

# Economics 6243

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**Hours** Subject to change: Fridays 8:40 (or so) - 11:30 See the website for latest information.

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## 1 Purpose

The objective of this course is for you to become knowledgeable users of the linear regression model. The topics include the estimation and specification of the linear regression model, imposition and testing of exact linear parameter restrictions, confidence intervals, estimation of nonlinear models, and an introduction to generalized least squares.

In order to become functionally literate in applied econometrics, it is also necessary for you to learn some of the basics of econometric theory. The basic tools of econometric theory will help to slow the rate of depreciation of your hard-earned econometric human capital. It is well worth your time to learn these tools now, especially if you intend to do any empirical work in the future.

## 2 Textbooks

### Required

Russell Davidson and James MacKinnon, *Econometric Theory and Methods*, Oxford, 2004.

Many of our lectures and class assignments will come from Davidson and MacKinnon's book. The major shortcoming of this book is that it doesn't contain

many empirical examples. Also, it can be rather terse at times and you may need to supplement your reading in ETM with Verbeek or Greene; in particular, Verbeek's book and ETM are highly complementary. Many will find Verbeek or Greene to be a little more accessible. Each includes many empirical examples that may illuminate what you see in ETM.

Also, you may consider Wooldridge's *Introductory Econometrics: A Modern Approach*, which is a nice upper level undergraduate book, when trying to fill in the gaps. It also has a number of very good data sets and empirical examples that we may use from time to time. The data sets and empirical examples from the book are available through links on our class website.

By way of review, you can also check out the last two chapters in Stock and Watson's book listed below for very nice summaries of the linear model and general linear model.

## Recommended

Marno Verbeek, *A Guide to Modern Econometrics*, Second edition, John Wiley and Sons, 2004.

Jeffrey Wooldridge, *Introductory Econometrics: A Modern Approach*, 2nd edition, Southwestern, 2003.

Kennedy, Peter, *A Guide to Econometrics* 5th edition, MIT Press.

Greene, William A., *Econometric Analysis*, Prentice-Hall (there are several editions—anything  $\geq 4$ th edition will do).

A. Colin Cameron and Pravin K. Trivedi, *Microeconometrics: Methods and Applications*, Cambridge University Press, 2005.

## Other Sources

James Stock and Mark Watson, *Introduction to Econometrics*, Addison Wesley, 2004.

Fomby, Hill, and Johnson, *Advanced Econometric Methods*, Springer Verlag, 1984. Second Printing, 1988.

Jan Kmenta, *The Elements of Econometrics*.

Judge et al., *The Theory and Practice of Econometrics*, 2nd Edition, Wiley, 1985. (a.k.a., "Big Judge.")

Schmidt, Peter, *Econometrics*, Marcel Dekker, 1976.

### 3 Prerequisites

This course requires you to work with probability, statistics, calculus, matrix algebra, and to write computer programs (as well as learn econometrics). If you have any doubts about whether your experience is sufficient, please talk to me about it. At a minimum, I assume that you know the basics of differential calculus, matrix algebra, probability theory, and how to use a Windows based microcomputer. A first course at the Ph.D. level in econometrics is essential. I recommend Econ 5243, which uses the same text, or Ag Econ's course (which I believe uses Greene). This course is a continuation of that one.

For those of you who did not take my course, you may want to read chapters 1-5 in ETM during the first week of class to familiarize yourselves with the approach and notation. I think you'll find the Econ and Ag Econ courses comparable, though they look a little different at first glance. The difference is more style than substance. If you have any doubts about whether your experience is sufficient, please talk to me about it.

### 4 Course Outline

- 1 Chapter 7: Review
  - 1.1 The GLS Estimator
  - 1.2 Computing GLS Estimates
  - 1.3 Feasible Generalized Least Squares
  - 1.4 Nonlinear regressions (Chapter 6, ETM)
  - 1.5 Models for Panel Data
- 2 Chapter 8: IV Estimation
  - 2.1 Correlation Between Error Terms and Regressors
  - 2.2 Instrumental Variables Estimation
  - 2.3 Finite-Sample Properties of IV Estimators
  - 2.4 Hypothesis Testing
  - 2.5 Testing Overidentifying Restrictions
  - 2.6 Durbin-Wu-Hausman Tests
- 3 Chapter 10: Maximum Likelihood Estimation
  - 3.1 Basic Concepts
  - 3.2 Asymptotic Properties

3.3 Hypothesis Testing

3.4 Some Examples: AR(1) and Box-Cox regressions

4 Chapter 11: Discrete and Limited Dependent Variable Models

4.1 Binary Response Models

4.2 Multinomial Response Models

4.2.1 Ordered Probit

4.2.2 Multinomial Logit

4.2.3 Conditional Logit

4.2.4 Nested Logit

4.2.5 Multinomial Probit

4.3 Count Data

4.4 Censored and Truncated Models

4.5 Sample Selectivity

5 Chapter 12.1 and 12.2: Seemingly Unrelated Regression Equations

## 5 Computer Assignments

Early in the course you will begin to use the computer to do portions of your homework. You will be responsible for learning to use the Stata software that is available in the CBA lab. There is a manual available that can help you with the basics of Stata. The manual was written to accompany an undergraduate econometrics book, but it contains every Stata trick that I know (and many more that I have forgotten). The sections on panel data and qualitative choice models are particularly relevant for this course. This book is purely optional and I am NOT specifically recommending its purchase. However, it is available and you may find it useful.

Adkins, Lee C. and R. Carter Hill, *Using Stata for Principles of Econometrics*, John Wiley and Sons, 2008.

## 6 Grades

Your grade in this class will be based on your performance on 3 exams and on homework assignments. A reasonable amount of homework will be assigned and I expect it to be completed in a timely fashion. The homework is designed to reinforce your understanding of the material we cover in class. Also, it provides

a basis for class discussion. Generally, I will answer just about any question you may have about homework in class and will provide solutions periodically if necessary.

Because it is impossible for me to determine how much of the homework you actually do (as opposed to how much help you receive from me or others), I usually don't give actual grades on individual assignments. This means that you will not get very much individual feedback on your homework—in this respect, it is really more of a self-paced set of exercises. I do expect you to do the homework and to turn it in at some point before grades are due. Homework scores are based on whatever assignments I decide to grade (randomly drawn, of course) and on your completion percentage.

**Grade Weights**

Exam 1	28%
Exam 2	28%
Exam 3	28%
Homework	16%

Grades will be assigned according to the following scale:

**Grades**

91%–100%	A
78%–90.9%	B
60%–77.9%	C
50%–59.9%	D
< 50%	F

All exams must be taken at the designated time. No make up exams will be given. If you miss an exam you will receive a grade of zero.

Unless you are specifically told otherwise by me, all homework must be turned in at the beginning of the class period on the date that it is due. Homework will not be accepted if late.

## 7 Attendance

Regular attendance is expected. You are responsible for any material you miss because of absence. In general, I do not permit students to copy my notes. If you miss class and need a copy of the notes, please obtain them from one of your classmates.

## **8 Cheating Policy**

Cheating will not be tolerated. Any violation of the University's academic dishonesty policy will be prosecuted according to University regulations. You will receive a grade of 0 on any test or assignment you are caught cheating on. In addition, you are responsible for the security of your work (in other words, if someone copies your work, you will also receive a zero on the test or assignment). You will find a link to OSU's academic integrity pages on my website. If you have questions about the policy, visit those pages and if that does not address your questions, ask me.