

# Syllabus

Introduction to Econometrics - Economics 4818-001  
Fall 2006, MWF 2:00-2:50, Econ 117

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Hours: Tuesday 11-12, Wednesday 11-1

## Introduction

Economics 4818 is an introduction to the practice of econometrics, which has a range of applications in economic research. I like to think of econometrics as methods of using data and statistics to provide evidence for economic theory. This course will feature a mixture of learning both basic econometric methods (think of this as a “tool kit”) and learning how to apply these methods to answer economic questions. The goal of this course is to provide you with enough understanding and experience to use econometric analysis in your career: in government, academic or commercial applications.

The text for this course will be: **Introductory Econometrics: A Modern Approach (3rd Edition)**, by Jeffrey Wooldridge. New copies are expensive, but there should be used copies available if you buy early. You may be able to find a copy online that is less expensive, but keep in mind you will need it by Aug. 30<sup>th</sup>

This is a 4000 level class, and I expect each lecture to be an exercise in civil discourse. Please be aware of university regulations concerning classroom conduct, as stated in: <http://www.colorado.edu/policies/classbehavior.html>. Use of cell phones and laptops is prohibited while class is in session – if you are browsing the web you are clearly not paying attention in class, and distracting other st

## Assignments

The major assignment for this course is the **econometric project**. This should be a paper in the style of applied economic research. By now, in your senior or junior year as an economics major, you should be familiar some relationships between economic variables as suggested by theory. Your task will be to:

1. choose an economic relationship to study
  2. find data that describe the related variables
  3. estimate the direction and magnitude of the relationship, and
  4. write a paper about the relationship based on your estimates.
- Let me describe in each of these steps in detail:

Also, the Economic Census collects data every five years about U.S. firms and industries.

- [www.bea.gov](http://www.bea.gov): Macroeconomic variables such as U.S. GDP, gross state product and U.S. current account.
- Compustat database – Detailed data about U.S. and multinational companies. Available online through Wharton Research Data Services (WRDS), but only through terminals in the business library.
- <http://home.developmentgateway.org/Datastatistics>: A website with links to many agencies that collect data, including the IMF, OECD and UN.

This is a partial list, and I encourage you to look for data on your own. Another approach is to try to replicate an already published academic work. Only a few authors list where they got their data, or provide it on their website, so you may need to search a while to find one that you can replicate. You may find articles in journals such as the *Review of Economics and Statistics*, *Journal of Applied Econometrics*, *Applied Economics*, *the Journal of Labor Economics*, *the Journal of Development Economics*, *the Journal of Environmental Economics* or the *International Economic Review*. Don't try to replicate an article that you don't understand!

If your honors thesis contains an empirical component, you may submit this as your econometrics project. You may need to revise the econometric methods in your paper however, because it will be evaluated on how well you apply what you learn in this class. Also, when choosing data for your paper, try to pick data that is either cross-sectional or time-series in nature, not both, since we will not be covering panel data estimation methods in this class.

### Estimate the direction and magnitude of the relationship.

You will need to write the relationship as an econometric model which can be estimated from your data. How to do this will be the subject of the first two months of class. You will also need to consider possible problems in the estimation, such as bias from omitted variables and endogeneity, multicollinearity and heteroskedasticity. For estimation with time-series, serial correlation should be considered as well. Any statistical program can be used for the estimation, but I recommend using E-views since I will be demonstrating how to use it in class. Other programs include Stata, SAS, SHAZAM, GAUSS, MATLAB and Excel.

### Write a paper about the relationship based on your estimates.

The project should be submitted in the form of a paper, and include an introduction, discussion of the economic relationship and econometric model, discussion of the estimation method, results and a conclusion. The conclusion should discuss the relevance of the results. Your research may not be of earthshaking importance, but I want you to write like it is. You should make an effort to interpret and communicate your findings.

The econometric project will be evaluated on how well you apply your estimation method and how well you interpret your results. No extra points will be given for complicated data sets, a lengthy discussion. Please keep it simple and to the point. It should be a minimum of five pages.

