ECONOMICS 452
INTRODUCTION TO ECONOMETRICS
COURSE OUTLINE

Department of Economics - University of Michigan
Fall 2017
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Course meetings: MW 8:30-10:00 East Hall B844
Discussion section 002: F 12:00-1:00 1570 CC Little
Discussion section 003: F 11:00-12:00 1570 CC Little

COURSE DESCRIPTION

This course focuses on techniques for estimating parametric linear regression models, on problems commonly encountered in estimating such models, and on interpreting the estimates from such models. Both estimation and interpretation are marketable skills. The goal of the course is to teach you the basics of the theory and practice of econometrics and to give you experience in estimating econometric models with actual data.

Two other economics courses cover similar topics, but at different technical levels. Economics 454 uses matrix algebra (rather than summations), and focuses more on econometric theory, and less on intuition and interpretation, than this course. In contrast, Economics 251 aims at a less technical, more applied audience than this course. You should be sure that you are in the course that best matches your interests and abilities.

This is a challenging course. If you have concerns about that, you should consider taking Economics 251 instead.

PREREQUISITES

Economics 451 or Economics 453 is the prerequisite for this course. This prerequisite is enforced
as part of the registration process for the course. Students without one of these prerequisites (e.g. visiting students from other universities) should contact the instructor directly.

The substantive background you should have includes familiarity with the following concepts: random variable, probability distribution, independence, expected value (and properties of the expected value operator), variance (including calculating the variance of a sum of random variables), sampling distribution, hypothesis testing, confidence interval, estimation, and properties of estimators (such as unbiasedness). You should also have had one semester of calculus. We will use (some) calculus in the course.

**TEXTS**


Optional: Baum, Christopher. 2006. *An Introduction to Modern Econometrics Using Stata*. College Station, TX: Stata Press.

You should be fine with the fourth or fifth editions of Wooldridge (or even the second or third) in terms of learning the material. You may be able to purchase the Acock book directly from Stata ([www.stata.com](http://www.stata.com)) at a lower price than you could find elsewhere. Both books are on reserve at the undergraduate library.

There are many other texts that cover the same material as the Wooldridge book. My favorite is *Basic Econometrics* by Damodar Gujarati. The material in this course does not change much from year to year so pretty much any edition of Gujarati will do. The Gujarati text is a less technical (and more verbal) backup if you want an alternative presentation to that in the required text. *Introduction to Econometrics*, by Stock and Watson, is fine too. It is sometimes used in other sections of Economics 452 and is on about the same technical level as WR but has a different writing style and emphasizes different subfields of economics when discussing applications. Your text from Economics 451 (or equivalent) may also prove useful as a reference.

Finally, for fun, and because it provides the intellectual history of much of the material we cover in this class, you might enjoy:


Stephen Stigler is the son of George Stigler, who won the Nobel Prize in economics.
REVIEW

Students should review the material in Appendices B and C of the Wooldridge text as it represents the basic background material for the course. The first quiz will cover this material. Lecture notes for this material will be made available on the Canvas page but we will not cover the material in class.

GRADES

Quizzes: 20 percent of final grade (best 4 out of 5)
Problem sets: 20 percent of final grade (best 4 out of 5)
Midterm exam: 25 percent of final grade
Final exam: 35 percent of final grade

Department rules require that I use the grading system announced at the beginning of the semester. I cannot make any exceptions to this rule. In particular, there will be no “extra credit” projects available after the final exam, or at any other time. I also cannot change the weighting of the different components of the grade on an individual basis. This means that you cannot rely on a stellar final performance to overcome low grades on earlier parts of the course when it comes time to assign final grades.

EXAMS

The course includes a midterm and a final exam. Both are cumulative in the sense that they cover all of the material in the course up to (and including) the lecture preceding the exam.

Both exams should be completed in a blue book or green book supplied by the student.

The dates and times for the exams appear on the schedule below. You can also find the university’s final exam schedule here: [http://www.ro.umich.edu/exams/](http://www.ro.umich.edu/exams/)

If you miss the midterm due to a documented illness or family emergency, then your grade will be calculated without the midterm (i.e. there will be no make-up midterm) with the weights on the other components scaled up that they sum to one.

If you miss the final due to a documented illness or family emergency, we will sort out some arrangement that may or may not include a make-up final. If a make-up final is offered, it may be an oral one, rather than a written one. Travel plans, no matter how far in advance you made them, how far you are travelling or how much the ticket cost, do not constitute a valid reason for missing the final.

QUIZZES

The quizzes are short (15 minute) in-class tests. They will be given at the start of class; thus, if you are late, you will have less time to complete the quiz. They are designed to provide you with
an incentive not to get too far behind on the course material. They will also provide rapid feedback in terms of how you are doing. Because you can drop one quiz grade, there will be no make-up quizzes.

### PROBLEM SETS

The problem sets will ask you to estimate econometric models and discuss the results. Your grade will depend on both whether or not you in fact estimate what you are asked to estimate and get the correct answer, and on how well you interpret your results. Both are valuable (and marketable) skills. In my experience, interpretation is more difficult to learn. Some of the problem sets may also require you to do some algebra or other similar calculations, or to explain the meaning of various statistical formulae.

