

TEACHING GUIDE

MATHEMATICAL METHODS IN ECONOMICS I

GRADO EN ECONOMÍA (INGLÉS)

ACADEMIC YEAR 2026-27

Publication date: 05-07-2026



I.-Subject Identification

Type	OBLIGATORIA
Teaching period	1 course, 1Q semester
Nº of credits	4.5
Language in which the subject is taught	English

II.-Presentation

During her academic training, the school teacher will face a diverse and complex socio-educational reality that is essential to the development and acquisition of a set of skills in order to carry out her future career with quality guarantees.

Learning is justified in this respect and various methodologies will be explained in the present subject, allowing future school teacher to select the most suitable methodology to analyze, describe and interpret the educational phenomenon under study that he faces at each moment.

For these reasons, in this course, students will improve the knowledge acquired in Probability and Statistics during the secondary education, with the aim of analysing data during the research process.

III.-Learning outcomes

CT01. Ability to analyse and synthesise

CT02. Ability to organise and plan

CT07. Ability to solve problems

CT15. Ability to learn independently

CB01 .That students have demonstrated the possession and comprehension of knowledge in a field of study based on the foundations of general secondary education, at a level that, although supported by advanced textbooks, includes some aspects that imply knowledge proceeding from the forefront of the field of study.

CB02 . That students are able to apply their knowledge to their work or vocation in a professional manner and have the skills that are typically demonstrated through the preparation and defense of arguments and problem solving within their field of study.

CB03 . That students have the ability to gather and interpret relevant data (usually within their field of study) to express judgments that include a reflection on relevant topics related to social, scientific or ethical areas.

CE06. Ability to learn and apply the different qualitative techniques used in economics

- Key for degrees not adapted to RD 822/21: **CB** - basic competences, **CG** - generic competences, **CE** - specific competences, **CT** - transversal competences.

- Key for degrees adapted to RD 822/21: **CON** - knowledge, **COM** - competences, **HAB** - skills.



IV.-Contents

IV.A.-Syllabus

Themes	Lessons	Sections
1. Linear Algebra	Lesson 1: Vector spaces (AP), (AD)	1.1 Vector Space: definition and properties 1.2 Specific topics of vector spaces 1.3. Vector Spaces and matrices 1.4 Basis change 1.5 Vector Subspaces
	Lesson 2. Linear Maps (AP), (AD)	2.1. Linear maps. Classification 2.2 Associated Matrix of a linear Map 2.3 Composition and Inversion of linear Maps
	Lesson 3. Linear Transformations: Linear Sequential processes (AP), (AD)	3.1. Linear Transformations: Eigenvalues and Eigenvectors 3.2 Similar Matrices 3.3 Diagonalization of a square matrix 3.4 Linear sequential Processes
	Lesson 4. Real quadratic forms	4.1 Definitions 4.2 Definiteness and study of signs of Quadratic Forms
II. Analysis of one variable functions	Lesson 5: Analysis of magnitudes assessed by Functions. Limits and Continuous Behaviour of one variable functions. (AP), (AD)	5.1. Assessing magnitudes. Assessing Forms Explicitly assessed Economic Magnitudes 5.2 Limit at a point. Constrained limits. Directional Limits. Continuous Behaviour
	Lesson 6. Derivatives. Analysis of Behaviour (AP), (AD)	6.1 Behaviour and local Trend in one direction. Analysis of Behaviour and local Trend of real functions of one variable. Derivatives in several variables' functions. Matrices of partial Derivatives 6.2 Economic applications. Marginal Values and Elasticity
	Lesson 7. Primitive Calculus (AP), (AD)	7.1 Basic Integration: immediate integrals 7.2 Integration by parts 7.3 Integration of rational functions 7.4 Integration by change of variables
	Lesson 8. Continuous Distributions. Definite Integrals (AP), (AD)	8.1 Univariate continuous Magnitudes 8.2 Riemann Integral 8.3 Definite Integrals. Fundamental Theorems of Calculus



IV.B.-Training activities	
Type	Title
Lectures	Explanation of theoretical contents and solving problems
Lectures	Continuously solving exercises and problems related to the theory in class and/or online (AP), (AD)

