



1. General information

Course: MATHEMATICS FOR ECONOMICS II

Type: BASIC

Degree: 316 - UNDERGRADUATE DEGREE IN ECONOMICS

Center: 5 - FACULTY OF ECONOMICS AND BUSINESS

Year: 2

Main language: Spanish

Use of additional
languages:

Web site:

Code: 53309

ECTS credits: 6

Academic year: 2020-21

Group(s): 10 17

Duration: First semester

Second language:

English Friendly: Y

Bilingual: N

Lecturer: MARIA EMILIA GARCIA PEREZ - Group(s): 17

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Lecturer: GONZALO GARCIA-DONATO LAYRON - Group(s): 10 17

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2. Pre-Requisites

It is recommendable having taken the previous course Matemáticas I para la Economía and more concisely, the topics on Algebra: vector spaces, matrices, and quadratic forms and their classification. And on Calculus: dominium, continuity, derivatives and graphical representation of a function of a single variable; topology in the real line and integration methods.

3. Justification in the curriculum, relation to other subjects and to the profession

Matemáticas II para la economía is the second and last course about mathematics in the degree. This implies that it contains very important topics that are relevant in understanding great part of the rest of courses in the degree (and particularly those with a strong quantitative component). Matemáticas II is conceived to provide the student with the basic concepts of the analysis of several variables and an introduction to optimization methods.

In relation with professional skills, the main goal of the course is to introduce, from a mathematical perspective, the models and methods of quantitative analysis, including methods for decision making.

4. Degree competences achieved in this course

Course competences

Code	Description
E03	Ability to find economic data and select relevant facts.
E06	Application of profesional criteria to the analysis of problems, based on the use of technical tools.
G01	Possession of the skills needed for continuous, self-led, independent learning, which will allow students to develop the learning abilities needed to undertake further study with a high degree of independence.
G03	Develop oral and written communication skills in order to prepare reports, research projects and business projects and defend them before any commission or group of professionals (specialised or non-specialised) in more than one language, by collecting relevant evidence and interpreting it appropriately so as to reach conclusions.
G04	Ability for the use and development of information and communication technology in the development of professional activity.
G05	Capacity for teamwork, to lead, direct, plan and supervise multidisciplinary and multicultural teams in both national and international environments.

5. Objectives or Learning Outcomes

Course learning outcomes

Description

Enable student for autonomous work and learning, as well as for personal initiative

Train the student to listen to and defend arguments orally or in writing

Train the student to search for information in order to analyze it, interpret its meaning, synthesize it and communicate it to others.

Train the student to work out problems in creative and innovative ways.

To know the tools and methods for quantitative analysis of markets, sectors and companies, including models for decision-making and economic forecasting models.

6. Units / Contents

Unit 1: The $\mathbb{R}^n$ space

Unit 1.1 Introduction and basic concepts

Unit 1.2 Basic topological aspects of $\mathbb{R}^n$

Unit 2: Functions of several variables

Unit 2.1 Previous definitions

Unit 2.2 Limits and continuity

Unit 2.3 Derivatives and differentiability

Unit 3: Vectorial functions of several variables

Unit 3.1 Previous definitions

Unit 3.2 Limits and continuity

Unit 3.3 Derivatives and differentiability

Unit 4: Multiple integration

Unit 4.1 Multiple definite integration. Definition and properties

Unit 4.2 Double integrals over rectangular, type I and type II regions

Unit 4.3 Change of variables. Polar coordinates

Unit 5: Introduction to optimization problems

Unit 5.1 Introduction to modeling. Basic concepts of optimization problems

Unit 5.2 Types of problems. Classification of main methods to solve problems. Weirstrass theorem

Unit 5.3 Convexity analysis. Local-global theorem

Unit 6: Classic programming

Unit 6.1 Optimization without restrictions

Unit 6.2 Optimization subject to equality restrictions

Unit 7: Optimization subject to inequality restrictions

Unit 7.1 Standard form

Unit 7.2 Kuhn-Tucker conditions of optimality

7. Activities, Units/Modules and Methodology

Training Activity	Methodology	Related Competences (only degrees before RD 822/2021)	ECTS	Hours	As	Com	Description
Class Attendance (theory) [ON-SITE]	Lectures	E03 G01	1.33	33.25	N	-	
Class Attendance (practical) [ON-SITE]	Problem solving and exercises	E06 G01	0.67	16.75	N	-	
Progress test [ON-SITE]	Cooperative / Collaborative Learning	E06 G01 G03 G04 G05	0.1	2.5	Y	N	
Progress test [ON-SITE]	Assessment tests	G01 G03	0.1	2.5	Y	N	
Final test [ON-SITE]	Assessment tests	G01 G03	0.1	2.5	Y	Y	
Study and Exam Preparation [OFF-SITE]	Self-study	E03 E06 G01 G03 G04	1.4	35	N	-	
Other off-site activity [OFF-SITE]	Self-study	G01	2	50	N	-	
Other off-site activity [OFF-SITE]	Problem solving and exercises	G01 G04	0.2	5	Y	N	
Group tutoring sessions [ON-SITE]	Group tutoring sessions	G01 G03 G05	0.1	2.5	Y	N	
Total:			6	150			
Total credits of in-class work: 2.4			Total class time hours: 60				
Total credits of out of class work: 3.6			Total hours of out of class work: 90				

As: Assessable training activity

Com: Training activity of compulsory overcoming (It will be essential to overcome both continuous and non-continuous assessment).

