

TEACHING GUIDE
MATHEMATICAL METHODS IN ECONOMICS I

GRADO EN ECONOMÍA (INGLÉS)

ACADEMIC YEAR 2023-24

Date: 11-07-2023

I.-Subject Identification	
Type	OBLIGATORIA
Teaching period	1 course, 1Q semester
Nº of credits	4.5
Language in wich the subject is taught	English

II.-Presentation
<p>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.</p> <p>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.</p> <p>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.</p>

III.-Competences
<p>Generic competences</p> <p>CT01. Ability to analyse and synthesise CT02. Ability to organise and plan CT07. Ability to solve problems CT15. Ability to learn independently</p> <p>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.</p> <p>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.</p> <p>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.</p>
<p>Specific competences</p> <p>CE06. Ability to learn and apply the different qualitative techniques used in economics</p>

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

	<p>Lesson 8. Continuous Distributions. Definite Integrals (AP), (AD)</p>	<p>8.1 Univariate continuous Magnitudes 8.2 Riemann Integral 8.3 Definite Integrals. Fundamental Theorems of Calculus</p>
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IV.B.-Training activities	
Type	Title
Reading	Explanation of theoretical contents and solving problems
Reading	Continuously solving exercises and problems related to the theory in class and/or online (AP), (AD)

V.-Student workload		
Lecture classes	20	
Practical classes/resolution of exercises, case studies, etc.	22	
Practical sessions in technological laboratories, hospitals, etc.	0	
Tests	3	
Academic tutorials	10	
Related activities: conferences, seminars, etc.	3.5	
Preparation of lecture classes	25	
Preparation of practices, exercises, cases studies work	35	
Test preparation	16.5	
Total student workload	135	
VI.-Methodology and academic programme		
Type	Period	Content
Master classes	Week 1 to Week 14	Primitive Calculus and Continuous Distributions. Definite integrals (AP), (AD).
Master classes	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.

VII.-Assessment methods

VII.A.-Assessment weighting

Continuous ordinary assessment:

The distribution and characteristics of the assessment tests are those described below. Only in exceptional case and for special reasons may the teacher add changes to the Guide. These changes will require the prior consultation with the Subject Head and the prior and explicit authorisation of the Degree Programme Coordinator, who will notify the Vice-Rector's office in charge of Academic Affairs of the modifications made. In any case, the changes proposed must take into account the stipulations of the verified report. In order for these changes to take effect, they must be duly communicated at the start of the course to the students using Aula Virtual.

The combination of activities that are not re-assessable cannot exceed 50% of the subject grade and, in general, cannot have a minimum grade (except for the case of laboratory or clinical work placements, where duly justified), and tests which exceed 60% of the subject weighting cannot be added.

Extraordinary assessment: Students who do not manage to pass the ordinary assessment, or who did not attend, will be subject to completion of an extraordinary assessment to verify their acquisition of the skills established in the guide, only for activities that are re-assessable.

Description of the tests for assessment and their weights.

This score obtained by the student will as follows:

The evaluation of the subject will be carried out by means of two written tests carried out as indicated below:

•Test 1:

Contents: block I, topics 1 to 4.

Weight: 40%.

Time: 45 minutes.

Test 1 will be carried out during the school period, reassessable in the extraordinary call.

•Test 2:

Contents: block II, topics 5 to 7.

Weight: 60%.

Time: 70 minutes.

Test 2 will be carried out in the ordinary evaluation period, on the official date established by the University, reevaluable in the extraordinary call.

Final grade of the course:

The final grade for the course will be the weighted average grade of the two tests.

To pass the exam, the minimum grade is 5 out of 10 in all the tests.

Extraordinary assessment: the reassessment on June/July will be carried out with a similar test than the ordinary one.

In the first days of the course the teacher will point out the methodology to follow during the course, the tutorial schedule, and specific issues related to the evaluation. University students must participate responsibly in the activities and cooperate with the normal development of the sessions, respect the members of the university community and take care of and use the goods properly, university equipment and facilities. In particular for the development of the classes the teacher will dictate the rules about punctuality, participation and as many aspects as it deems to specify. The teacher will ensure proper compliance of these rules. The permanence of the student in the classroom is conditioned to the fulfillment of the same. In the next link, you can consult all related to the regulations regarding to the academic conduct that governs in the Rey Juan Carlos University https://www.urjc.es/images/Universidad/Presentacion/normativa/Normativa_conducta_academica_URJC.pdf

The dates of these exams are official and will be known in advance, so once published on the web as definitive, these dates cannot be adapted or changed for a particular student. The same criteria is followed for exam reviews. The June/July reevaluation will be developed with tests of similar characteristics to the previous one in ordinary call.

For the development of the subject it is necessary for the student to acquire the minimum knowledge he has got in previous courses in High School, being under the responsibility of the student, if necessary, to review them so that they are able to monitor classes. These minimal knowledge are those referring to matrices, determinants, linear equations systems, derivatives of one variable equations and graphical representation of functions. URJC, offers a zero mathematics course that is will be convenient to take in case the student does not have the necessary prior knowledge.

Also, during the first days of the course, the teacher will specify the methodology, the tutoring schedule and more specific aspects related to the evaluation.

In the case the teacher didn't have met the minimum conditions for a normal development of the session class, this could be discontinued and it will be informed to whom it may concern. Class attendance is recommended but it won't be controlled, so it is not a requirement to pass the course. Attendance is, therefore, a student responsibility.

VII.B. Assessment of students with an academic exemption

Student who wish to opt for this assessment will have to get an academic exemption for the subject, which they will have to request from the Dean or Director of the Centre which teaches their course. An academic exemption may be granted where the subjects own characteristics allow for it.

Subject with the possibility of an exemption: Yes

VII.C. Review of assessment tests

In accordance with the exam appeal regulations of the Universidad Rey Juan Carlos.

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

Curricular adaptations for students with a disability or special educational needs will be determined by the Disabled Students Support Department, in accordance with the regulations governing the Disabled Students Support service, approved by the Universidad Rey Juan Carlos Council, in order to guarantee equal opportunities, inclusive treatment, universal accessibility and a greater guarantee of academic success.

For this purpose, this Department will have to issue a curricular adaptation report, therefore students with disabilities or special educational needs must contact the Department to analyse the different alternatives together.

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

The Universidad Rey Juan Carlos is completely committed to the highest standards of academic integrity and honesty. Therefore, studying at the URJC means you accept and agree to the academic integrity and honesty values described in the University's Code of Ethics. In order to monitor this procedure, the University has Regulations on academic behaviour at the Universidad Rey Juan Carlos and uses different tools (anti-plagiarism, supervision?) which provides a collective assurance that these essential values are completely developed

VII.-Bibliography
Referecense Generic
Título: Problemas Resueltos de Matemáticas para Economía y Empresa Autor: Cámara, A.; Garrido, R.; Tolmos, P. Editorial: Paraninfo
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
Reference literature
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.-Lecturers/Teachers/Professors	
Lecturer/teacher/professor´s name	JAVIER MACIAS HORAS
E-mail address	javier.macias@urjc.es
Department/field	Economía Financiera y Contabilidad
Category	Profesor/a Visitante
Academic qualifications	Doctor
Subject Coordinator	Yes
Academic tutorial timetable	Para consultar las tutorias póngase en contacto con el/la profesor/-a a través de correo electrónico
Nº of Quinquenios	0
Nº of Sexenio	0
Nº period for technology transfer	0
Stretch Docentia	1