V.-Student workload

Theoretical sessions	15
Resolution of exercises, problems, case studies, etc.	26
Practical sessions in experimental, technological and clinical laboratories, fieldwork, etc.	0
Tests and/or exams	4
Academic tutorials	12
Related activities: conferences, seminars, etc.	24
Preparation of theoretical sessions and self-study	10
Preparation of practical tasks, exercises, case studies, projects, etc.	24
Preparation for tests and/or exams	20
Total student workload	135

VI.-Methodology and academic programme

Type	Period	Content
Theoretical sessions	Week 1 to Week 14	Primitive Calculus and Continuous Distributions. Definite integrals (AP), (AD).
- to -	Worksheets and problems to solve	Theoretical sessions
Week 1 to Week 3	Vector spaces (AP), (AD)	Academic tutorials
Week 1 to Week 15	Mentoring to solve doubts and questions and to explain theoretical content and practical exercises.	- to -



VII.-Assessment methods

The general assessment method is continuous as established in the *Regulation for the Assessment of Learning Outcomes* of Rey Juan Carlos University.

All the assessment systems established in the degree report must be employed, except for those that have a minimum weight of 0%, which can be used by professors in the academic years they consider relevant. Each assessment system may be applied through one or more assessment activities, consistent with the system. No assessment activity can exceed individually 60% of the overall grade for the subject.

The sum of non re-evaluable activities cannot exceed 40% of the overall grade for the subject and, in general, should not have an established minimum grade (except for practical activities in which, strictly speaking, the conditions of the ordinary call cannot be reproduced in the extraordinary call).

Those students who do not manage to pass the subject in the ordinary call, or do not attend this first call, may attend the extraordinary call only for failed re-evaluable assessment activities.

The distribution and characteristics of the assessment activities are described below.

VII.A.-Description and weight of the assessment activities



Description of assessment tasks and their weighting

The assessment of this subject will be conducted through two written examinations, organized as follows:

Ordinary assessment:

Examination 1:

- Content:** Block I, Topics 1 to 4.
- Weighting:** 50%.
- Duration:** 60 minutes.

Examination 1 will take place during the teaching period and is eligible for reassessment during the extraordinary examination session.

Examination 2:

- Content:** Block II, Topics 5 to 8.
- Weighting:** 50%.
- Duration:** 60 minutes.

Examination 2 will take place during the ordinary assessment period on the official date established by the University and is eligible for reassessment during the extraordinary examination session.

Final Grade for the Subject:

The final grade for the subject will be the weighted average of both examinations. To pass the subject, a minimum score of 5 out of 10 must be achieved.

Examinations 1 and 2 are cumulative and final in nature. Therefore, if a student achieves a minimum score of 5 points in either examination during the ordinary session but does not pass the overall subject, that score will be preserved for the extraordinary assessment. Consequently, the student will only need to sit for the failed examination during that extraordinary session. However, if the student chooses to answer both examinations during the extraordinary session, it is understood that they waive the grades previously obtained in the ordinary session.

IMPORTANT: The dates for these examinations are OFFICIAL and are announced well in advance. Once published on the website as definitive, these dates cannot be adjusted or modified for individual students. The same criterion applies to examination reviews.

Extraordinary assessment:

The June/July reassessment will consist of examinations with characteristics similar to those described above.

For the proper progression in this subject, it is necessary for students to have acquired the core knowledge required in previous Secondary and Baccalaureate courses. It remains the student's responsibility, if necessary, to review this material to follow the classes successfully. This essential prerequisite knowledge includes matrices, determinants, systems of linear equations, derivatives of single-variable functions, and the graphical representation of functions.

During the first days of the course, the professor will detail the methodology to be followed, the office hours for tutorials, and more specific aspects regarding the assessment.

