

**COURSE DATA****DATA SUBJECT****Code:** 36112**Name:** Econometrics II**Cycle:** Undergraduate Studies**ECTS Credits:** 6**Academic year:** 2025-26**STUDY (S)**

| Degree                     | Center              | Acad. year | Period         |
|----------------------------|---------------------|------------|----------------|
| 1316 - Degree in Economics | Facultat d'Economia | 3          | Second quarter |

**SUBJECT-MATTER**

| Degree                     | Subject-matter | Character  |
|----------------------------|----------------|------------|
| 1316 - Degree in Economics | Econometrics   | COMPULSORY |

**COORDINATION**

SERRANO DOMINGO GUADALUPE

**SUMMARY**

Econometrics II introduces students to different regression models and methods for analyzing data in economics and related disciplines. The objective of the course is for the student to learn how to conduct  $\hat{\beta}$  and how to critique  $\hat{\beta}$  empirical studies in economics and related fields. Accordingly, the emphasis of the course is on acquiring an intuitive understanding of the principles of econometric analysis and applying them to actual data. The aim of the subject is, thus, to provide students with the basic knowledge of the discipline of Econometrics, which combines concepts from Economic Theory, Mathematics and Statistics, in order to provide the appropriate tools to analyse the economic reality and its evolution. It is therefore a subject of a high educational, practical and theoretical level that, together with the use of computer programs, provides students with a comprehensive view of the instruments of quantitative analysis of the economic reality.

The contents of the course Econometrics II focus on expanding the knowledge acquired in Econometrics I and on the study of certain special econometric problems. The first part of the course is dedicated to the study of endogeneity and some of the classical and modern methods for identifying causal relationships. Panel data are also introduced (estimation of unit and time fixed effects), along with some of the most widely used policy evaluation methods (causal analysis), and the estimation of models with binary dependent variables (Logit and Probit models). The second part focuses on the study of time series (dynamic models, stationarity, and ARIMA models for forecasting). Students are expected to apply prior knowledge acquired from various subjects previously studied: matrix algebra, calculus, statistics, and



econometrics.

Thus, this course offers an integrative and quantitative approach that enables the analysis of real economic problems based on statistical information, as well as economic forecasting. This equips students with the necessary tools for their future professional careers, whether they focus on advisory and consultancy work in the private and business sectors, or pursue a role as economists in companies and public institutions.

## PREVIOUS KNOWLEDGE

### RELATIONSHIP TO OTHER SUBJECTS OF THE SAME DEGREE

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

### OTHER REQUIREMENTS

There are not enrollment restrictions with other courses in the grade.

It is assumed that students have a basic working knowledge of linear algebra (e.g. matrix algebra, linear systems of equations), multivariate calculus (e.g. partial derivatives), elementary probability theory (e.g. joint distributions, conditional expectations, variances and correlations), and statistical inference (e.g. unbiasedness, confidence intervals)

## COMPETENCES / LEARNING OUTCOMES

### 1316 - Degree in Economics

Apply the principles of economic analysis (rational decision) to the diagnosis and resolution of problems.

Be able to collect and analyse information.

Be able to learn autonomously.

Be able to prepare and defend an economic report.

Be able to use ICTs.

Have decision-making skills and be able to apply knowledge to practice.

Know and understand the basic quantitative tools for economic analysis, diagnosis and prospection, such as mathematics, statistics and econometrics.

Understand and apply the scientific method, which involves formulating hypotheses, deducing verifiable results and contrasting them with empirical and experimental evidence.

## DESCRIPTION OF CONTENTS



1. OLS Bias/Inconsistency.

- 1.1 Non-compliance with the 'zero conditional mean' of the error. Causes: omitted variables, measurement errors, simultaneity (all are 'confounding factors').
- 1.2 The case of SIMULTANEITY in economic relationships, exclusion restrictions and identification
- 1.3 Instrumental variables estimation and MC2E (2SLS).
- 1.4 Properties of IV estimation.
- 1.5 Endogeneity test, instrument weakness, and instrument validity.

2. Panel data

- 2.1 Structure and benefits of panel data.
- 2.2 Time and individual fixed effects (two-way fixed effects, TWFE).
- 2.3 Fixed effects as a solution to unobservable heterogeneity biases.

