

ECON 121
Applied Econometrics and Data Analysis
Syllabus

Time and place: Tuesday / Thursday, 9:30-10:50am @ PETER 102

Course webpage: <https://canvas.ucsd.edu/courses/68831>

Github repo (for notes, datasets, examples, problem sets): <https://github.com/tomvogl/econ121>

Professor: Tom Vogl

E-mail: tvogl@ucsd.edu

Office hours: Thursday 11:00am-12:00pm @ SDSC E-194 and <https://ucsd.zoom.us/my/tomvogl>

Teaching assistant: Regina Calles-Martinez

E-mail: rcallesmartnez@ucsd.edu

Problem set labs: Tuesday 5:30-7:30pm (10/7, 11/4, 11/18, 12/2 @ SDSC E-129), (10/21 @ Zoom)

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 Github before each lecture. No textbook is required.

ASSIGNMENTS AND QUIZZES

The course assigns **five problem sets** involving analysis with R. Each has two components: code and written answers. For code, you are encouraged to collaborate in groups of four or fewer. You may use AI, but you must limit yourself to packages, functions, and coding approaches discussed in class. For written answers, you must work independently. If your written answers are identical to a classmate's, you will receive 0 points. You will submit your 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. 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 AI! But you will take it in the classroom on a laptop (or at home with Zoom proctoring) and may not communicate while taking it.

PARTICIPATION

Participation matters for your course grade. You are expected to attend class, and we will check attendance occasionally. Beyond that, participation can take many forms. Some students ask questions during lecture; others are more active during discussions about academic articles; others come to office hours or problem set labs. The key is to demonstrate engagement.

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. The weighted average is 10% participation, 15% quizzes, 40% problem sets, and 35% final exam.

ACADEMIC INTEGRITY

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

- For problem set code, if you are working with a group, academic integrity means working together, **not** just waiting for others to do all the work. If you are relying on AI, academic integrity means using it to guide your code, **not** copying and pasting without thinking.
- For problem set write-ups, academic integrity means using your own words to demonstrate your understanding, **not** copying a classmate's or chatbot'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.

STATISTICAL COMPUTING

We will use **R**, **RStudio**, **R Markdown**, **tidyverse**, **fixest**, and **marginalEffects**.

- **R** is a statistical programming language.
- **RStudio** provides a convenient user interface for it.
- **R Markdown** is an R package that creates documents with text, code, and output.
- **tidyverse**, **fixest**, and **marginalEffects** are R packages for data analysis: data transformation/visualization, regression estimation, and postestimation computation.

Problem Set 1 will guide you through the setup process. Classroom examples will demonstrate all the programming tools you need for the problem sets, but here are a few additional resources:

- [R for Data Science](#) provides a general introduction to R and the tidyverse.
- [R Markdown: The Definitive Guide](#) has details on R Markdown.
- [ChatGPT](#) and [Claude](#) are good at coding in R, and you are welcome to use them for help.

CLASS SCHEDULE

Week 0 (9/25): Course Introduction

Week 1 (9/30, 10/2): Parameters and Estimators || Means, T-Tests, and Regressions

Week 2 (10/7, 10/9): Unequal Probability Sampling || Heteroskedasticity and Dependence

Thursday, 10/9: Problem Set 1 (Naming Trends in the United States)

Week 3 (10/14, 10/16): Multivariate Models

Thursday, 10/16: 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 (10/21, 10/23): Maximum Likelihood || Binary Dependent Variables

Thursday, 10/23: Problem Set 2 (Estimating the Returns to Education)

Week 5 (10/28, 10/30): Panel Data

Thursday, 10/30: 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 (11/4, 11/6): Causality

Thursday, 11/6: Problem Set 3 (Socioeconomic Determinants of Health)

Week 7 (11/11, 11/13): Instrumental Variables

Thursday, 11/13: 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 (11/18, 11/20): Regression Discontinuity Designs

Thursday, 11/20: Problem Set 4 (Effects of Head Start)

Week 9 (11/25): Nonparametric Methods (REMOTE)

Tuesday, 11/25: 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 (12/2, 12/4): Conclusion

Thursday, 12/4: Problem Set 5 (Effect of Military Conscription on Crime)

Saturday, 12/6 (3:00-5:59pm): Final Exam