# **Overview and Objectives**

This is an introductory course in econometrics. The course is designed to cover the basic procedures of econometrics, including an introduction to time series. This material will be extensively covered in the following courses of the econometric sequence. The approach of the course is to introduce econometric methods and discuss estimation procedures. The first part of the course deal with the statistical underpinnings of econometrics and it is more theoretically oriented. The second part emphasizes applications and interpretation of the results. The final objective is for students to know what method to apply in each case, and what assumptions are needed for correct inference in each situation. The third part provides an introduction to Time Series models and procedures. The course also prepares students for the two follow-up courses Microeconometrics and Time Series Econometrics.

# **Course Outline**

**Part I: Core methods (20 hours)**

Introduction

Linear regression: method of moments and small sample properties

Linear regression: inference

Asymptotic theory

Maximum likelihood estimation

**Part II: Extensions and applications (20 hours)**

Specification problems

Generalized least squares

Instrumental variables estimation

Randomized and natural experiments (time permitting)

**Part III: Introduction to Time Series (20 hours)**

Stationary and Non-stationary Processes

Autoregressive and Moving Average Processes

Likelihood Methods for ARMA Processes: Estimation, Asymptotics and Hypothesis Testing

ARIMA Processes and Unit Roots Tests

Vector Autoregressions: Definition, Impulse response functions, Variance decompositions and Estimation

Conditional Heteroscedasticity and univariate GARCH models (time permitting)

# **Required Activities**

There will be a weekly take home problem set. You may work in small groups (3-4 people) but every student has to hand in an individual set of solutions.

# **Evaluation**

Grades will be based on the problem sets (25%) and a final exam (75%)

## **Materials**

**Software**

The basic econometric software for this course is STATA. Students who want to use the software to understand better the theory are encouraged to write their own programs using matrix calculation languages like MATLAB, GAUSS or MATA.

**Readings and Reference Material**

Any textbook in econometrics covers the topics that will be developed in the course. References to specific material or applications will be given during lectures. You can choose your favorite textbook. The two companions are not self-contained textbooks but useful to help with the intuition behind the formal derivations. The level of the course will be closer to the basic textbooks than to an advanced book.

*Introductory textbooks*

Goldberger, A. (1991), *A course in econometrics*, Harvard University Press.

Stock and Watson (2010). *Introduction to econometrics* (3rd edition).

Wooldridge (2009). *Introductory econometrics: a modern approach* (4th edition).

Enders, Walter (2003), Applied Econometric Time Series, Wiley.

Harvey, Andrew C. (1993), Time Series Models, 2nd ed., MIT Press.

Lutkepohl, Helmut and Markus Kratzig (2004), Applied Time Series Econometrics, Cambridge University Press.

*Advance textbooks (use only to check specific results)*

Cameron and Trivedi (2005), *Microeconometrics: methods and applications*.

Greene (2011), *Econometric Analysis*, 7th Edition, Prentice Hall.

Hamilton, James (1994), *Time Series Analysis*, Princeton University Press.

*Companion textbooks*

Kennedy (2008). *A guide to econometrics* (6th edition).

Angrist, J. and J. S. Pischke (2009), *Mostly harmless econometrics: an empiricist’s companion*.