

Economics 184b: Econometrics Fal 2019

Professor Brainerd
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Office hours:
Wednesdays 9:00-11:00 am

Course description: This course provides an introduction to the methods and statistical techniques used to test economic theory and analyze economic data. The importance of econometrics is not limited to economics; the tools you will learn are also widely used outside of economics, in fields ranging from public policy, public health, sociology and psychology to marketing and finance.

The main tool of econometrics is regression analysis, which is concerned with uncovering and estimating relationships between different variables. In this course we will learn about regression analysis, emphasizing the intuition behind the procedures and how to apply them to real-world data. You will gain hands-on experience analyzing data and interpreting the results through a series of exercises in which you use econometric software to analyze data sets.

Learning goals: upon successful completion of the course you will:

- Understand the basic statistical assumptions underlying regression analysis and the situations in which these assumptions are appropriate
- Be able to identify when the basic regression assumptions may be violated and to correct for these violations using appropriate techniques
- Be able to critically assess empirical studies in economics and other professional journals
- Have proficiency using Stata or R, and
- Be able to implement original research using the empirical techniques you have learned.

Prerequisites: Econ 80a and Econ 83a; Econ 80a may be taken concurrently.

Course materials: The required textbook for the course is James H. Stock and Mark W. Watson, *Introduction to Econometrics* (4th edition), Pearson/Addison Wesley, 2019. It is fine to use the 3rd edition if you would like a cheaper option. If you are having difficulty purchasing course materials, please make an appointment with your Student Financial Services or Academic Services advisor to discuss possible funding options and/or textbook alternatives. Additional supplemental readings for the course will be posted on Latte.

Students have the choice of using R or Stata to do the empirical exercises in this course. Please choose one and use the same program for the whole semester. Introductions to Stata and R will be provided in recitation early in the semester, but students should expect to spend additional time learning one of these packages on their own. IBS Technology and the Brandeis Library offer workshops in Stata and R, and students can use the online learning platform LinkedIn Learning (formerly Lynda.com) for training videos in Stata and R. Downloads are available at:

Stata download: Brandeis on the Hub

R download: <https://www.r-project.org/>

R Studio download: <https://www.rstudio.com/products/rstudio/download/>

Attendance: Learning in econometrics is cumulative; each topic builds on the previous one. As a result, *attendance is extremely important*. You are expected to attend all classes; however one absence from class will have no effect on your attendance grade.

Course requirements: Students will be evaluated on the following:

Attendance	5%
Problem sets	10%
Midterm 1 (Friday, Sept. 27)	20-30%*
Midterm 2 (Friday, Nov. 8)	20-30%*
Final exam (cumulative)	35%

(* The midterm with the highest grade will have a weight of 30%; the midterm with the lowest grade will be weighted at 20%.)

Success in this four-credit course is based on the expectation that students will spend a minimum of 9 hours of study time per week in preparation for class (readings, problem sets, midterm exams, and cumulative final exam).

Problem sets: Seven problem sets will be due during the semester on the dates listed below. Complete problem sets must be turned in at the beginning of class on the due date. ***Late problem sets will not be accepted under any circumstances.*** To accommodate illness and unforeseen conflicts, I will drop the lowest score among your problem sets in the grade calculation. In other words, you must turn in six of the seven problem sets; alternatively you can turn in all seven problem sets and I will take the top six grades in calculating your problem set grade. The dropped grade can be used for any problem, but it is advisable to save it for medical or personal emergencies as only one grade will be dropped.

Your problem sets must be legible, stapled, and must show all of your work including R or Stata output. No credit will be given for empirical questions if the R or Stata output is not included with the problem set. Teaching assistants are permitted to take off points for an unstapled problem set.

You may discuss your homework assignments with other students in the course and form small study groups (2-3 people). However, you must do the computer assignments yourself and write up your own answers to all questions. Please write the name(s) of any students you have worked with on the first page of the problem set. Note that if you copy your answers from one of your classmates, or from any outside source, in addition to receiving a zero on the problem set you will be in violation of Brandeis rules on academic honesty and may not receive credit for the course. A zero problem set score due to plagiarism is not dropped from the problem set grade.

Exams: No make-up exams will be given in this course. Absence from an exam will be excused only for a serious illness or family emergency that is appropriately documented; otherwise a

grade of zero will be assigned. An excused absence from an exam will result in greater weight being placed on the other exams in the course. There are no exceptions to this rule.