You are welcome to work together on the problem sets, but each student must turn in his or her own version of the assignment in their own words. In my experience, neater and better organized problem sets receive higher grades, conditional on content.

As described in detail on the first page of each problem set, you must turn in both your clean and commented Stata log file and a completely separate set of answers to the problem set questions. The answers should consist of complete English sentences, possibly in addition to mathematical derivations or formulae and tables of your own creation. Failure to adhere to this format will result in a loss of 10 points on the first problem set and a grade of zero on subsequent problem sets.

Problem sets should be turned in on Canvas.

As you are allowed to drop your lowest problem set grade, no late problem sets will be accepted for any reason.

### STATISTICAL SOFTWARE

We will use Stata 15, which is available at the campus computing centers.

Stata is available at all full service workstations in computing centers on campus. A list of computing centers on campus is here: [http://www.itcs.umich.edu/sites](http://www.itcs.umich.edu/sites).

Lots of information on Stata can be found here: [http://www.stata.com/links/resources1.html](http://www.stata.com/links/resources1.html)

There are videos about Stata here: [https://www.youtube.com/user/StataCorp](https://www.youtube.com/user/StataCorp)

In addition, the GSI sessions will include instruction in Stata.

You can order your own copy of Stata at a very low rate; see the information here:

EMAIL AND CANVAS

Information about the course will be distributed using the Canvas site for the course. If you are not receiving information about the course, you need to make sure that you have set up canvas correctly. I am not responsible for your failure to receive course information.

SOCIAL MEDIA

I am happy to connect with you on LinkedIn after the class is over and grades have been assigned. I generally do not friend students on Facebook.

ATTENDANCE

Attendance is encouraged but not required. Please attend only if you plan to devote your full attention to the class.

CONTACT

If you have a question about a problem set or about the course material more generally, start by asking it by email. Many questions can be answered that way, often within a short time.

ACADEMIC INTEGRITY, GRADED ASSIGNMENTS AND RELIGIOUS HOLIDAYS

“This course complies with the Department of Economics policies on academic integrity, graded assignments, and religious holidays. These policies are posted at the "Files" tab of the course's Canvas site. When relevant, be sure to use the Medical Excuse Form that is also posted there.”

Additional information on academic integrity is available here: https://lsa.umich.edu/lsa/academics/academic-integrity/

STUDENTS WITH DISABILITIES

“If you believe you need an accommodation for a disability, please let me know at your earliest convenience. Some aspects of this course may be modified to facilitate your participation and progress. As soon as you make me aware of your needs, we can work with the Office of Services for Students with Disabilities to help us determine appropriate accommodations. I will treat any information you provide as private and confidential.”

More on the university policy is here: http://ssd.umich.edu/

STUDENT MENTAL HEALTH AND WELLBEING

The “University of Michigan is committed to advancing the mental health and wellbeing of its students. If you or someone you know is feeling overwhelmed, depressed, and/or in need of support, services are available. For help, contact Counseling and Psychological Services
(CAPS) at (734) 764-8312 and https://caps.umich.edu/ during and after hours, on weekends and holidays, or through its counselors physically located in schools on both North and Central Campus. You may also consult University Health Service (UHS) at (734) 764-8320 and https://www.uhs.umich.edu/mentalhealthsvcs, or for alcohol or drug concerns, see www.uhs.umich.edu/aodresources.

For a listing of other mental health resources available on and off campus, visit: http://umich.edu/~mhealth/.”
COURSE SCHEDULE

9/6  Distribution and review of course outline; optional lecture on economics graduate study

9/11  Simple linear regression: WR, Chapter 2
9/13  Quiz #1; Simple linear regression: WR, Chapter 2

9/18  Simple linear regression: WR, Chapter 2
9/20  Multiple linear regression - estimation: WR, Chapter 3

9/25  Multiple linear regression – estimation; WR, Chapter 3
9/27  Multiple linear regression – estimation; WR, Chapter 3

10/2  Quiz #2; Multiple linear regression – estimation: WR, Chapter 3
10/4  Multiple linear regression – inference: WR, Chapter 4

10/9  Multiple linear regression – inference: WR, Chapter 4
10/11  Multiple linear regression – inference: WR, Chapter 4

10/16  No meeting – fall break
10/18  Multiple linear regression – power calculations

10/23  Multiple regression – OLS asymptotics: WR, Chapter 5
10/25  Midterm exam

10/30  Multiple regression – further issues: WR, Chapter 6
11/1   Multiple regression – further issues: WR, Chapter 6

11/6   Multiple regression – further issues: WR, Chapter 6
11/8   Quiz #3; Multiple regression – qualitative variables: WR, Chapter 7

11/13  Multiple regression – qualitative variables: WR, Chapter 7
11/15  Heteroskedasticity: WR, Chapter 8

11/20  Quiz #4; Heteroskedasticity: WR, Chapter 8
11/22  Bonus lecture on social experiments (day before American Thanksgiving)

11/27  Data problems: WR, Chapter 9 (except 9.2)
11/29  Data problems: WR, Chapter 9 (except 9.2)

12/4   Simple panel data methods: WR, Chapter 13
12/6   Simple panel data methods: WR, Chapter 13

12/11  Quiz #5, course evaluations, final thoughts, review
12/14  Review session with Prof. Smith

12/20  Final exam: 8:00-10:00