

Syllabus

Ec141 - Econometric Analysis, Spring 2020

Course Description

This course provides a (sophisticated) introduction to identification, estimation and inference methods commonly used in economics. Both underlying theory and practical application will be emphasized. In addition to linear regression analysis, the method of instrumental variables and basic methods of panel data analysis will be introduced. Binary choice and survival analysis will also be introduced time permitting.

Instructor: Bryan Graham, 665 Evans Hall, email: bgraham@econ.berkeley.edu

Time and Location: Tuesday and Thursday, 11:00AM to 12:30PM, Barrows 170

Office Hours: Thursdays 2 to 3:40PM (sign up online here).

Graduate Student Instructor: Kevin Dano, e-mail: kdano@berkeley.edu

Prerequisites: Economics 100A-100B or 101A-101B or equivalent; Statistics 20, 21, 25, or 131A, or equivalent; and Mathematics 53 and 54, or equivalent. Linear/matrix algebra will be used freely in this course..

Course Webpage: This syllabus, and other instructional materials, can be found (or will be made available) on GitHub in the following repository

https://github.com/bryangraham/Ec_141

The GSI may make additional resources available on bCourses.

Textbook: There is no mandatory text. Material will be delivered primarily through lecture and assigned papers. *Good note taking is essential for successful performance in the class.* There are several books, entirely optional, which you may find as useful supplements to your course notes.

1. Goldberger, Arthur S. (1991). *A Course in Econometrics*. Cambridge, MA: Harvard University Press.
2. Wooldridge, Jeffrey M. (2016). *Introductory Econometrics: A Modern Approach*. Boston: Cengage Learning.
3. Stock, James H. and Watson, Mark W. (2015). *Introduction to Econometrics*. Boston: Pearson.

None of these books is required. The Goldberger (1991) text is now rather dated, but students have found the first thirteen chapters useful in the past. The Wooldridge (2016) and Stock & Watson (2015) books are standard undergraduate textbooks in econometrics and both have good coverage of the topics we will study this semester; however I will not “lecture” from either of these books. These are expensive books to purchase new. If you do elect to buy a book I suggest seeking out used and/or older editions.

Additional books which you may find helpful include Wasserman (2004) and Mitzenmacher & Upfal (2005). These are somewhat more technical.

Virtual Meetings: There will be no physical class meetings on February 6th and April 28th. Lecture will instead be delivered online using the Zoom video-conferencing software. This will occur (ideally) during the scheduled class meeting time. I will record the virtual lecture so that students can watch it at other times as well. Information on how to join the virtual class will be provided later.

Grading: Grades for the class will equal a weighted average of homework (40%), mid-term performance (50%) and scribing work (10%). There will be two in class midterm examinations; the first will be on March 10th, 2020 and the second on April 30th, 2020. Each midterm exam is graded on a scale from 0 to 100. I will only retain your highest midterm grade. Students that take both midterms (and get comparable/serious grades on both) will receive an additional bonus to their midterm grade component of 10 points. Consequently the highest available midterm aggregate is 110.

There will be 5 homework assignments. Homeworks are due at 5PM on the assigned due date (the GSI may elect to make small modifications to all things homework related). Homeworks are graded on a ten point scale with one point off per day late. You are free, indeed encouraged, to work in groups but each student must submit an individual write-up and accompanying Jupyter Notebook (when required; see below). Your lowest homework grade will be dropped, with the average of the remaining scores counting toward your final grade. There will be no ‘make-up’ midterms. I will add 5 points to homework aggregates for students who make serious efforts to complete all five problem sets (concretely this means that students may amass up to 45 homework points). The due dates for the five problem sets are:

Problem Set	Due Date
1	February 7th
2	February 28th
3	March 20th
4	April 10th
5	May 8th

Since there is no assigned textbook for the class, good note-taking is essential. To help everyone in this area each lecture will be assigned a few scribes. Scribes will take detailed

notes during lecture and then type up their notes (in LaTeX), making minor corrections and adding supplemental details/material as they feel needed (e.g., from the course readings). These typed notes will be made available to everyone in the class (likely via bCourses). This will be a group assignment and graded on a scale of 1 to 10.

Overall numerical course grades will be calculated as follows:

$$\text{Grade} = 40 \times \frac{\text{Homework Points}}{45} + 50 \times \frac{\text{Midterm Points}}{110} + 10 \times \frac{\text{Scribe Points}}{10}.$$

Numerical grades will be mapped into letter grades. A default mapping is 100 - 97 A+, 93 to 96 A, 90 to 92 A-, 87 to 89 B+, 83 to 86 B, 80 to 82 B- and so on. In practice grades are sometimes curved (particularly depending on the difficulty of the two midterms).

Computation: All computational work should be completed in Python. Python is a widely used general purpose programming language with good functionality for scientific computing. There are lots of ways of accessing Python. We will use <https://datahub.berkeley.edu> for computation. More information will be provided in section on how to access and use this platform. For those wishing to manage a Python environment on their personal computer, the Anaconda distribution, which is available for download at

[\[https://www.anaconda.com/distribution/\]](https://www.anaconda.com/distribution/)

is a convenient way to get started. Some basic tutorials on installing and using Python, with a focus on economic applications, can be found online at <http://quant-econ.net>.

