UAB
Universitat Autònoma de Barcelona

Introduction to Econometrics

2026/2027

Code: 104874
Credits: 6

Degree programme	Type	Course
Applied Statistics	OB	2

Contact lecturer

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Group languages

You can consult this information at the end of the document.

Prerequisites

It is recommended that the student have studied mathematics, statistics and linear models that have given him knowledge in linear algebra, matrix analysis, theory of probability and inference statistics (estimation and contrast of hypotheses).

Objectives

This course introduces students to the empirical analysis of relationships between economic variables, providing the fundamental tools to interpret and apply econometric models in real-world contexts.

The course begins with the simple linear regression model, revisiting concepts covered in the Statistics course, and progresses to multiple regression, incorporating both quantitative and qualitative explanatory variables. The assumptions of the linear regression model will be studied in detail, and strategies to address potential violations of these assumptions will be explored. Additionally, the use of instrumental variables and binary response models, such as logit and probit models, will be introduced.

The main objective is for students to develop the ability to extract relevant information from data using the regression model, understanding its strengths and limitations with analytical rigor. Emphasis will be placed on an intuitive understanding of the theoretical foundations of econometric analysis, complemented by a strong practical orientation. Throughout the course, students will work with real data and econometric software, allowing them to apply the concepts learned to concrete problems and develop applied analytical skills.

Learning outcomes

- CM14 (Propose the statistical model needed to analyse data sets belonging to real studies.) Propose the statistical model needed to analyse data sets belonging to real studies.
- KM17 (Recognise the statistical models for the analysis of data with different structures and complexities that frequently appear in different fields of application.) Recognise the statistical models for the analysis of data with different structures and complexities that frequently appear in different fields of application.
- KM18 (Recognise the language of applications of economics and finances, biomedical science and engineering, provided by research and innovation in the field of statistics.) Recognise the language of applications of economics and finances, biomedical science and engineering, provided by research and innovation in the field of statistics.
- SM16 (Select appropriate sources of information for the statistical work.) Select appropriate sources of information for the statistical work.

- SM18 (Refine the information available for subsequent statistical processing.) Refine the information available for subsequent statistical processing.

Contents

(T: theory, S: problems or seminars, PS: preparation of problems or seminars, L: laboratories, PP: practical preparation, E: study, AA: other activities, indicate the number of hours dedicated to each activity)

Unit 1: Introduction

- What is economics?
- The two branches of economics.
- Economic models vs. econometric models.
- Types of data structures: cross-sectional, panel data and time series.
- Experimental, quasi-experimental, and observational data.
- Causality vs. correlation.

Unit 2: The Simple linear regression model

- Specification of the simple linear regression model.
- Basic assumptions of the linear regression model.
- Ordinary Least Squares (OLS) estimation.
- Hypothesis testing: single restriction.

Unit 3: The Multiple linear regression model

- Specification of the multiple linear regression model.
- Extension of the basic assumptions of the linear model.
- Ordinary Least Squares (OLS) estimation.
- Hypothesis testing: multiple restrictions.

- Coefficient of determination and goodness of fit.
- VIF (Variance Inflation Factor).

Unit 4: Specification errors

- Specification errors
- Missing relevant variables
- Inclusion of irrelevant variables
- Functional form erroneous
- Parameter instability.
- Diagnostic tests.

Unit 5: Violation of OLS assumptions

- Properties of OLS estimators: finite samples and asymptotics.
- Endogeneity
- Heteroscedasticity
- Autocorrelation
- Perfect and high multicollinearity.

Unit 6: Instrumental Variables and Two-Stage Estimation

- Causal identification and endogeneity.
- Instrumental variables: what they are and the conditions they must meet.
- Estimation methods: ratio and two-stage methods.
- Advanced topics: weak instruments, inference, and precision in IV.

Unit 7: Models with discrete dependent variable

- Maximum likelihood method.
- Linear probability model.
- LOGIT model.
- PROBIT model.
- Marginal effects: AME (Average Marginal Effects), MEM (Marginal Effects at Means), and MER (Marginal Effects at Representative values).

Learning activities and methodology

Title	Hours	ECTS	Learning outcomes
Theory	30	1.2	CM14, KM17, KM18
Study	45	1.8	KM17, KM18
Solving problems	30	1.2	CM14, KM17, SM18
Laboratory practices	45	1.8	CM14, KM17, KM18, SM16, SM18

Two hours of theoretical classes a week plus two of labs and guided teamwork for the applied essay (with econometric software) and resolution of exercises related to the contents explained in class in order to favor the assimilation of this knowledge by the student.