For the conduct of the classes, the professor will issue specific rules regarding punctuality, participation, and any other aspects deemed necessary. A student's continued presence in the classroom is contingent upon compliance with these rules, as well as with the academic conduct regulations published on the website:

<http://www.urjc.es/alumnos/normativa/archivos/Normativa%20conducta%20academica%20URJC.pdf>

Should the professor determine that the minimum conditions for the normal conduct of the class are not met, they will suspend the teaching activity and inform the corresponding academic body. Continuous attendance is highly recommended but will not be monitored; therefore, it is not a requirement to pass the subject. Attendance is, consequently, at the sole discretion of the student.

Special early examination session:

The assessment conditions will be identical to those of the ordinary examination session.

VII.B. Assessment of students with academic exemption from class attendance

Having Academic Exemption from Class Attendance (DAAC) does not imply that students are automatically exempt from participating in the continuous assessment activities or in the training activities of compulsory attendance as established in the teaching guide. Once the exemption has been granted, students must contact the subject's teaching staff, who will propose the adaptations he/she may consider relevant, as long as they guarantee the acquisition and adequate assessment of the learning goals established. Students must maintain adequate communication with the teaching staff so that they may provide information on the dates for training and assessment activities, if these are not established in the programme and available for students at the time of achieving the exemption.

Subject with possibility of academic exemption: Yes.

VII.C. Review of assessment activities

In accordance with the Regulation for the Assessment of Learning Outcomes of Rey Juan Carlos University.

VII.D.-Students with a disability or special educational needs

In order to guarantee equal opportunities, non-discrimination, universal accessibility and academic success, students with disabilities or especial education needs may request curricular adaptations to follow their studies. These adaptations will be provided by the Unit of Attention to People with Disabilities of Rey Juan Carlos University, in accordance with the regulation which regulates the service for the Attention of People with Disabilities at the University. This Unit will issue a report for curricular adaptations, so that students with disabilities or special education needs must contact the service (at e-mail discapacidad.programa@urjc.es) in order to provide relevant information for different educational alternatives.

VII.E.-Academic behaviour, academic integrity and honesty

Rey Juan Carlos University is fully committed to the highest standards of academic integrity and honesty, so studying at the URJC means assuming and subscribing to the values of integrity and academic honesty set out in the University's Ethical Code. To support this process, the University has Rey Juan Carlos University's Academic Conduct Regulation as well as different tools (anti-plagiarism, supervision...) that offer a collective guarantee for the full development of these essential values.



VIII.-Teaching resources and materials

Basic bibliography

Título: Problemas y Cuestiones de Algebra Lineal

Autor: Ortega Pulido, P.

Editorial: Círculo Rojo.

Title: Fundamental Methods of Mathematical Economics.

Author: Chiang, A; Wainwright, K.

Editorial: McGraw-Hill International Edition

Título: Problemas Resueltos de Matemáticas para Economía y Empresa

Autor: Cámara, A.; Garrido, R.; Tolmos, P.

Editorial: Paraninfo

Cámara, A. (2026). *Matemáticas aplicadas a la Economía y la Empresa*. ESIC Editorial

Consultation bibliography

Title: Mathematics For Economic Analysis

Author: Sydsaeter, K; Hammond, P.J

Editorial: Prentice Hall international Editions.

Title: Introductory Mathematical Economics

Author: Wade Hands, D.

Editorial: Oxford University Press

IX.-Professors

Name and surname	ANUBIS BRITA PÉREZ MALDONADO
E-mail address	anubis.perez@urjc.es
Department	Economía Financiera y Contabilidad
Campus	Madrid - Quintana
Category	Profesor/a Ayudante Doctor/a
Academic degree	Doctor
Person responsible for the subject	Yes
Tutorial timetable	Para consultar las tutorias póngase en contacto con el/la profesor/a a través de correo electrónico
Number of quinquennia	1
Number of sexennia	0
No. of positive evaluations by Docencia	1
Name and surname	GERMÁN GARCÍA BUTENEGRO
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Department	Economía Financiera y Contabilidad
Campus	Madrid - Quintana
Category	Profesor/a Ayudante Doctor/a
Academic degree	Doctor
Person responsible for the subject	No
Tutorial timetable	Para consultar las tutorías póngase en contacto con el/la profesor/a a través de correo electrónico
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