

**COURSE SYLLABUS**

**16I032**

# Quantitative & Statistical Methods I

**6 ECTS**

**TERM 1**

**MANDATORY COURSE**

## **Professor**

Prof. Geert Mesters

## **Prerequisites to enroll**

The students are assumed to be familiar with undergraduate level linear algebra, statistics and probability as well as the Introduction to Econometrics textbook by Stock and Watson (at least up to chapter 15).

## **Overview and objectives**

This is an introductory course in econometrics. The course is designed to cover the basic procedures of econometrics. The approach of the course is to

introduce econometric methods and discuss its statistical foundations. The course deals with the statistical underpinnings of econometrics and 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.

## **Course outline**

Linear regression: introduction  
Linear regression: numerical properties  
Linear regression: statistical properties  
Linear regression: hypothesis testing  
Linear regression: confidence intervals  
Heteroskedasticity and generalized least squares  
Nonlinear least squares  
Instrumental variables estimation  
Maximum likelihood estimation

## **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**

The core of the course concerns Chapters 1-8 and 10 of Davidson, R. & MacKinnon, J. G. (2004), *Econometric Theory and Methods*, Oxford University Press, New York. In addition, there are slides and some notes.

### **More Material**

Additionally students may wish to consult:

White, H. (2001), *Asymptotic Theory for Econometricians: Revised Edition*, Academic Press, New York

Gallant, A. R. (1997), *An Introduction to Econometric Theory*, Princeton University Press, New Jersey

Hayashi, F. (2000), *Econometrics*, Princeton University Press, New Jersey

Hansen, B. (2014), *Econometrics*, available from <http://www.ssc.wisc.edu/~bhansen/econometrics/Econometrics.pdf>

## Competencies

- To (be able to) communicate with determination and in the English Language, the results and implications of the required analytical study using a language that the receiver can relate to.
- To work within a heterogeneous team of researchers as economic analyst using specific group techniques.
- To fit in diverse professional environments and varied types of collaborations in different professional projects
- To possess and understand the knowledge that provides a basis or opportunity to be original in the development and / or application of ideas, often in a research context.
- That students know how to apply the acquired knowledge and their ability to solve problems in new or unfamiliar environments within broader (or multidisciplinary) contexts related to their field of study.
- That the students be able to integrate knowledge and face the complexity of making judgments based on information that, being incomplete or limited, include reflections on the social and ethical responsibilities linked to the application of their knowledge and judgments.
- That the students be able to communicate their conclusions and the knowledge and the ultimate reasons that sustain them to both, specialized and non-specialized publics in a clear and unambiguous way.

- That students possess the learning skills that allow them to continue studying in a way that will be largely self-directed or autonomous.
- To identify and apply the insights of the theory, the models, and the analytical tools of modern economy to its global dimension.
- To understand and apply the quantitative methods used to solve complex problems of the economy
- To evaluate, with theoretical and quantitative instruments, the complex realities of the economy to understand the way it works.

### **Learning outcomes**

- Recognizes the statistical, econometric and analytical instruments required for economic analysis.
- Applies analytical and quantitative tools to economic problems, formulating the suitable hypotheses and using the necessary tools.
- Analyzes complex problems.
- Uses evidence to solve new problems and develops an adequate analysis.