Department of Economics
University of California San Diego

Fall 2024

ECON 121
Applied Econometrics and Data Analysis
Syllabus

Time and place: Tuesday / Thursday, 9:30-10:50 a.m. in PETER 104
Tuesday / Thursday, 2:00-3:20 p.m. in DIB 121
Course webpage: https://canvas.ucsd.edu/courses/58747
Github repo (for notes, datasets, examples, problem sets): https://github.com/tomvogl/econ121

Professor: Tom Vogl
E-mail: tvogl@ucsd.edu
Office hours: Friday 3:00-5:00pm in SDSC E-194 and on Zoom (https://ucsd.zoom.us/my/tomvogl)

Teaching assistant: Regina Calles-Martinez
E-mail: rcallesmartnez@ucsd.edu
Problem set labs: Tuesday 6:00-7:00pm in SDSC E-129 on 10/8, 10/22, 11/5, 11/19, and 12/3
Wednesday 6:00-8:00pm in SSB 107 on 10/9, 10/23, 11/6, 11/19, and 12/4

COURSE DESCRIPTION

Theoretically develops extensions to the standard econometric toolbox, studies their application in scientific research, and applies them to data. Emphasis is on using techniques, and on understanding and critically assessing others' use of them. Requires practical work on the computer using a range of data from around the world. Topics include advanced regression analysis, maximum likelihood, discrete choice, nonparametric methods, causality, panel data, instrumental variables, and regression discontinuity designs. Prerequisites: ECON 120B and (ECON 120C or ECON 5).

TEXTBOOK

The course is based on lecture notes, posted on Canvas before each lecture. No textbook is required.

STATISTICAL COMPUTING

The course uses the statistical software package R and the integrated development environment RStudio. Download both here: https://posit.co/download/rstudio-desktop/. Here are some tips for help while you're coding:

- *Help files*: To learn how to use a function named `x`, type `help(x)` at the prompt.
- *Web resources*: Many websites provide additional help.
  - UCLA: https://stats.oarc.ucla.edu/r/
  - UCSD: https://ucsd.libguides.com/data-statistics/r
  - StackOverflow: https://stackoverflow.com/
  - Google "R how to …"
  - ChatGPT, but make sure you understand its code, which can sometimes be wrong.
- *Data examples from class*: The examples are helpful for problem sets. I post them to Github.

ASSIGNMENTS AND QUIZZES

The course assigns five **problem sets** involving analysis with R. Each has two components: code and written answers. For the code, you are encouraged to collaborate in groups of four or fewer. For the written answers, you must work independently. If your written answers are identical to a classmate's, you receive 0 points; repeating offenders will be reported to the Academic Integrity Office. You will submit both code and written answers in Gradescope. Late assignments are not accepted, but the lowest problem set grade is dropped.

The course assigns four academic articles as case studies, which have two associated assignments:

(i) **Group presentation**. You will be assigned to a group based on your stated preferences. The group will lead a discussion of the article in class.

(ii) **Quizzes**. Before we discuss each article in class, you will take a 5-question multiple choice quiz about the article. The lowest quiz grade is dropped.

FINAL EXAM

The **final exam** will be 3 hours long. It will mimic a problem set, providing you with a dataset and asking questions about it. It will be open book, and you can even use ChatGPT! But you will take it the classroom with a laptop (or at home, with self-proctoring on Zoom), and you may not communicate with anyone while taking it.

PARTICIPATION

Participation matters for your course grade, but it can take on many forms. Some students ask questions during lecture; others are more active during discussions about academic articles; and others come to office hours with thoughtful questions. The key is to demonstrate engagement.

ACADEMIC INTEGRITY

Academic Integrity means striving to learn the course material and not copying the work of others.

- For group presentations and problem set coding, academic integrity means working together and contributing to the group effort, **not** just waiting for everyone else to do all the work.
- For problem set write-ups, academic integrity means using your own words to demonstrate your understanding, **not** copying someone else's words or thoughts.
- For quizzes and the final exam, academic integrity means demonstrating your understanding of the course material and solving problems the way you think is best, **not** using others' notes as your own, looking at others' responses, or communicating with others during the exam.

Academic Integrity is important because it is fair and ensures the value of a UCSD diploma. We will grade fairly and report violations of academic integrity as needed.

GRADING

Letter grades will be assigned on a curve based on the weighted average of performance on deliverables. The curve will follow typical economics department standards. The curve can be adjusted to accommodate exceptional circumstances (e.g., a year with many high-performing students), but in practice, adjustments are rarely necessary in courses with more than 20 students.

Because grades are assigned on a curve, if you receive a low score on a quiz, assignment, or exam, you should check the distribution of scores before you panic; if it was hard, your low score may translate to a good letter grade. Assignments without much variance (e.g., a problem set on which everyone did well) will not strongly influence your final grade.

Grades are based on the following weighted average:

Participation: 4%
Group presentation: 4%
Quizzes (top 3/4): 12%
Problem sets (top 4/5): 40%
Final exam: 40%

CLASS SCHEDULE

Week 0 (9/26): Course Introduction

Week 1 (10/1, 10/3): Parameters and Estimators || Means, T-Tests, and Regressions
Thursday, 10/3: Group presentation preferences survey responses due

Week 2 (10/8, 10/10): Unequal Probability Sampling || Heteroskedasticity and Dependence
Thursday, 10/10: Problem Set 1 due

Week 3 (10/15, 10/17): Multivariate Models
Thursday, 10/17: Abramitzky, Ran, Leah Boustan, Elisa Jacome, and Santiago Perez. 2021. "Intergenerational Mobility of Immigrants in the United States over Two Centuries." *American Economic Review* 111(2): 580-608.
https://www.jstor.org/stable/27027697

Week 4 (10/22, 10/24): Maximum Likelihood || Binary Dependent Variables
Thursday, 10/24: Problem Set 2 due

Week 5 (10/29, 10/31): Panel Data
Thursday, 10/31: Braghieri, Luca, Ro'ee Levy, and Alexey Makarin. 2022. "Social Media and Mental Health." *American Economic Review* 112(11): 3660-93**.**
https://www.aeaweb.org/articles?id=10.1257%2Faer.20211218

Week 6 (11/5, 11/7): Causality
Thursday, 11/7: Problem Set 3 due

Week 7 (11/12, 11/14): Instrumental Variables
Thursday, 11/14: Aizer, Anna, and Joseph J. Doyle, Jr. 2015. "Juvenile Incarceration, Human Capital, and Future Crime: Evidence from Randomly Assigned Judges." *Quarterly Journal of Economics* 130(2): 759-803.
https://www.jstor.org/stable/26372613

Week 8 (11/19, 11/21): Regression Discontinuity Designs
Thursday, 11/21: Problem Set 4 due

Week 9 (11/26): Nonparametric Methods (REMOTE)
Tuesday, 11/26: Bleemer, Zachary, and Aashish Mehta. 2022. "Will Studying Economics Make You Rich? A Regression Discontinuity Analysis of the Returns to College Major." *American Economic Journal: Applied Economics* 14 (2): 1-22.
https://www.aeaweb.org/articles?id=10.1257/app.20200447

Week 10 (12/3, 12/5): Conclusion
Thursday, 12/5: Problem Set 5 due

Saturday, 12/7 (11:30 a.m. - 2:29 p.m.): Final Exam