

**COURSE DATA****Data Subject**

Code	44942
Name	Econometrics
Cycle	Master's degree
ECTS Credits	5.0
Academic year	2022 - 2023

Study (s)

Degree	Center	Acad. year	Period
2242 - Master's Degree in Economics	Faculty of Economics	1	First term

Subject-matter

Degree	Subject-matter	Character
2242 - Master's Degree in Economics	1 - Instrumental matter	Obligatory

Coordination

Name	Department
BENEITO LOPEZ, PILAR	10 - Economic Analysis
BRETO MARTINEZ, CARLES	10 - Economic Analysis

SUMMARY

This course introduces the main methods of econometric analysis and their application to economics. The main goal of the course is to teach the students how to become both producers and critical consumers of empirical research. This is achieved by focusing both on the theoretical properties and on the practical implementation of the techniques.

The course starts introducing the classical linear regression model, assumptions about the explanatory variables and disturbances, properties of the least squares estimator and hypothesis tests. This first part of the course tries to provide all the students, those who have some training in undergraduate econometrics and those who have not, with an homogeneous basis. A second part of the course introduces the characteristics of non-spherical disturbances and the generalized least squares model, endogeneity issues and instrumental variables estimation, the generalized method of moments, the method of maximum-likelihood and simultaneous equations estimation.

The course also aims to develop the students' abilities to apply the methods to real data using the econometrics programme STATA.



PREVIOUS KNOWLEDGE

Relationship to other subjects of the same degree

There are no specified enrollment restrictions with other subjects of the curriculum.

Other requirements

Students will benefit greatly from any introductory undergraduate course of econometrics. Nevertheless, the course is orientated also to those without previous knowledge of econometrics. The assumption is that students have some training in basic statistical tools and linear/matrix algebra, which are extensively used in the course.

COMPETENCES (RD 1393/2007) // LEARNING OUTCOMES (RD 822/2021)

2242 - Master's Degree in Economics

- Students should apply acquired knowledge to solve problems in unfamiliar contexts within their field of study, including multidisciplinary scenarios.
- Students should be able to integrate knowledge and address the complexity of making informed judgments based on incomplete or limited information, including reflections on the social and ethical responsibilities associated with the application of their knowledge and judgments.
- Students should communicate conclusions and underlying knowledge clearly and unambiguously to both specialized and non-specialized audiences.
- Students should demonstrate self-directed learning skills for continued academic growth.
- Students should possess and understand foundational knowledge that enables original thinking and research in the field.
- Develop time management skills for learning: skills for organisation, planning and decision making in the process of learning advanced economics.
- Desarrollar la capacidad crítica, impulsar la inquietud y el interés investigador en el ámbito de la economía, especializarse en el manejo de material bibliográfico, en la utilización de bases de datos económicas y programas matemáticos y estadísticoeconómicos, así como aprender a transmitir de forma adecuada los resultados de investigadora a través de artículos científicos y ponencias en congresos.
- Know how to promote, in academic and professional contexts, technological, social or cultural progress in a knowledge-based society that is founded on the respect for: (a) fundamental rights and the principles of equal opportunities for men and women, which involves using an inclusive and egalitarian language that promotes the visibility of women; (b) the principles of equal opportunities and universal accessibility for people with disabilities, and (c) the distinctive values of a culture of peace and democratic values.



- Communicate orally and in writing using an inclusive and egalitarian language.
- Know how to properly use econometric techniques applied to the analysis of the functioning of the economy.

LEARNING OUTCOMES (RD 1393/2007) // NO CONTENT (RD 822/2021)

On successful completion of the course, the student should be able to:

- discuss basic econometric concepts including, but not restricted to, linear regression, sample, i.i.d. errors and estimators properties;
- explain the method of ordinary least squares (OLS), write the classical linear regression model in matrix form and use it, explain its assumptions and discuss the properties of the estimators;
- demonstrate understanding of measures of goodness of fit including their uses and limitations;
- interpret and critically evaluate econometric results;
- demonstrate understanding of the principles of hypothesis testing and thorough knowledge of statistical distributions, their properties and uses;
- explain linear restrictions and carry out tests of the validity of linear restrictions;
- demonstrate understanding of dummy variables, be able to incorporate them in models and interpret the results;
- demonstrate understanding of spherical and non-spherical disturbances and heteroskedasticity and autocorrelation: its causes, consequences, tests of it and how to make progress in its presence;
- demonstrate understanding of the particular features of maximum-likelihood estimation and its usefulness;
- write a system of equations to represent economic relationships and use of different ways to estimate these models;
- use the course software to implement the econometric methods discussed in the course and demonstrate ability to analyse the output.

