California State University, Fullerton **Dr. Mira Farka**
Department of Economics **Spring 2007**

Economics 440
INTRODUCTION TO ECONOMETRICS

MW: 5:30 pm-6:45 pm; LH 320

Office LH 713
Office Hours: Monday: 3-4 pm; Wednesday 3-4 pm, and by appointment
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Prerequisites:

Business Admin 301, Economics 202, Info Sys/Decision Sci 361 A, or consent of the instructor. The nature of this course is quantitative and requires a good understanding of algebra, elementary calculus and inferential statistics. Students should also be comfortable with the basic concepts of probability and statistics. The statistical package EViews will be used for demonstration and assignments. Students can use EViews in the lab, and a student version is also available for home use.

Required Texts: Wooldridge, J.M., *Introductory Econometrics: A Modern Approach 3rd Edition*

Course Background:

This course is designed to introduce basic Econometric methods and techniques used to analyze data in Economics, Business and other interrelated disciplines. Econometrics as a discipline is based upon the development of statistical methods for estimation, evaluation, implementation and forecasting purposes in economics and other social sciences. The course is designed to offer students the necessary tools in grasping essential empirical analyses presented to them as well as to prepare them to undertake empirical research on their own.

Grading:

- There will be **weekly** graded homework assignments due at the beginning of each Wednesday class period. Problem sets are worth 25% of your grade. You are strongly encouraged to work in groups (no larger than three persons per group), given the importance and volume of work involved in the problem sets. Each group of students should submit one homework (not 3 identical copies) with each student's name on the single homework. You can drop **one** of your lowest homework scores. No late work will be accepted.
- Two midterm exams each worth 20% of the total grade. No make-up midterms will be given. In extreme circumstances (in case of illness or emergency), if one midterm is missed the grade of the other midterm will be counted twice.
- Final exam is worth 35% of your grade. The final will be comprehensive.
- Grades will be determined using the plus/minus system

Important Dates

February 28	Midterm 1
April 18	Midterm 2
May 14	Final: 5:00-6:50 pm

Other:

- Although attendance is not mandatory, a substantial amount of the material covered will come from lecture notes. As such, you should make every attempt to attend class or get lecture notes from another student when you are unable to attend.
- Part of the lecture material will be covered using EViews during the lab portion of the class. For each class period there will be a lab (in-class) assignment, which will be used to explain empirically the theoretical concepts introduced in the course. You are all expected to work either individually or in groups during lab exercises. I will go over the lab assignment at the end of the lab period. This should help you with the Eviews portion of your homework assignments.

University Policy Regarding Academic Dishonesty

Cheating on exams or other assignments is against the rules. Consequently, academic dishonesty will result in a lower letter grade for the work at hand, and may result in an "F" for the course, plus additional university disciplinary actions

COURSE OUTLINE

I. Review of Probability and Statistics — **Appendices A, B, C & Handout**
- Random Variables
- Probability Distributions
- Expected Value, Variance, Covariance, Correlation
- Joint and Conditional Distributions

II. The Nature of Regression Analysis — **Chapter 1**
- What is Econometrics?
- Statistical vs. Deterministic; Regression vs. Causation; Regression vs. Correlation
- The Structure of Econometric Data: Cross-Section, Time Series, Panel Data

The Classical Linear Regression Model

III. Two Variable (Simple) Linear Regression Model — **Chapter 2**
- Definition
- Population Regression Function (PRF)
- Sample Regression Function (SRF)
- Derivation of OLS Estimates
- Gauss-Markov Assumptions for Simple Regression
- Gauss-Markov Theorem for Simple Regression
- Fitted Values, Residuals, Goodness of Fit

IV. Multiple Variable Regression Model — **Chapter 3**
- Definition of n-variable model
- Derivation of OLS Estimates in n-variable case
- Gauss-Markov Assumptions for Multiple Variable Regression
- Gauss-Markov Theorem for Multiple Variable Regression
- Fitted Values, Residuals, Goodness of Fit

V. Multiple Variable Regression Model: Inference — **Chapter 4**
- Normal Distribution Assumption
- Hypothesis testing about a single parameter: the t-test and p-values (one- and two-sided alternative)
- Hypothesis testing of multiple linear restrictions: the F-test

VI. Further Issues with Regression Models — **Chapter 6**
- Data Scaling
- Different Functional Forms:
  - Logarithmic Functions
  - Quadratic Functions
  - Models with Interaction Terms
- Adjusted R-squared
- Over Specification
- Prediction and Residual Analysis

Relaxing the Assumptions of the Classical Model

VII. Multicollinearity — **Lecture Notes**
- The Nature of Multicollinearity
- Estimation in the Presence of Multicollinearity
- Theoretical and Practical Consequences
- Detection of Multicollinearity

VIII. Heteroskedasticity **Chapter 8**

The Nature of Heteroskedasticity
OLS Estimation in the Presence of Heteroskedasticity
Heteroskedasticity-Robust Inference
Testing for Heteroskedasticity
    Breusch-Pagan Test
    White Test
Weighted Least Squares
Feasible GLS
Heteroskedasticity in Time Series Regression
Autoregressive Conditional Heteroskedasticity

Time Series Models

IX. Time Series Basic Regression Analysis **Chapter 10**

Definition and Examples of Time Series Models
Gauss-Markov Assumptions for Time Series Regression Models
Gauss-Markov Theorem for Time Series Regression Models
Inference with Time Series Data
Trends and Seasonality

X. Autocorrelation **Chapter 12**

The Nature of Autocorrelation
OLS Estimation in the Presence of Autocorrelation
First-order Autocorrelation
Serial Correlation in the Presence of Lagged Dependent Variables
Testing for Autocorrelation
    t-Test
    The Durbin-Watson Test
    Testing for Higher Order Serial Correlation
Correcting for Autocorrelation
Differencing and Autocorrelation

Special Topics

XI. Qualitative Response Models **Chapter 7**

Dummy Variables; Dummy Variables for Multiple Categories
Interactions Involving Dummy Variables
The Chow Test
The Linear Probability Model