8. Evaluation criteria and Grading System

Evaluation System	Continuous assessment	Non-continuous evaluation*	Description
Assessment of problem solving and/or case studies	10.00%	0.00%	Activity
Progress Tests	20.00%	0.00%	A midterm individual exam
Final test	70.00%	100.00%	A final exam with a weight of 70%
Total:	100.00%	100.00%	

According to art. 4 of the UCLM Student Evaluation Regulations, it must be provided to students who cannot regularly attend face-to-face training activities the passing of the subject, having the right (art. 12.2) to be globally graded, in 2 annual calls per subject, an ordinary and an extraordinary one (evaluating 100% of the competences).

Evaluation criteria for the final exam:

Continuous assessment:

Minimum 40% in the final exam.

Non-continuous evaluation:

The final exam will consist of the necessary tests (written or oral) to validate the competences of the subject

Specifications for the resit/retake exam:

For the resit evaluation the students will have an exam that counts 90% and the remaining corresponds to half the grade in the group activities during the regular

period. Similar criteria will be applied for the non-continuous evaluation as in the regular case.

Specifications for the second resit / retake exam:

No evaluation criteria have been entered.

9. Assignments, course calendar and important dates	
Not related to the syllabus/contents	
Hours	hours
Unit 1 (de 7): The R^n space	
Activities	Hours
Class Attendance (theory) [PRESENCIAL][Lectures]	33.25
Class Attendance (practical) [PRESENCIAL][Problem solving and exercises]	16.75
Progress test [PRESENCIAL][Cooperative / Collaborative Learning]	2.5
Progress test [PRESENCIAL][Assessment tests]	2.5
Final test [PRESENCIAL][Assessment tests]	2.5
Study and Exam Preparation [AUTÓNOMA][Self-study]	35
Other off-site activity [AUTÓNOMA][Self-study]	50
Other off-site activity [AUTÓNOMA][Problem solving and exercises]	5
Group tutoring sessions [PRESENCIAL][Group tutoring sessions]	2.5
Global activity	
Activities	hours
Class Attendance (theory) [PRESENCIAL][Lectures]	33.25
Class Attendance (practical) [PRESENCIAL][Problem solving and exercises]	16.75
Progress test [PRESENCIAL][Cooperative / Collaborative Learning]	2.5
Progress test [PRESENCIAL][Assessment tests]	2.5
Final test [PRESENCIAL][Assessment tests]	2.5
Other off-site activity [AUTÓNOMA][Self-study]	50
Other off-site activity [AUTÓNOMA][Problem solving and exercises]	5
Group tutoring sessions [PRESENCIAL][Group tutoring sessions]	2.5
Study and Exam Preparation [AUTÓNOMA][Self-study]	35
Total horas: 150	

10. Bibliography and Sources						
Author(s)	Title/Link	Publishing house	Citv	ISBN	Year	Description
Caballero, R.E., Calderón, S., Galache, T.P., González, A.C., Rey, M.L. y Ruiz, F.	Matemáticas aplicadas a la economía y la empresa. 434 ejercicios resueltos y comentados	Ediciones Pirámide			2000	
Chiang, A.C. and Wainwright, K.	Fundamental Methods of Mathematical Economics	McGraw-Hill			2005	
Fuente, A.	Mathematical methods and models for economists.	Cambridge University Press.			2000	
Guzmán, L., Sánchez, M., Muñoz, A. y Santos, J.	Fundamentos matemáticos para la administración y dirección de empresas. Análisis y Optimización	Editorial Centro de Estudios Ramón Areces, S.A.			1999	
Martín, Q.; Santos, M.T. y De Paz, Y.	Investigación operativa	Pearson Prentice-Hall.			2005	
Purcell, E.J. y otros	Cálculo. (8a edición).	Prentice-Hall.			2001	
Stewart, J.	Cálculo multivariable. (4a edición).	Thomson.			2002	
Uña, I., San Martín, J. y Tomeo, V.	Problemas resueltos	Thomson.			2007	
Apostol, T.M.	Calculus. Vol. 1 y Vol 2. (2a edición).	Reverte.			1994	
Barbolla, R.; Cerdá, E. y Sanz, P.	Optimización	Prince-Hall.			2001	
Besada, M., García, F.J., Miras, M.A. y Vázquez, C.	Cálculo de varias variables. Cuestiones y ejercicios resueltos	Prentice Hall			2001	