

Economics 21000: Econometrics A
Autumn 2015

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Class: Mondays and Wednesdays, 1:30-2:50 pm in SHFE 203

Section: Thursdays, 5:00-5:50 pm in Rosenwald 011

Website: <http://chalk.uchicago.edu>

Course Description: The course will provide an introduction to econometrics and the linear regression model. By the end of the course, students should have an intuitive understanding of the purpose of least squares estimation and be able to do basic proofs of the properties of simple estimators.

Prerequisites: Econ 20200, Stat 23400 (or 24400) and Math 19620. The course will draw on material from calculus, probability, statics, and linear algebra. Some review of essential concepts will be provided.

Textbook: The required text for the course is *Introductory Econometrics: A Modern Approach*, Fifth Edition, by Jeffrey Wooldridge. The course will loosely follow the text, though the lectures will provide more mathematical detail, as well applications outside of the traditional economic focus.

Programming: Students will be exposed to statistical programming in this class, in part to get an intuitive understanding of the techniques by using data. We will be using R for this course. It is free and available here: <http://cran.r-project.org/>

I also recommend that you download and use RStudio, which is a graphical interface for R.
<http://www.rstudio.com/>

Grading: There will be approximately eight problem sets, one in-class midterm, and a final exam. All students will be required to take the exams at the designated time. Please mark your calendar and plan accordingly. Exceptions will be made for medical emergencies only. There is an optional project for the students who are more enthusiastic about the course. The project, which is assigned individually, is defined to reproduce the results of an original research paper using R. This is a good exercise to acquire the skills that are in great demand in the job market. Final grades will be determined according to the following weights:

Problem Sets: 20%

Midterm Exam: 35%

Final Exam: 45%

*Optional project: 10%

Exams schedule:

- *Midterm Exam:* Wednesday, Oct 28, 1:30-2:50 pm in SHFE 203.
- *Final Exam:* Monday, Dec 7, 1:30-3:30 pm in SHFE 203 (tentative, might change).

Problem Sets: Problem sets should be turned in at the beginning of class/discussion section on Thursdays. Late problem sets will not be accepted; however, at the end of the quarter the lowest problem set grade will be dropped. Students may work in groups, but are required to turn in individual written up problem sets and should write the names of the students collaborated with at the top of their assignments.

Course Topics and Schedule: Below is an outline of the topics for the quarter. The schedule may be modified as the course progresses.

Lecture 1: Univariate Random Variables and Probability (Chapters B.1-B.3)

Lecture 2: Multivariate Random Variables and Probability (Chapters B.4-B.5)

Lecture 3-4: Finite and Large Sample Properties of Estimators (Chapters C.1-C.3)

Lecture 5: Hypothesis Testing and Inference (Chapters C.5-C.6)

Lecture 6: Introduction to Linear Regression (Chapters 2.1-2.6)

Lecture 7: Interpreting Linear Regression

Lecture 8: Measuring Goodness of Fit and Properties and Pitfalls of Ordinary Least Squares (Chapters 3.3-3.5, 5.1-5.3)

Lecture 9: Linear Regression Hypothesis Testing (Chapters 4.1-4.3)

Lecture 10: Midterm (Oct 28th, 2015)

Lecture 11: Linear Algebra (Chapters D.1-D.3, D.6-D.7)

Lecture 12-13: Multivariate Linear Regression (Chapters 3.1-3.2, 6.1-6.2, 7.1-7.6)

Lecture 14: Interpreting Multivariate Linear Regression / Measuring Goodness of Fit and Properties and Pitfalls of Multivariate Linear Regression (Chapters 3.3-3.5, E.1-E.4)

Lecture 15: Multivariate Regression Hypothesis Testing (Chapters 4.4-4.5)

Lecture 16-17: Instrumental Variables and Causality (Chapters 15.1-15.5)

Lecture 18: Panel data methods (Chapters 13-14)

Lecture 19: Introduction to Maximum Likelihood method (Chapters C.4, 17.1-17.2, 17.4)