

### **Introduction to Econometrics**

(Wednesday: 2:10-4:40 p.m.; Thursday: 10-12 Computer Lab)

In this class we will study, discuss, analyze and practice traditional econometric methods. These methods are frequently used for investigating empirical (real world) data as a first step toward policy analysis. Sessions in the computer lab are part of this class as well. The basic objective of that class is to provide students with the background needed for data analysis and with the ability to apply econometric and statistical methods, using computer packages, for applied economic and policy analysis. This is a “hands on” econometric class: students will practice econometrics with real data.

This class introduces students to the basics of regression methods with focus on economic applications. In addition to linear regression models, discrete response models, instrumental variables, panel data, as well as issues such as omitted variables and missing data will be studied. Depending on time, time series models may be discussed as well.

The primary purpose of this class is to provide students with the background for understanding both (i) the basic theory (mainly regression analysis as applied to economic problems) and (ii) to develop the necessary empirical tools for practicing the theory in a wide range of economic estimation problems. To accomplish this goal, we will emphasize economic applications and experiments that include analyzing real data sets in the computer. But in order to understand and evaluate correctly the empirical work, a sound theoretical foundation is needed. This foundation will be developed throughout the class.

We will study each model/problem by trying to understand (i) the data generation process, (ii) the corresponding statistical models for representing this process, (iii) observables and unobservables, (iv) known and unknowns, (v) how to recover the unknowns from the data (the known), (vi) how to develop a statistical estimation criterion, (vii) what properties we want from a good estimator or model, (viii) distribution of estimators, (ix) hypothesis testing, (x) confidence intervals, (xi) basis for prediction, etc.

The course statistical software is STATA.

*We will follow these questions and guidelines as we investigate and analyze each one of the following topics.*

## Tentative Outline of Class

*(We may change order and/or add topics throughout the semester)*

Lecture	Date	Topic	Readings (S & W) Chapters
1	January 16	Introduction and Review of Statistics/Econometrics (Probability and random variables; Basic statistics)	1, 2, 3
2	23	Simple Regression Model - I	4
3	30	Simple Regression Model – II	5
4	February 6	Multiple Regression Model and Extensions	6, 7
5	13	Nonlinear Regression	8
6	20	Assessing regression studies	9
7	27	Binary and discrete choice models	11
8	March 5	Discrete choice models; Instrumental Variables and/or Experimental Economics	12, 13
*	12	Spring Break	
9	19	Instrumental Variables (or Experimental Economics)	12, 13
10	26	Panel Data	10
11	April 2	Time Series	14.1-14.4
12	9	Time Series and/or Special Topics TBA	15, 16.1-16.2
13	16	Special Topics – TBA	TBA
14	23	Special Topics and Review (Last Class)	
*Final	May 7	FINAL	

*Lab Dates and Tentative Plan (We may add/change Labs and Topics)*

Lab	Date	Topic
*	January, 17	Independent work at Lab with TA and Lab assistants (Highly recommended)
1	January, 24	Introduction to Computer Lab and STATA and Basic Data Analysis
2	February, 7	Data Analysis and Regressions
3	February, 21	Data Analysis and Regressions
4	March, 6	Discrete Choice and survey data
5	March, 20	Panel data, IV
6	April, 3	Introduction to Eviews and/or SAS and Practice with data
7	April, 17	Practice with data

NOTE: Computer Labs are a mandatory part of the class and will take place at the SPA Lab.

### ***Assignments:***

Problem Sets will be given periodically (about every two weeks) and will involve both analytical problems and empirical work.

Students may collaborate with others in the class on the computer (empirical) part of the problem sets. Students can work with groups of no more than 3. Even when working as a group, *each student must write her/his answer separately* and explain the analysis in her/his own words.

### ***Grades:***

1. Problem Sets: 45% of final grade. This includes summary of the computer labs and one or two short presentation of lab results.
2. Final Exam (55%). (Note: At least two questions from the problem sets will be in the Final Exam.) The final exam may take place in the computer lab.

*Office Hours* (Roper 219): Tuesday 12:15-2:00 and by appointment.

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### **Textbook and Readings**

#### *Required*

**Stock and Watson (SW), 2<sup>nd</sup> Ed.** “*Introduction to Econometrics*” (Addison Wesley, 2007).

#### *Additional Background*

**Wooldridge** “*Econometric Models and Economic Forecasts*” (South-Western College Publishing).

**Pindyck and Rubinfeld (PR)** “*Introductory Econometrics*” (McGraw Hill, 4th edition, 1998).

**Miller and Miller**, “John E. Freund’s *Mathematical Statistics with Applications*” (Prentice Hall, 7th ed., 2004).

A Note on Software. It is recommended to do your problem sets with STATA, but it is not required. In the computer lab we will use STATA which is available on the AU server. Those who are interested can purchase a version of STATA, Eviews and/or SAS via the computer Lab. We may provide an introductory session for software other than STATA (e.g., SAS and Eviews) later in the semester.