Econ452: Intermediate Introduction to Statistics and Econometrics II

Lecture: Monday and Wednesday, 8:30am–9:50am in B844 EH

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Office hours: Wednesday, 10:00am–11:00am in 351C Lorch

Discussion section: Friday, 9:00am–9:50am in 260 Weiser or 11:00pm–11:50pm in 120 WH

Max Huppertz (mhupp@umich.edu)

Office hours: Tuesday, 3:50pm–5:50pm in 3347 MH

Class web page: umich.instructure.com

Textbook: Jeffrey Wooldridge, *Introductory Econometrics: A Modern Approach*, 6th Edition, Cengage Learning.

We will use this textbook extensively. Although I will refer to the 6th edition, any edition other than the 1st is okay. Access to the online resources for this book is not needed. Along with Wooldridge's book, I will assign mandatory readings of academic articles. The readings and other class materials will be available through Canvas.

Course objective: Economics begins with a few basic assumptions and utilizes these as building blocks for extensive models of the real world. Models are only useful if they can be tested with data and therefore economists have developed a large toolkit of statistical methods to test these models. The workhorse method is the linear regression model estimated by ordinary least squares (OLS). The bulk of the course will be spent outlining the properties of OLS and related estimators. In the second half of the semester, we will also discuss several academic papers to see how the econometric methods are applied by researchers and policy makers. Students will be expected to read the assigned papers and be able to discuss not only the statistical techniques used but also the underlying economic issues. In addition, most of the econometric methods introduced in class will be implemented into a modern statistical software package.

Like many econometricians, I do my programming in R. You can download R for free at r-project.org. Max will provide a brief introduction to R in his first discussion section. However, it is best to learn a programming language by working with it rather than by watching someone else type in code, so we will keep the programming aspect of the course short. Feel free to talk to me or Max if you have any questions. In addition, R has an extensive help system with a large community and typing in a question in Google solves any common problem.

Prerequisites: Econ451 or Stats426. You are expected to know some simple calculus. Please read Appendices A and B in Wooldridge. They cover most of the concepts you should be familiar with, such as expected values, covariance, correlation, linear combinations of random variables, and tests of hypotheses.

Expectations: Students are expected to attend class, to be prepared for class, to *not* be late to class, to participate in classroom discussions, and to hand in assignments when due. This course complies with the Department of Economics policies on academic integrity, graded assignments, and religious holidays. These policies are posted at

`lsa.umich.edu/econ/undergraduates/policies-and-procedures.html`.

When relevant, be sure to use the Medical Excuse Form that is also posted there.

Evaluations: Your final grade will be based on six problem sets (20% of the course grade), a mid-term examination (25%), an empirical project (20%), and a comprehensive final exam (35%). I will provide letter grades for the mid-term exam. These letter grades, however, are only there to provide informal feedback about your relative standing in class and play no direct role in the determination of the final course grade.

Problem sets: Six problem sets will be assigned during the semester. These problem sets are designed to gauge your understanding of the concepts discussed in class. The problem sets will have two types of questions: (1) You will be asked to prove a mathematical statement, calculate an estimate, or derive an equation. These questions are the type that will be asked on the exams. (2) You will be given a data set and asked to generate and interpret statistical output. You can use any statistical software package to answer these questions but I will only provide sample programs and support for R.

You are encouraged to work in groups of up to four people. You can turn in the answers as a group with the understanding that you worked on these problems together. It is not enough to split up the problems within the group. Problem set answers should be turned in at the beginning of class on the day they are due. I will not accept late problem sets. The first problem set is on the class web page and is due at the beginning of class on Wednesday, September 11. It covers topics you learned in Econ451.

Examinations: The mid-term exam will be held on Wednesday, October 23, 8:30am-9:50am in class. The final exam date is determined by the University and can be found at

`ro.umich.edu/calendars/final-exams`.

It will be held on Friday, December 13, 1:30-3:30pm in class. (The final exam date and location are provided 'as is,' and I make no warranties on the information provided. Refer to the Office of the Registrar for final exam dates and locations.) Exams will be a mix of problems like those from the problem sets, and discussion-type questions. The final exam is cumulative. Makeup exams will only be given for students who have a valid University excuse, applied for in writing and adequately documented. I must receive documentation within 48 hours of the missed exam.

"No questions asked"-weight transfer between mid-term and final: Everyone has bad days. Once mid-term grades are returned, you can sign a contract with me that reduces the weight of your first exam by up to 10 percentage points (reduces it to a minimum of 15 percent of the course grade) and increases the weight of the final by up to 10 percentage points (increases it to a maximum of 45 percent of the course grade). The contract cannot be rescinded once you take the final. You cannot bargain for more points to be transferred. You cannot transfer points ex post from the final to the mid-term.

Paper: A group research project is due December 09. More information about the project will be given later in the semester. In a nutshell, I will provide you with a data set and a fairly narrow research question and you will be expected to review the relevant literature, estimate models to answer the particular question, and write up the results as if this were an academic paper. The assignment will be distributed on the first class after the mid-term exam (Monday, October 28). You will work in groups of four and you must identify your group by 5:00pm on Friday, November 1. If you cannot find a group, I will assign you one. It is assumed that if your name is on the paper, you made a significant contribution to the project. Grades on the paper will be based on the quality of the writing (grammar counts), the justification for the model you estimate, and the accuracy with which you interpret your statistical models.

Ask me anything: `https://forms.gle/eMsgPsrqvYr2P9eU7`

Course outline: The following is a tentative outline of the course. I will add or remove topics depending on how the course progresses. There will be no class on November 6 and 27. There will be no discussion section on September 6.

Topic	Chapter	Date
Econometrics and economic data	1	09/04
The simple regression model	2	09/09, 09/11, 09/16
Multiple regression analysis: estimation	3	09/18, 09/23, 09/25
Multiple regression analysis: inference	4	9/30, 10/02, 10/07
Binary (or dummy) variables	6,7	10/09, 10/16
OLS asymptotics	5	10/21
Mid-term exam	1,2,3,4,6,7	10/23
Applications	TBA	10/28, 10/30
Heteroskedasticity	8	11/04
Simple panel data models	13	11/11, 11/13
Applications	TBA	11/18, 11/20
Instrumental variables estimation	15	11/25, 12/02
Applications	TBA	12/04, 12/09
[Reserved for cancelled classes]		12/11