DESCRIPTION OF CONTENTS

1. Econometrics

1. LINEAR REGRESSION WITH i.i.d. ERRORS

- 1.1 Introduction.
- 1.2 OLS estimation.
- 1.3 Hypothesis testing.
- 1.4 OLS Asymptotics.



1.5 Dummy variables.

2. REGRESSION WITH non-i.i.d. ERRORS

- 2.1 Types of deviations from i.i.d. errors.
- 2.2 The robust estimator of the VCE.
- 2.3 The generalized least-squares estimator, GLS (and Feasible GLS).
- 2.4 Heteroskedasticity in the error distribution.
- 2.5 Serial correlation in the error distribution.

3. ENDOGENEITY

- 3.1 Endogeneity in economics relationships.
- 3.2 Instrumental variables estimation with 2SLS.
- 3.3 Identification and testing overidentifying restrictions.
- 3.4 The GMM estimator.
- 3.5 Testing overidentifying restrictions in GMM.
- 3.6 Testing for relevance of instruments.
- 3.7 Tests for endogeneity in IV estimation.

4. SIMULTANEOUS EQUATIONS MODELS

- 4.1 The nature of simultaneous equations models.
- 4.2 Simultaneity bias in OLS.
- 4.3 Identifying and estimating a structural equation.
- 4.4 Simultaneous equations models with time series.

5. THE METHOD OF MAXIMUM-LIKELIHOOD

- 5.1 Introduction. Preliminaries and examples.
- 5.2 General framework for conditional maximum-likelihood estimation (CML).
- 5.3 Consistency of CML.
- 5.4 Asymptotic normality and asymptotic variance estimation.
- 5.5 Hypothesis and specification testing.

Practical sessions: INTRODUCTION TO STATA

- The basics.
- Getting the data into STATA.
- Common data transformations.
- Organizing and handling economic data.
- Application of methods.



WORKLOAD

ACTIVITY	Hours	% To be attended
Theory classes	40,00	100
Classroom practices	10,00	100
Study and independent work	75,00	0
TOTAL	125,00	

TEACHING METHODOLOGY

The course is taught two-hour lectures and one and a half-hour tutorial (or practical class) per week.

- The lectures will focus on presentation of the theoretical concepts and models. To this purpose, students will count on material provided by the teacher in advance to the lectures. Following the text books is also essential to complement the theoretical lectures.
- The practical classes will be orientated to develop students' abilities in applying the theory to real data using the course software STATA. Students will need to solve some exercises (analytical and computer exercises) both in advance to the class and also during class time.

EVALUATION

Continual assessment counts for 35% of the total final grade and the final exam counts for 65%.

- Homework assignments all through the course count together for 15% of the grade.
- A final applied work counts for 10%, and a critical written report of one of the classmates' work counts for another 10%.
- The final exam grade counts for 65%. Minimum exam grade required for passing the course is 5 out of 10 points.

NOTE: The tasks of the continual assessment will be non-recoverable beyond the corresponding deadline.

REFERENCES



Basic

- Wooldridge, J.M. (2013). Introductory Econometrics: A Modern Approach, 5th edition. Cengage Learning (Previous editions: 2009, 2006, 2003).
- Greene, W.H. (2012). Econometric Analysis, 7th edition. Prentice Hall.
- Baum, Ch. F. (2006). An Introduction to Modern Econometrics Using STATA. STATA-Press.

Additional

- Wooldridge, J.M. (2002). Econometric Analysis of Cross-Section and Panel Data. The MIT Press.