The other assignments include problem sets and computer exercises. Problem sets of ten to fifteen questions will be chosen from the text. These assignments will be posted on the course website, as will answer keys after the due date. The due dates are shown on the schedule below. We spend some time discussing the answers to each assignment, and students may volunteer to demonstrate the problems for the class for extra credit. Periodically we will have in-class problem sets as well, which will be a small portion of the problem sets grade, and are not posted on the schedule.

The computer exercises are assignments that will also be posted online, and will be done with a computer program. The recommended program is E-views, which is installed in the computer lab in the department. A student version of E-views may be purchased for about \$32; I will take a group order in-class to save on shipping for those who want to put it on their personal computers. Details about the E-views product can be seen at: [www.eviews.com](http://www.eviews.com).

## Tentative Course Schedule

**Text chapters to be discussed are in parentheses. Assignments are in bold-case. Due dates are in italics.**

8/28/06: Introduction (Ch. 1)

8/30: Statistics Review (Appendices A and B)

9/1: Statistics Review (Appendices B and C)

9/4: Labor Day, no class

9/6: Simple linear regression (2.1, 2.2)

9/8: Functional Form, examples of linear regression (2.4)

9/11: Properties of Ordinary Least Squares (2.3, 2.5)

9/13: Simple OLS discussion and examples (all chapter 2)

9/15: **Computer Exercise 1 Due**, Multiple Linear Regression (3.1, 3.2)

9/18: Algebra and Assumptions of OLS (3.2, 3.3)

9/20: Irrelevant variables and omitted variable bias (3.3)

9/22: **Problem Set 1 Due** Unbiasedness and efficiency of OLS (3.3, 3.5)

9/25: Review problem set 1, Variance of OLS estimators (3.4)

9/27: Multicollinearity, Multiple regression discussion and examples (3.4)

9/29: **Problem Set 2 Due**, Inference of a single parameter with OLS (4.1, 4.2)

10/2: Review problem set 2, Two-sided tests and confidence intervals (4.2, 4.3)

10/4: F-tests (4.5)

10/6: Tests with more than one parameter; interpreting regression results (4.4, 4.6)

10/9: **Econometrics project introduced**; topics discussion

10/11: Consistency (5.1)

10/13: **Problem Set 3 Due**, Asymptotic normality and efficiency of OLS (5.2, 5.3)

10/16: Review problem set 3, Scaling, log and quadratic forms (6.1, 6.2)

10/18: Goodness of fit, selection of regressors, residual analysis (6.3, 6.4)

10/20: **Computer Exercise 2 Due**, Dummy and categorical variables (7.1, 7.2, 7.3)

10/23: Binary dependent variables (7.5, 17.1)

10/25: Review for midterm

10/27: **MIDTERM EXAM**

10/30: Static time-series models (10.1, 10.2)  
11/1: Form of functions and variables in time series estimation (10.3, 10.4)  
11/3: Trends and Seasonality; examples of time-series regressions (10.5)  
11/6: Proxy variables (9.2)  
11/8: Measurement error (9.3)  
11/10: **Problem Set 4 Due**, Examples of econometric studies  
11/13: Review problem set 4, Sampling Bias (9.4)  
11/15: (class optional) Discuss econometrics project progress, more examples  
11/17: **Econometrics Project Due**, Endogeneity and functional form (9.1)  
11/20: Fall break  
11/22: Fall break  
11/24: Fall break  
11/27: Heteroskedasticity in cross-sectional models (8.1, 8.2)  
11/29: Testing for heteroskedasticity (8.3)  
12/1: **Problem Set 5 Due**, Correcting estimates with heteroskedastic errors (8.4)  
12/4: Review problem set 5, Serial Correlation (12.1)  
12/6: Testing for serial correlation (12.2)  
12/8: **Computer Exercise 3 Due**, Correcting for serial correlation (12.3)  
12/11: **Problem Set 6 Due**, Heteroskedasticity in Time Series Regressions (12.6)  
12/13: Review problem set 6, review for final  
12/15: Review for final  
12/18: FINAL EXAM – 4:30 – 7:00 PM