In this course, the use of Artificial Intelligence (AI) technologies is permitted only in the research project and exclusively for support tasks, such as literature or information searches, text proofreading, or the compilation of text and LaTeX code. Students must clearly identify any parts generated using these technologies, specify the AI tools used, and include a critical reflection on how these tools influenced both the process and the final outcome of the assignment.

Failure to disclose the use of AI in this assessed activity will be considered a breach of academic integrity and may result in a partial or full reduction of the assignment grade, as well as more severe disciplinary sanctions in cases of serious misconduct.

The course combines lectures with active learning methodologies aimed at promoting applied learning. In particular, it incorporates the following teaching strategies:

- Project-Based Learning (PBL): students work in groups to develop a research project in which they apply the econometric techniques covered in class to the analysis of a real social, political, or economic

issue using real-world data.
- Collaborative learning: the project is carried out in teams, fostering cooperation, shared decision-making, and collective responsibility.
- Formative and shared assessment: the assessment process incorporates peer assessment and self-assessment, encouraging students to reflect critically on their own learning as well as that of their peers.
- Responsible use of Artificial Intelligence: the course promotes the ethical and transparent use of AI tools to support literature searches, text revision, and other auxiliary tasks related to the research project, while encouraging students to reflect critically on the impact of these tools on the learning process.

Annotation: within the schedule set by the centre or degree programme, 15 minutes of one class will be reserved for students to evaluate their lecturers and their courses or modules through questionnaires.

Assessment

Continuous assessment activities

Title	Weight	Hours	ECTS	Learning outcomes
Final exam	50%	0	0	KM17, KM18
Delivery of Exercises	10%	0	0	KM17, KM18
Group applied project	20%	0	0	CM14, KM17, KM18, SM16, SM18
Midterm	20%	0	0	CM14, KM17, KM18

The activities to evaluate the subject will be:

1. Midterm exam. Written test to be held in class classroom about the subject explained. This test does NOT release matter and represents 20% of the final grade.
2. Group application project. The goal is to apply the econometric techniques learned in class to a relevant social, political, or economic issue. The project will be carried out in groups of 4 to 6 students, and will be jointly evaluated by the instructor and the group members themselves.Details and assessment criteria will be provided in Week 4. This project is mandatory in order to take the final exam. It accounts for 20% of the final grade, evaluated as follows:

70% instructor evaluation + 30% peer and self-evaluation.

4.Final exam. The final exam will cover all course material and will include both theoretical and practical components. To be eligible for the calculation of the final course grade, students must obtain a minimum score of 4.0 out of 10 on the final exam. Students who do not achieve this minimum score will not be eligible to have their final exam grade averaged with the grades obtained in the other assessment activities, regardless of their performance in those activities. The final exam accounts for 50% of the final grade.

5.Laboratory assignments. Throughout the semester, students will submit problem sets completed during the laboratory sessions, as well as a brief presentation of an academic article. These activities account for 10% of the final grade.

A student who has not participated in any of the described assessment activities will receive the \"Not presented\" qualification. If a student performs some of the assessment activities, even if it is only one, you can no longer opt for a \"Not Presented\".

Resit exams

Students whose final grade is below 5 may take the resit exam.

Students who obtain an overall average of 5.0 or higher, but who fail to achieve the minimum score of 4.0 out of 10 on the final exam, will also be eligible to take the resit examination, since obtaining this minimum score is a requirement for the calculation of the final course grade.

To be eligible, it is mandatory to have completed the final exam and submitted the practical assignment.

The final grade after the resit will be the higher of:

- 80% resit exam + 20% final project
- 100% resit exam

Bibliography

- Wooldridge, J.M. \"Introducción a la Econometría: Un Enfoque Moderno\" -Thomson Learning. (available online, UAB library)
- Stock, J.H. y Watson, M.M., \\textit{Introducción a la Econometría}, Pearson.
- Angrist, J.D., Pischke, J.S., Mostly Harmless Econometrics, Princeton University Press. (Opcional)

Software

The practical sessions will be conducted using R Studio.
Basic knowledge of LaTeX is recommended for writing the group research paper.

Course groups and languages

The information provided is provisional until November 30. After this date, you will be able to consult the language of each group through this link. To access the information, you will need to enter the course CODE

Type of teaching	Group	Language	Semester	Shift
(TE) Theory	1	Spanish	second semester	afternoon
(PLAB) Practical laboratories	1	Spanish	second semester	afternoon