UNIVERSIDAD DE CASTILLA - LA MANCHA
GUÍA DOCENTE

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: 2019-20
Group(s): 10 17
Duration: First semester
Second language:
English Friendly: Y
Bilingual: N

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

Building/Office	Department	Phone number	Email	Office hours
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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 is 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 Rn space
    Unit 1.1 Introduction and basic concepts
    Unit 1.2 Basic topological aspects of Rn

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	R	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	N	
Progress test [ON-SITE]	Assessment tests	G01 G03	0.1	2.5	Y	N	Y	
Final test [ON-SITE]	Assessment tests	G01 G03	0.1	2.5	Y	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	Y	N	Y	
Other off-site activity [OFF-SITE]	Problem solving and exercises	G01 G04	0.2	5	Y	N	Y	
Group tutoring sessions [ON-SITE]	Group tutoring sessions	G01 G03 G05	0.1	2.5	Y	N	Y	
		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
R: Rescheduling training activity

8. Evaluation criteria and Grading System

Evaluation System	Grading System		Description
	Face-to-Face	Self-Study Student	
Assessment of problem solving and/or case studies	20.00%	0.00%	Activities to be solved in groups of three to four students. There have been programmed three of these activities: the first one with a weight of 10% and each of the two others with a 5% weight.
Progress Tests	10.00%	0.00%	A midterm individual exam to evaluate the progress of the student with a weight of 10%. This exam covers the units 1,2 and 3.
Final test	70.00%	0.00%	A final exam with a weight of 70%
Total:	**100.00%**	**0.00%**	

Specifications for the resit/retake exam:

For the resit evaluation the students will have an exam that counts 80% and the remaining 20% is obtained in the following way: 10% in an extra activity proposed by the teacher before the exam and 10% that corresponds to half the grade in the group activities during the regular period.

9. Assignments, course calendar and important dates

Not related to the syllabus/contents

Hours	hours

Unit 1 (de 7): The Rn 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
Other off-site activity [AUTÓNOMA][Problem solving and exercises]	5
Group tutoring sessions [PRESENCIAL][Group tutoring sessions]	2.5
Other off-site activity [AUTÓNOMA][Self-study]	50
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
Total horas:	150

10. Bibliography and Sources

Author(s)	Title/Link	Publishing house	City	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	