

ECON 523
Applied Econometrics I /Masters Level
American University, Spring 2008

Instructor: Maria Heracleous

Office: 221 Roper

Office Hours: M W 5:15-7:15 p.m.,
and by appt.

Lectures: M 8:10 - 10:40 p.m. WARD 202

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Course webpage: AU "Blackboard"

Prerequisites: You must have taken STAT 202

Description of the course

This course is an introduction to Econometrics at the masters level with emphasis on empirical econometric modeling. It is designed to provide the necessary concepts, tools and techniques for analyzing and modeling economic data and drawing conclusions from such data.

In this course we will provide a detailed introduction to the Classical Linear Regression model. We will focus on its assumptions and optimality properties. We will learn how to use misspecification testing to examine the validity of the underlying assumptions and develop better models. A major feature of the course are the computer-based exercises which will enable students to obtain considerable practical experience in analyzing real economic data and a wide variety of econometric problems.

Aims:

- To show how economic theory and econometrics can be used together to solve practical problems.
- To develop an understanding of the use of regression analysis and related techniques for quantifying economic relationships and testing economic theories.
- To enable students to formulate economic hypotheses in a manner suitable for econometric testing.
- To be able to interpret the results of testing those hypotheses.
- To give students the opportunity to learn how to use commonly used statistical packages to fit and test economic models.
- To equip students to read empirical papers in professional journals.

Required Texts

Wooldridge, Jeffrey M., *Introductory Econometrics: A Modern Approach*, 3rd edition, South Western College Publishing, 2006.

Stock and Watson, *Introduction to Econometrics*, Addison Wesley 2003.

Software

We will be using STATA for all the applied homework assignments. STATA is an interactive user-friendly statistical package and is available in several campus computer labs.

Homework Assignments

There will be roughly 6 homework sets. These will be posted on the class web page or distributed in the class and will be due in approximately one week. The assignments will be due at the beginning of the class. **No late homework will be accepted.** To receive credit on your assignment you need to present your work neatly, clearly label each problem and give sufficient justification. The homework average will be 50% of your final grade. You are allowed to discuss homework problems with other students, however you need to present your own work. Verbatim copying is absolutely forbidden.

Exams, Grades and Attendance

There will be 2 midterm exams. Each one will worth 25%. Exams and homeworks and will count towards your grade as follows:

Homework	50%
Midterms	50%

For exams you will need to be able to **use** the concepts, models and tools not just memorize them. Exams may include material from reading assignments, lectures and Internet assignments.

Consistent class attendance and participation will greatly increase your chances for success, as well as lightening your outside of class workload.

DO NOT MISS TESTS! Makeup exams will not be given. All the exams will be administered in strict observance of the University Honor Code, without compromise or exception.

Internet

The class web page will be used to post announcements, assignments, homework problems, exam results and other class related items. You are responsible for checking it on a regular basis, and completing any assignments posted there.

Email

You are encouraged to email me about any arrangements or special needs you might have. To ensure that I respond promptly, you must put Econ523 in the subject box.

Tentative Course Outline

Introduction to Empirical Modeling (Week 1- Jan. 14th)

The Nature of Econometrics and Economic Data

- A. What is Econometrics?
- B. Nature of Economic Data
- C. Statistical Vs Theory information
- D. Experimental Vs Observational data
- E. Descriptive Statistics

Review of Probability Theory

Reference: Chapter 1, Wooldridge, + Lecture Notes
Chapter 1 & 2, Stock and Watson

Review of Statistics (Week 3, Jan. 28th)

Review of Basic Probability Theory

- A. Random Variables
- B. Discrete and Continuous Probability Distributions
- C. Joint /Conditional /Marginal Distributions
- D. Conditional Means ($E(Y/X)$)

Reference: Appendices A-B, Wooldridge, + Lecture Notes
Chapter 2, Stock and Watson

Review of Statistics (Week 4, Feb 4th)

Review of Basic Statistical Inference

- A. Estimators
- B. Properties of estimators
- C. Hypothesis Testing
 - Misspecification testing
 - Specification testing

Computer Lab on Introduction to Stata

Reference: Appendix C, Wooldridge, + Lecture Notes
Chapter 3, Stock and Watson

Linear (Normal)Regression Model (Week 5, 6, 7 - Feb. 11th, 18th and 25th)

Simple Regression Analysis

- A. The Two-Variable Case
- B. OLS estimation
- C. Properties of OLS estimators

Reference: Chapters 2, 3 Wooldridge + Lecture Notes
Chapter 4, 5 Stock and Watson

Multiple Regression Analysis

- A. Multiple Regression in Matrix form
- B. Gauss Markov Theorem (BLUE)
- C. T-statistics and Confidence Intervals for Coefficient estimates
- D. Joint tests of hypotheses

Reference: Chapters 4, 5 Wooldridge + Lecture Notes
Chapter 6, 7 Stock and Watson

Linear (Normal) Regression Model (Week 6, Feb. 18th)

Computer Lab on Linear Regression

Linear (Normal) Regression Model (Week 8, March 3rd)

Choice of Functional Form for the Regression

Multiple Regression Analysis with Qualitative Explanatory Variables

- A. Uses of Dummy variables
- B. Chow test for structural difference

Nonlinear Regression Functions

- A. Polynomials
- B. Log-Log / Log-Linear / Linear-Log
- C. Interaction terms

Reference: Chapters 6, 7 Wooldridge + Lecture Notes
Chapters 8 Stock and Watson

No class on Monday March 10 Spring Break (Week 9)

Midterm Monday March 17 (Week 10)

Model Misspecification (Week 11, March 24st)

Misspecification (Diagnostic) Testing

- A. Normality
 - B. Heteroskedasticity
 - C. Linearity
- Heteroskedasticity
- A. Nature of Heteroskedasticity
 - B. Consequences of Heteroskedasticity
 - C. Tests for Heteroskedasticity

Reference: Chapters 8, 9, Wooldridge + Lecture Notes on Misspecification Testing

Internal and External Validity (Week 12, March 31st)

Threats to Internal Validity

- A. Omitted Variables
- B. Functional Form Misspecification
- C. Measurement Error
- D. Sample Selection
- E. Simultaneous Causality

Computer Lab on Model Misspecification

Reference: Chapters 9 Stock and Watson + Lecture Notes

Binary Choice Models (Week 13, April 7)

- A. Linear Probability Model
- B. Probit and Logit Model

Computer Lab on Binary Choice Models

Reference: Chapter 11 Stock and Watson + Lecture Notes

Instrumental Variables (IV) Regression (Week 14, April 14)

- A. Instrument Relevance
- B. Instrument Exogeneity
- C. Two-Stage Least Squares Estimators

Reference: Chapter 12 Stock and Watson + Lecture Notes

Experiments and Quasi -Experiments (Week 15, April 21)

- A. Idealized Experiments and Causal Effects
- B. Difference Estimator
- C. Potential Problems with Experiments in Practice
- D. The Differences-in Differences Estimator
- E. Quasi-Experiments/Natural -Experiments

Reference: Chapter 13 Stock and Watson + Lecture Notes

Final exam

Monday

May 5

(Week 16)

Homework due dates and Exam dates:

Homework 1:	Monday	February	4
Homework 2:	Monday	February	18
Homework 3:	Monday	March	3
Midterm 1:	Monday	March	17
Homework 4:	Monday	March	31
Homework 5:	Monday	April	7
Homework 6:	Monday	April	21
Midterm 2:	Monday	May	5

This outline represents a basic course plan that is subject to change. You are responsible for any changes which are announced in class or posted on the website.