Good books for learning Python, with some coverage of statistical applications, are Guttag (2013), VanderPlas (2017), and McKinney (2017). These books are available online via <http://oskicat.berkeley.edu/>. Any code I provide will execute properly in Python 3.6, which is (close to) the latest Python release. There are a large number of useful resources available for learning Python on campus (including classes at the D-Lab).

While issues of computation may arise from time to time during lecture, I will not teach Python programming. *This is something you will need to learn outside of class* (although help will be provided in section). I do not expect this to be easy. I ask that those students with strong backgrounds in technical computing to assist classmates with less experience. Problem sets will be more fun if you all work together and assist each other.

Extensions: Extensions for assignments will not be granted. The penalty for lateness is relatively minor and I also drop the lowest homework grade.

Accommodations: Any students requiring academic accommodations should request a 'Letter of Accommodation' from the Disabled Students Program at <http://dsp.berkeley.edu/> *immediately*. I will make a good faith effort to accommodate any special needs conditional on certification. Please plan well in advance as I may not be able accommodate last minute requests.

Academic Integrity: Please read the Center for Student Conduct's statement on Academic Integrity at <http://sa.berkeley.edu/conduct/integrity>. I take issues of intellectual honest *very* seriously.

Cooperation: I remember my undergraduate studies as a period of immense intellectual excitement, punctuated by periods of equally intense frustration and stress. My classmates were an important source of intellectual support and encouragement. *Please be open to helping one another learn the material.* Don't be afraid to ask classmates for help and, if asked for help, be generous and gracious in providing it. Everyone will learn more in this class if they work together. You are not rivals in this class.

E-mail and office hours: I prefer to avoid having substantive communications by e-mail. Please limit e-mail use to short yes/no queries. I am unlikely to read or respond to a long/complex e-mail. Do feel free to chat with me immediately before class. For longer questions please make use of my office hours. This is time specifically allocated for your use; please come by! I look forward to getting to know all of you. You can sign-up for office hour slots online [here](#).

COURSE OUTLINE

DATE	TOPIC	READINGS/NOTES
TU 1/21	Econometrics in Action	Discrimination (Ashenfelter & Oaxaca, 1987), Environmental Services (Cars
TH 1/23	Probability Review 1 of 2	Events & probability (Mitzenmacher & Upfal, 2005, Ch. 1)
TU 1/28	Probability Review 2 of 3	Random variables & Expectations (Mitzenmacher & Upfal, 2005, Ch. 2)
TH 1/30	Experiments 1 of 2	A/B Testing
TU 2/4	Experiments 1 of 2	Power calculations (Bloom, 1995)
TH 2/6 (*)	Least squares 1 of 4	Projection theorem
TU 2/11	Least squares 2 of 4	Long, short & auxiliary regression (Card & Krueger, 1996)
TH 2/13	Least squares 3 of 4	Least Squares (Nerlove, 1963; Case & Paxson, 2008)
TU 2/18	Least squares 4 of 4	Large sample properties of least squares
TH 2/20	Instrumental Variables 1 of 4	Introduction (Card, 1995; Benjamin, 1995), Benjamin (1995)
TU 2/25	Instrumental Variables 2 of 4	Heterogeneity (Angrist et al., 1996)
TH 2/27	Instrumental Variables 3 of 4	Supply & demand (Angrist et al., 2000)
TU 3/3	Instrumental Variables 4 of 4	Production functions (Griliches & Mairesse, 1998)
TH 3/5	Review and Catch-up	
TU 3/10	Midterm 1 of 2	
TH 3/12	Panel Data 1 of 4	Static models (Jakubson, 1991)
TU 3/17	Panel Data 2 of 4	Spillovers (Jaffe, 1986; Bloom et al., 2013), Bloom et al. (2013)
TH 3/19	Panel Data 3 of 4	Production functions (Griliches & Mairesse, 1998)
TU 3/24	No Class	Spring Break
TH 3/26	No Class	Spring Break
TU 3/31	Panel Data 4 of 4	Production functions; Blundell & Bond (2000), de Loecker (2013)
TH 4/2	Binary choice 1 of 4	Random Utility Models
TU 4/7	Binary choice 2 of 4	Maximum Likelihood: Probit/Logit
TH 4/9	Binary choice 3 of 4	Application: Contingent Valuation
TU 4/14	Binary choice 4 of 4	
TH 4/16	Survival Analysis 1 of 3	Kaplan-Meier (Efron & Hastie, 2016, Chs. 8 - 9)
TU 4/21	Survival Analysis 2 of 3	Discrete hazard (Ashenfelter & Card, 2002)
TH 4/23	Survival Analysis 3 of 3	Discrete hazard (continued)
Tu 4/28	No Class or Zoom (TBA)	
TH 4/30	Midterm 2 of 2	

References

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