COURSE GUIDE

Econometrics 1 (2261131)

Approval date: 25/06/2025

Grado (Bachelor's Degree)	Grado en Economía (Bilingüe)	Branch	Social and Legal Sciences
Module	Métodos Cuantitativos	Subject	Econometría I

Year of study	3º	Semester	1º	ECTS Credits	6	Course type	Compulsory course

PREREQUISITES AND RECOMMENDATIONS

This subject is a continuation of the quantitative-oriented subjects. The student should have a solid understanding of the concepts and foundations covered in these subjects (Quantitative Techniques I and II) in order to better follow the Econometrics 1 classes. Additionally, familiarity with concepts from subjects related to the basic principles of Economics and Mathematics would also be beneficial.
In the case of using AI tools for the development of the subject, the student must adopt an ethical and responsible use of them. The recommendations contained in the document "Recommendations for the use of artificial intelligence in the UGR" (published in this location: https://ceprud.ugr.es/formacion-tic/inteligencia-artificial/recomendaciones-ia#contenido0) should be followed.

BRIEF DESCRIPTION OF COURSE CONTENT (According to the programme's verification report)

- Introduction: The role of Econometrics
- The classical linear regression model.
- Assumptions Least Squares Properties of estimators in finite samples
- Asymptotic properties. Laws of large numbers and limit theorems
- Inference and prediction. Restricted estimation. Maximum likelihood estimation
- Functional form, specification errors, and structural change
- Heteroscedasticity
- Autocorrelation
- Generalized Method of Moments

SKILLS

GENERAL SKILLS

- CG02 - Cognitive comprehension skills.
- CG03 - Ability to analyse and summarise.
- CG16 - Ability to engage in critical and self-critical reasoning.

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- CG18 - Ability to adapt to new situations
- CG19 - Creatividad o habilidad para generar nuevas ideas

SUBJECT-SPECIFIC SKILLS

- CE21 - Use basic quantitative tools for diagnosis and analysis.
- CE22 - Bring rationality to the analysis and description of any aspect of economic reality.
- CE31 - Identify the sources of relevant economic information and their content.
- CE32 - Communicate fluently in an environment and work in a team.
- CE33 - Conocer y aplicar los conceptos básicos de Estadística
- CE35 - Definición y comprensión de modelos de regresión múltiple, análisis y validez de la estimación, formulación de regresiones, análisis de ecuaciones simultánea
- CE36 - Modelos econométricos. Econometría y estimación de modelos económicos
- CE38 - Derive from the data relevant information not accessible to non-professionals.
- CE39 - Regularly use Information and Communication Technologies (ICTs) in their professional activities.
- CE41 - Apply professional criteria based on the use of theoretical instruments to the analysis of problems.
- CE43 - Motivation for quality.
- CE44 - Cuantificar relaciones de comportamiento entre variables económicas

TRANSFERABLE SKILLS

- CT01 - Through the knowledge and application of concepts learnt in the Bachelor's Degree (Grado), be able to identify and anticipate economic problems relevant to the allocation of resources, both in the public and private sectors.
- CT02 - Know, understand and apply the different economic models to provide rationality to the analysis and description of any aspect of reality, and be able to know the economic choice criteria of the different agents that make up society.
- CT03 - Learn to communicate fluently in an environment and to work in a team, both in a national and an international context.

LEARNING OUTCOMES

- Estimate and interpret the parameters of a linear regression model.
- Validate linear hypotheses about the propositions that theoretical models propose regarding the parameters.
- Make predictions about future values of dependent variables, assessing their reliability.

PLANNED LEARNING ACTIVITIES

THEORY SYLLABUS

1. The role of Econometrics
    1. The econometric method
    2. Economic models and econometric models
    3. Components of an econometric model: variables, parameters, and relationships
    4. Phases of the econometric method
    5. Nature of information used in Econometrics

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2. The classical multiple linear regression model
    1. Introduction
    2. The linearity assumption
    3. The assumption of full column rank
    4. The exogeneity assumption
    5. The causality assumption. The sample generating process
    6. Assumptions about the disturbance term
    7. The assumption of normality of the disturbance term
3. The ordinary least squares
    1. Introduction
    2. Regression by least squares
    3. Algebraic properties of least squares
    4. Normal equations.
    5. Goodness of fit.
    6. The role of the constant term
    7. Coefficient of determination and model selection
4. Properties of ordinary least squares estimators in finite samples
    1. Variance of OLS estimators. Unbiased and optimal linear estimation. The Gauss-Markov theorem
    2. Estimation of the disturbance term variance and the OLS estimators of model parameters
    3. The assumption of normality and inference on model parameters
    4. Hypothesis testing of model parameters. The general hypothesis test
    5. Confidence intervals for model parameters
    6. Testing the overall significance of the model, relationship with ANOVA
5. Prediction. Restricted estimation and maximum likelihood
    1. Point prediction and interval prediction
    2. Restricted least squares estimation. Estimator formula and variance
    3. Relative variation in the sum of squared residuals when restricting parameter values. The Chow test.
    4. Maximum likelihood estimation
6. Functional form and use of dummy variables
    1. Qualitative variables: Concept and specification with dummy variables
    2. The use of dummy variables in nonlinear models
    3. Structural change tests with dummy variables. Modeling and structural change tests
7. Generalized linear model
    1. Generalized least squares estimator
    2. Feasible Generalized Least Squares estimators
8. Heteroscedasticity
    1. Concept and causes of heteroscedasticity
    2. Goldfeld-Quandt test
    3. Breusch-Pagan test
    4. White test
    5. Test for equality of variances across different subsamples
    6. Estimation of models with heteroscedasticity
9. Autocorrelation
    1. Nature and causes of autocorrelation
    2. Consequences and detection of autocorrelation
    3. Tests for detecting autocorrelation
    4. Estimation of models with autocorrelated disturbances

PRACTICAL SYLLABUS

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The practical syllabus matches the theoretical one.

