

TEACHING GUIDE
MATHEMATICAL METHODS IN ECONOMICS II

GRADO EN ECONOMÍA (INGLÉS)

ACADEMIC YEAR 2023-24

Date: 10-07-2023

I.-Subject Identification	
Type	OBLIGATORIA
Teaching period	1 course, 2Q semester
Nº of credits	4.5
Language in wich the subject is taught	English

II.-Presentation
<p>Mathematical Methods for Economics attends to provide students with technical terminology, topics and tools which are necessary for some other disciplines such as Economic Theory or Applied Statistics. The subject consists of mathematical tools like Optimization and Integral Calculus that allow us to handle and solve economic and financial problems using different mathematical models.</p> <p>Goals, skills and competences to be adquired by students:</p> <ul style="list-style-type: none"> •To reinforce previous mathematical reasoning closer to economic analysis. •To provide students with the main mathematical knowledge and make them able to use them in other subjects. •To promote the use of mathematics for some other subjects <p>Skills required or prerequisites</p> <p>Good knowledge in mathematical topics and skills in Mathematical Methods in Economics I and notions of Basic integrals and Derivatives.</p>

III.-Competences
Generic competences
<p>CT01. Ability to analyse and synthesise</p> <p>CT02. Ability to organise and plan</p> <p>CT07. Ability to solve problems</p> <p>CT15. Ability to learn independently</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>CB04 . That students are able to transmit information, ideas, problems and solutions to both specialized and non-specialized audience.</p>
Specific competences
<p>CE01. Ability to put knowledge of economics into practice</p> <p>CE06. Ability to learn and apply the different qualitative techniques used in economics</p>

IV.-Contents		
IV.A.-Syllabus		
Themes	Lessons	Sections
I. Integral Calculus (II)	Lesson 1: Improper integrals	1.1 Improper integrals on infinite interval 1.2 Improper integrals of discontinuous functions (discontinuous integrand) 1.3 Gamma Integrals 1.4 Beta integrals
	Lesson 2: Differential equations. Continuous Dynamic analysis	2.1 First-order differential equations 2.2. Separable differential equations 2.3 Linear Differential Equations 2.4 Dynamic analysis and Economic Applications
II. Analysis of Multivariate Functions	Lesson 3: Limits and Behaviour of Multivariate Functions	3.1 Assessing multivariate magnitudes 3.2 Limits at a point. Constrained limits. Directional Limits. 3.3 Continuous behaviour
	Lesson 4: Differential calculus with several variables	4.1 Local behaviour in several real variables functions 4.2 Directional derivatives 4.3 Matrices of partial derivatives 4.4 Assessing economic functions: marginal values, Mean Values, elasticity
II. Optimization	Lesson 5: Optimization without constraints	5.1. Introduction to mathematical programming. Basic concepts 5.2 Programmes without constraints. Non-constrained Extreme Points 5.3. First-order optimality conditions: critical points 5.4. Necessary conditions of optimality 5.5 Second-order conditions of optimality 5.6. Economic Applications
	Lesson 6: Optimization with Equality constraints. Introduction to Linear programming: Graphical Solutions	6.1 Programmes with Equality constraints. Constrained Extreme Points 6.2 Solution by Elimination of variables 6.3 Necessary conditions of optimality. Lagrange theorem 6.4 Sufficient conditions of optimality 6.5 Analysis of sensibility

	Lesson 7: Double integrals	7.1 Bivariate distributed Magnitudes 7.2 Integral conditions 7.3 Marginal density's functions Reiterative integration 7.4 Computing Areas and volumes
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IV.B.-Training activities	
Type	Title
Practical / resolution of exercises	Solving exercises and worket problems related with the different topics allover the classes

V.-Student workload		
Lecture classes	15	
Practical classes/resolution of exercises, case studies, etc.	26	
Practical sessions in technological laboratories, hospitals, etc.	0	
Tests	4	
Academic tutorials	10	
Related activities: conferences, seminars, etc.	3.5	
Preparation of lecture classes	20	
Preparation of practices, exercises, cases studies work	36.5	
Test preparation	20	
Total student workload	135	
VI.-Methodology and academic programme		
Type	Period	Content
Master classes	Week 8 to Week 9	Differential calculus.
Master classes	Week 3 to Week 4	Differential equations.
Master classes	Week 5 to Week 6	Directional limits
Master classes	Week 10 to Week 12	Optimization with and without constraints.
Master classes	Week 13 to Week 14	Double integrals.
Master classes	Week 1 to Week 2	Improper and Eulerian integrals.

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.

Ordinary assessment:

The assessment and evaluation of this subject will consist in one-final exam that includes theoretical concepts and solutions of practical exercises or problems. To be accepted or pass the subject, students must demonstrate the required ability to interpret and solve given questions related to all the content covered during the lecture classes. The teacher will explain during the first lessons how the evaluation will be organized. Theoretical concepts consist in telling or defining the conceptual aspect of the given problem. The weights and system will follow the following scheme:

Type of evaluation	Weight	Period	Topics
Practical and theoretical tests	40%	During the academic period on dates and times previously indicated on time by the teacher	All the topics covered throughout the subject
Practical tests or problems	60%	During the academic period on dates and times previously indicated on time by the teacher	All the topics covered throughout the subject

Minimum score to pass the exam: **5 points out of 10 for the total of the score.**

Extraordinary assessment:

The extraordinary of June/July will consist in one final exam, taken on the date officially fixed by the University and will cover all the content of the different topics of the subject. Once more, to pass such extraordinary student must demonstrate skills and abilities related to the subject and obtain at least 5 points out of 10. The dates and periods of Exams are responsibility of the URJC and are announced with sufficient times and are not submitted to be modified by none of students.

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 aplicadas a la Economía y la Empresa. Autor: Calvo, M. y otros Editorial: Paraninfo
Título: Problemas Resueltos de Matemáticas para Economía y Empresa. Autor: Cámara, A.; Garrido, R.; Tolmos, P. Editorial: Paraninfo
Título: Métodos de Optimización. Autor: M. Dolores Solo Torres Editorial: Delta
Title: Fundamental Methods of Mathematical Economics Author:Alpha C. Chiang and Kevin Wainwright Editorial: McGraw-Hill International
Title: Mathematics For Economic Analysis Author:Knut Sydsaeter and Peter J. Hammond Editorial: Prentice Hall International Editions
Reference literature
Title: Introductory Mathematical Economics Author:D. Wade Hands Editorial: Oxford University Press

IX.-Lecturers/Teachers/Professors	
Lecturer/teacher/professor´s name	CLEMENT KANYINDA-MALU KABIENA
E-mail address	clement.kanyindamalu@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	2
Nº of Sexenio	1
Nº period for technology transfer	0
Stretch Docencia	3

