

61334 - Econometrics and Mathematical Instruments

Syllabus Information

Academic year: 2023/24

Subject: 61334 - Econometrics and Mathematical Instruments

Faculty / School: 109 - Facultad de Economía y Empresa

Degree: 525 - Master's in Economics

ECTS: 6.0

Year: 1

Semester: First semester

Subject type: Compulsory

Module:

1. General information

The objective of this course is to provide students with useful tools that can be used to analyze economic problems, both in axiomatic aspects and in those that require detailed quantitative analysis.

2. Learning results

The course includes the following learning tasks:

- Lectures (40 hours): compulsory attendance.
- Autonomous work (90 hours).
- Discussion and presentation of a final report (20 hours): compulsory attendance. The defense of the report will take place at the end of the course.
- Presentation and discussion, at the end of the course, of a significant collection of problems and exercises.

3. Syllabus

SECTION I. ADVANCED MATHEMATICAL INSTRUMENTS IN ECONOMIC ANALYSIS

Topic 1: MATHEMATICAL PROGRAMMING

- 1.1 Inequality constraints programs.
- 1.2 Kuhn-Tucker conditions.
- 1.3 Global optimality conditions.
- 1.4 Economic Analysis Applications.

Topic 2: OPTIMAL CONTROL THEORY

- 2.1 Hamiltonian. The Pontryagin maximum principle.
- 2.2 Dynamic programming.
- 2.3 Economic Applications.

Topic 3: MILLENNIUM PROBLEMS

- 3.1 The input-output framework.
- 3.2 Other Economic Analysis Applications.

SECTION II. ECONOMETRICS

Topic 1. General Linear Model: A critical view

- 1.1 Introduction
- 1.2 Basic hypothesis
- 1.3 OLS estimation
- 1.4. Restricted least squares

- 1.5. Testing
- 1.6. Generalized least squares
- 1.7. HAC/HAR Estimation

Topic 2. Panel data analysis

- 2.1. Introduction
- 2.2. Fixed effect model
- 2.3. Random effect model
- 2.4. Testing
- 2.5. Specification analysis

Topic 3. Qualitative dependent variables

- 3.1. Introduction
- 3.2. Problem
- 3.3. Linear probability model
- 3.4. Logit and Probit models
- 3.5. Goodness-of-fit measures
- 3.6. Interpretation of the models

Topic 4. Vector autoregressions

- 4.1. Introduction
- 4.2. VAR formulation
- 4.3. Estimation, checking and prediction
- 4.4. Causality and exogeneity
- 4.5. Impulse-response functions
- 4.6. Introduction to the use of common factors

Topic 5. Regression with integrated variables

- 5.1. Introduction
- 5.2. Estimation with integrated variables
- 5.3. Testing for unit roots
- 5.4. Cointegration and error correction mechanism

4. Academic activities

- Lectures and subsequent discussion between professor and students.
- Individual and voluntary assignments about open questions presented in class.

5. Assessment system

Assessment: continuous assessment system, or students who wish it have the opportunity to take a global final exam.