Laptop, tablet and cell phone policy: I come to class to help you learn, and I assume that you are here because you want to learn. Using a cell phone, tablet or laptop to talk, text, email, or surf the internet is both disrespectful and distracting to me and to your fellow students. Because of this, *the use of cell phones, tablets, and laptops in class is prohibited. You will be marked 'absent' from class for each instance in which you are observed using a device of any sort in class.* Barring special accommodation, students will **keep laptops closed and phones off and stowed away** during class meetings. All materials will be available in printed form, and recent studies consistently show that note-taking by hand prompts students to listen more deeply and learn more effectively. If you must take a call or text due to an emergency situation, please discuss the problem with me before class and leave the classroom to take the call. If you are unable to take notes without the use of a laptop, please speak to me. Recording of my lectures is prohibited unless arranged in advance with me.

Recitation: Wednesdays, 6:30-7:20pm and 7:30-8:20pm

TAs: Noa Benveniste, Noah Blumenthal, Matt Ekins and Yinghan Lin

Accommodations: Brandeis seeks to welcome and include all students. If you are a student who needs accommodations as outlined in an accommodations letter, please talk with me and present your letter of accommodation as soon as you can. I want to support you.

In order to provide test accommodations, I need the letter as early in the semester as possible. I want to provide your accommodations, but cannot do so retroactively. If you have questions about documenting a disability or requesting accommodations, please contact Student Accessibility Support (SAS) at 781.736.3470 or access@brandeis.edu.

Academic honesty: You are expected to be honest in all of your academic work. Please consult Brandeis University Rights and Responsibilities for all policies and procedures related to academic integrity. Students may be required to submit work to TurnItIn.com software to verify originality. Allegations of alleged academic dishonesty will be forwarded to the Director of Academic Integrity. Sanctions for academic dishonesty can include failing grades and/or suspension from the university. Citation and research assistance can be found at LTS - Library guides: <http://guides.library.brandeis.edu/c.php?g=301723> .

KEY DATES FOR THE CLASS:

No class: Tuesday, Oct. 1st (Rosh Hashanah)
 Tuesday Oct. 15 (Brandeis Monday)

Midterm 1: Friday, Sept. 27

Midterm 2: Friday, Nov. 8

Final exam: Scheduled during exam period

CLASS SCHEDULE

Class #	Date	Topic	Reading	PS due
1	Friday, Aug. 30	Introduction; review of probability	Ch. 1 and 2	
2	Tuesday, Sept. 3	Review of probability and statistics	Ch. 2 and 3	
3	Friday, Sept. 6	Bivariate regression	Ch. 4 and 5	
4	Tuesday, Sept. 10	Bivariate regression	Ch. 5	
5	Friday, Sept. 13	Multiple regression	Ch. 6	1
6	Tuesday, Sept. 17	Multiple regression	Ch. 6	
7	Friday, Sept. 20	Hypothesis testing	Ch. 7	2
8	Tuesday, Sept. 24	Hypothesis testing	Ch. 7	
	Friday, Sept. 27	Midterm 1		
9	Friday, Oct. 4	Nonlinear regression	Ch. 8	
10	Tuesday, Oct. 8	Nonlinear regression	Ch. 8	3
11	Friday, Oct. 11	Internal and external validity	Ch. 9	
12	Friday, Oct. 18	Panel data	Ch. 10	4
13	Tuesday, Oct. 22	Panel data	Ch. 10	
14	Friday, Oct. 25	Binary dependent variable	Ch. 11	
15	Tuesday, Oct. 29	Binary dependent variable	Ch. 11	5
16	Friday, Nov. 1	Instrumental variables	Ch. 12	
17	Tuesday, Nov. 5	Instrumental variables	Ch. 12	
	Friday, Nov. 8	Midterm 2		
18	Tuesday, Nov. 12	Experiments and quasi-experiments	Ch. 13	
19	Friday, Nov. 15	Experiments and quasi-experiments	Ch. 13	
20	Tuesday, Nov. 19	Machine learning and big data	Ch. 14	
21	Friday, Nov. 22	Machine learning and big data	Ch. 14	6
22	Tuesday, Nov. 26	Introduction to time series analysis	Ch. 15	
23	Tuesday, Dec. 3	Introduction to time series analysis	Ch. 15	
24	Friday, Dec. 6	Introduction to time series analysis	Ch. 15	7
25	Tuesday, Dec. 10	Review for the final exam		