3. The 'counterfactual' approach to identify causal relationships

- 3.1 Intuition: "What would have happened if...?" Parallelism with experimental data.
- 3.2 Presentation of some 'design' estimators: 'matching' estimators, diff-in-diff estimation, regression in discontinuity, and the synthetic control method.
- 3.3 Necessary conditions in each case to 'validate' the method.

4. Qualitative dependent variables

- 4.1 Discrete choice models.
- 4.2 Linear Probability Model, Logit and Probit.
- 4.3 Maximum Likelihood Estimation.
- 4.4 Interpretation of coefficients.

5. Dynamic models

- 5.1 Distributed lag models
- 5.2 Short- and long-term multipliers
- 5.3 Estimation with and without autocorrelated errors. Instrumental Variables
- 5.4 Tests for autocorrelation

6. Time series: forecasting with ARIMA models

- 6.1 Approaches to Economic Forecasting.
- 6.2 ARMA and ARIMA Processes.
- 6.3 Simple Autocorrelation Function and Partial Autocorrelation Function.
- 6.4 Identification, estimation, validation and prediction.

**WORKLOAD****PRESENCIAL ACTIVITIES**

| Activity            | Hours        |
|---------------------|--------------|
| Theory              | 30,00        |
| Classroom practices | 30,00        |
| <b>Total hours</b>  | <b>60,00</b> |

**NON PRESENCIAL ACTIVITIES**

| Activity                              | Hours        |
|---------------------------------------|--------------|
| Attendance at other activities        | 0,00         |
| Individual or group project           | 10,00        |
| Independent study and work            | 50,00        |
| Preparation of lessons                | 30,00        |
| Preparation for assessment activities | 0,00         |
| Resolution of case studies            | 0,00         |
| <b>Total hours</b>                    | <b>90,00</b> |

**TEACHING METHODOLOGY**

- In the theoretical classes, the presentation of the subject matter for each session is combined with the projection of summaries and the solving of exercises and practical cases proposed by the instructor, in order to enhance the understanding of the theory.
- In the practical classes, exercises will be solved on the board by both the instructor and the students, and computer-based exercises will be carried out individually or in groups.
- In addition to consulting the recommended bibliography, students will have access to course materials prepared for each topic, both theoretical and practical, which will be published in the virtual classroom in advance.

The practical assignments will be aimed at learning how to draft a report that explains the steps taken during the analysis of an economic problem: formulation and motivation of the problem and its analysis, the search for a simple economic model that relates the relevant variables of the problem, and the search for statistical information on those variables. Some national and international economic databases will be introduced, including electronic databases available on the OECD website, as well as databases from national or international organizations such as the National Statistics Institute ([www.ine.es](http://www.ine.es)), Eurostat (<http://ec.europa.eu/eurostat>), the United Nations (<http://unstats.un.org/unsd/default.htm>), or the Penn World Tables (<https://www.rug.nl/ggdc/productivity/pwt/>).

**EVALUATION**

**Final Grades:** the final grade will be the weighted sum of a final exam (70%) and the continuous assessment (30%). This continuous assessment can not be retaken.



The final exam is based on theoretical and practical questions about the contents of the course. The exam's grade will add the 70% of the final grade.

The continuous assessment is based on solving three assignments that include questions, exercises or short reports based on the contents of the course. These assignments will be solved throughout the course and will have to be submitted by the due date previously established. This continuous assessment, that will not be retaken (so it cannot be solved or submitted for the second call), will add the remaining 30% of the student's final grade.

**This grading will be applied both in the first and second call of the course.**

**Any attempt otherwise for cheating or plagiarism is the exam or in the assignments will automatically result in a student receiving 0 as his/her final grade.**

The official regulations of the centre regarding the evaluation and grading of subjects can be consulted at the following link:

[https://www.uv.es/graus/normatives/2017\\_108\\_Reglament\\_avaluacio\\_qualificacio.pdf](https://www.uv.es/graus/normatives/2017_108_Reglament_avaluacio_qualificacio.pdf)

## REFERENCES

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- Stock J.H. y Watson M.M. (2020) Introduction to Econometrics. 4th Edition, Global Edition. Pearson.
- Gujarati, D. (2014) Econometrics by example, 2nd Edition. Palgrave MacMillan
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- Heiss, F. (2016) Using R for Introductory Econometrics. Using the Independent Publishing Platform CreateSpace.