RECOMMENDED READING

ESSENTIAL READING

Wooldridge, Jeffrey M., 1960-. (2012). Introductory econometrics : a modern approach. Mason, Ohio :South-Western Cengage Learning,

COMPLEMENTARY READING

- Sánchez, C., López, M.M. y García, T. (2015). Econometría. Ed. Fleming.
- Sánchez, C. (1999). Métodos Econométricos. Ariel Economía. Barcelona.
- Herrerías, R. y Sánchez, C. (1995). Ejercicios de Econometría. Ed. Proyecto Sur.
- Gujarati, D. (1992). Econometría. Ed. McGraw Hill.
- Uriel, y otros (1990). Econometría. El Modelo Lineal. Ed. A. C.
- Johnston, J. (1987). Métodos de Econometría. Ed. Vicens-Vives.
- Salvatore, D. (1983). Econometría. Ed. McGraw Hill, Serie Schaum.
- Greene (1999): Análisis Econométrico. Ed. Prentice Hall.
- Martín, G. Labeaga, JM. y Mochón, F. (1997). Introducción a la Econometría. Ed. Prentice Hall.
- Guisán, MC (1997). Econometría. Ed McGraw Hill
- Intriligator y otros (1996): Econometric Models, Tecniques and Applications. Prentice Hall.
- Pulido, A. (1989). Modelos Econométricos. Ed. Pirámide.
- Novales, A. (1988). Econometría. Ed. McGraw Hill
- Kmenta. J. (1987): Elementos de Econometria- Ed- Vicens Vives.

RECOMMENDED LEARNING RESOURCES/TOOLS

1. PRADO Platform: http://prado.ugr.es

TEACHING METHODS

- MD01 - Face-to-face teaching in the classroom
- MD02 - Individual work by the student; retrieval, consultation and processing of information; problem solving and practical case studies; and completion of assignments and presentations
- MD03 - Individual and/or group tutoring and evaluation

ASSESSMENT METHODS (Instruments, criteria and percentages)

ORDINARY EXAMINATION DIET

The overall grade will correspond to the weighted score of the different aspects and activities

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that make up the evaluation system. The grading system will be expressed through a numerical grade according to the provisions of article 5 of Royal Decree 1125/2003, of September 5th, which establishes the European credit system and the grading system for official university degrees with validity throughout the national territory.
In order to assess the acquisition of the contents and competencies to be developed in the subject, a diversified evaluation system will be used, selecting the most appropriate evaluation techniques for the subject at each moment, which will allow to demonstrate the different knowledge and skills acquired by students when taking the subject.
Specifically, the overall grade for the continuous assessment system will correspond to the weighted score of the different aspects and activities that make up the evaluation system:

1. Continuous assessment (30%): Among the following evaluation techniques, one or several of them will be used:
    1. Written test: essay exams, multiple-choice tests, problem solving, cases or scenarios, short-answer tests, computer-based tests, reports, and class journals. Oral test: oral presentations in class, individual or group, on subject content (seminar) and on the execution of practical tasks corresponding to specific competencies.
    2. Observation: observation scales, where the student's behaviors in the execution of tasks or activities corresponding to the competencies are recorded.
    3. Techniques based on student attendance and active participation in class, seminars, and tutorials: work in small groups on proposed practical scenarios.
2. Written assessment (70%): It will consist of a theoretical part and a practical part. To pass the subject, it will be necessary to meet all of the following requirements:
    1. Obtain at least 35% of the score in the theoretical part of the written test.
    2. Obtain at least 35% of the score in the practical part of the written test.
    3. Obtain at least a minimum score of five points, on a scale of zero to ten, in the written test. In this case, to pass the subject, it will be necessary to obtain a minimum score of five points on the overall grade scale of zero to ten. If any of the THREE aforementioned requirements are not met, the overall grade for the subject in the regular examination period will be "Fail," with a numerical grade that will be the minimum of four points and the sum of the points obtained in the written part plus the continuous assessment. A student who does not take the final exam in the regular examination period will receive a grade of "Not present."

EXTRAORDINARY EXAMINATION DIET

In extraordinary examination periods, a single exam will be conducted and graded on a scale of 10 points, with 5 points for the theory part and 5 points for the practical part. The final grade will be the simple arithmetic average of the two parts. To calculate the average, a minimum of 35% in the theory part and 35% in the practical part is required.

SINGLE FINAL ASSESSMENT (evaluación única final)

Students who submit the corresponding request to the Department Director within the deadlines specified in the applicable regulations and whose request is approved will be eligible for the final single evaluation.
Additionally, students who are allowed to opt for the final single evaluation without the need to request it from the Department Director, in accordance with the evaluation and grading regulations of the University of Granada, may also avail themselves of this option.
Specifically, the procedure for evaluation through the final single evaluation system will be as follows:

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A single exam will be conducted and graded on a scale of 10 points, with 5 points for the theory part and 5 points for the practical part. The final grade will be the simple arithmetic average of the two parts. To calculate the average, a minimum of 35% in the theory part and 35% in the practical part is required.

ADDITIONAL INFORMATION

Information of interest to students with disabilities and/or Specific Educational Support Needs (SEN): Management of services and supports (https://ve.ugr.es/servicios/atencion-social/estudiantes-con-discapacidad).
Información de interés para estudiantado con discapacidad y/o Necesidades Específicas de Apoyo Educativo (NEAE): Gestión de servicios y apoyos (https://ve.ugr.es/servicios/atencion-social/estudiantes-con-discapacidad).

SOFTWARE LIBRE

The software that will be used in class is R-Studio.

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