zoom session. The intro quiz is intended to gauge your incoming understanding of the prerequisite material: it will only be graded on completion and counts for just 2% of your grade.

Quiz	Planned Time (PDT)	% of grade
Intro Quiz	July 2, 5-5:30pm	2%
Quiz 1	July 9, 5-6pm	26%
Quiz 2	July 16, 5-6pm	26%
Quiz 3	July 23, 5-6pm	26%
Quiz 4	Aug 1, 7-8pm	26%

Lecture and Discussion

Lectures and discussion will all be hosted live on zoom, and recordings of each session will be shared in the Canvas "Media Gallery". Keeping up with these sessions is essential for succeeding in the course. We strongly encourage you to attend live if possible, as this gives you the opportunity to engage with the active learning exercises and ask questions as we go. Live attendance and engagement also help us gauge class comprehension and better prepare you for the quizzes.

Lectures will be held live 5-8pm Tuesdays and Thursdays. Discussion review sessions will be held on Wednesdays, 5-7pm weekly. The TAs will review key course concepts through practice problems in these sessions.

Course Materials and Tools

Textbook

The course textbook is *Introduction to Econometrics Fourth Edition*, by Stock and Watson. Readings from the book are assigned for each lecture and it's an excellent resource for previewing and studying the course material. We'll also do homework problems from the book. By taking this course, you are automatically opted into renting the textbook electronically through RedShelf (should be $22.38), which can be accessed through our course Canvas page. **If you don't want to pay for the RedShelf rental, you need to opt-out through RedShelf by Tuesday July 7.** If you opt to use a different version of the text, it's up to you to make sure the exercises and material line up with the fourth edition.

Econometrics Video Handbook

On the course Canvas homepage you'll find the Econometrics Video Handbook (EVH) under Review Videos. These videos offer a detailed review of key concepts in the 120 sequence, from our very own esteemed faculty. I encourage you to use them as an additional resource when studying for this course. Just note that we may use slightly different notation or framing when we cover the material in lecture.

Technology Requirements

Stata will be required to complete the 2 homework assignments for the course. Information on downloading Stata (for free), and resources for getting started, are posted on Canvas under "Text and Tools".

Additional Info

Academic Integrity

Academic Integrity is expected of everyone at UC San Diego. This means that you must be honest, fair, responsible, respectful, and trustworthy in all of your actions. Lying, cheating, or any other forms of dishonesty will not be tolerated because they undermine learning and the University's ability to certify students' knowledge and abilities. Thus, any attempt to get, or help another get, a grade by cheating, lying or dishonesty will be reported to the Academic Integrity Office and will result in sanctions. Sanctions can include an F in the class and suspension or dismissal from the University. So, think carefully before you act. Before you act, ask yourself the following questions: a: is my action honest, fair, respectful, responsible, and trustworthy, and b) is my action authorized by the instructor? If you are unsure, don't ask a friend, ask your instructor, instructional assistant, or the Academic Integrity Office. For any *suspected* integrity violations, we reserve the right to administer an individualized oral quiz to *validate* a quiz score.
You can learn more about academic integrity at academicintegrity.ucsd.edu.
(Source: Bertram Gallant, T. (2017). Teaching for integrity. UC San Diego Academic Integrity Office.)

Accessibility and Inclusion

We will do everything we can to make this class accessible and inclusive for all our students. If you require an accommodation for the course, please tell us as early as possible. If you have ideas on how to make the course more inclusive let us know, we'd absolutely like to work on incorporating them!

OSD: https://disabilities.ucsd.edu/.
Office of Equity, Diversity and Inclusion: https://diversity.ucsd.edu/
Additional student resources: https://ucsd.edu/campus-life/student-support.html

Subject to Change Policy

The details of this syllabus are subject to change as the class progresses. We will keep you informed about any changes to the course policies as they arise, and post a revised syllabus.