

COURSE DESCRIPTION

MATHEMATICS I

1ST YEAR 1ST SEMESTER

DEGREE: BUSINESS ADMINISTRATION

IN-CLASS TEACHING

ACADEMIC YEAR: 2021/2022

SCHOOL OF BUSINESS AND ECONOMICS

1. COURSE IDENTIFICATION

1.- COURSE:

Name: Mathematics I		
Code: 18287		
Year(s) course is taught: First	Semester (s) when the course is taught: First	
Type: Compulsory	ECTS: 6	Hours ECTS: 60
Language: English and Spanish	In-class teaching	
Degree (s) in which the course is taught: Business Management		
School of Business and Economics		

2.- ORGANIZATION OF THE COURSE:

Department: Applied Mathematics and Statistics
Area of knowledge: Applied Mathematics

2. LECTURERS OF THE COURSE

1.-LECTURERS:

Instructor in charge	CONTACT DETAILS
Name:	M ^a Carmen Escribano Ródenas
Phone (ext):	91 456 63 00 ext. 15365
Email:	escrod@ceu.es
Office:	0.03 B
Lecturer (s)	
Name:	Pablo Arés Gastesi
Phone (ext):	91 456 6300 ext. 15366
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Office:	0.04 B
Lecturer (s)	
Name:	
Phone (ext):	
Email:	
Office:	

2.- TUTORIALS:

For any queries students can contact lecturers by e-mail, phone or visiting their office during the teacher's tutorial times published on the students' Virtual Campus.

3.COURSE DESCRIPTION

The student should be able to apply the key mathematical tools used in the solution of economic and business problems. To achieve this aim, the student should acquire mathematical skills at topics such as: modelling of economic processes, application of matrix analysis, resolution of linear equations systems, the study of differentiation of economic functions in one and several real variables.

4.SKILLS

1.- SKILLS

Code	Basic and General Skills
CB1	Students have shown to have and understand knowledge in an area of study that draws from the basis of general secondary education, and is usually found at a level that, although it rests on advanced textbooks, also includes certain aspects that imply knowledge obtained at the forefront of their field of study.
CB5	Students have developed those learning skills necessary to undertake subsequent studies with a high degree of autonomy.
CG01	Applying analytical and critical thinking, and its oral and/or written communication.

Code	Specific Skills
CE8	Understanding and applying mathematical models that allow the design of economic models that facilitate decision making in business organizations.

2.- LEARNING OUTCOMES:

Learning outcomes
- Model and solve economic problems through systems of linear equations and matrix calculus.

- Apply differential calculus to economic functions.
- Model and find optimal solutions to problems with real functions, without constraints and with equality constraints.

5. EDUCATIONAL ACTIVITIES

1.- DISTRIBUTION OF STUDENTS' ASSIGNMENT:

Total hours of the course	180
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Code	Name	On-campus hours
AF2	Seminar	56
AF5	Assessment tests	4
TOTAL Hours		60

Code	Name	Not on-campus hours
AF6	Independent Work	120

2.- EDUCATIONAL ACTIVITIES:

Educational Activity	DEFINITION
AF2 seminar	A classroom-seminar training activity that, under the guidance of the professor, either individually or in a group, focuses on completing exercises, or resolving problems or practical cases, which demonstrates understanding of the theory studied.
AF5 Assessment tests	A training activity intended to assess the acquisition of knowledge and/or competencies by the student.
AF 6 independent work	A training activity in which the student independently manages what they have learned through the study of training materials or activities initiated by professors.

6. ASSESMENT OF LEARNING

1.- CLASS ATTENDANCE:

- To be eligible for examination by continuous assessment students must attend at least 75% of scheduled class time (attendance sheets will be used). As students may be absent 25% of the classes, no attenuating circumstances will be accepted for absences.

2.- ASSESSMENT SYSTEM AND CRITERIA:

ASSESSMENT SYSTEM		
Code	Name	Percentage
AS4	Written or computer-based examination on exercises, problems, cases, and so forth.	80
AS9	Submission of exercises	20

ORDINARY EVALUATION

The student's evaluation will be carried out taking into account the following criteria:

Continuous assessment is scored with 60% of the final grade.

- Two controls during the semester. The assessment of each one will be 20% of the final grade.
- 20% will be obtained by carrying out transversal group activities that may require the use of digital tools.

Both the dates of the controls and the different activities of continuous evaluation will be included in the schedule of each group at the beginning of the semester.

The remaining 40% of the final grade for the course corresponds to the final test that will take place on the official date established by the Secretary of the Faculty. To pass the course it is necessary to obtain a minimum grade of three points out of ten in the final exam of the ordinary call for the course.

Once the calendar of activities or face-to-face tests (exams, practices, exercises, assignments, presentations, etc.) has been set in advance, to guarantee equal conditions for all students, said tests will not be repeated for the student (s) that they did not attend them.

EXTRAORDINARY EVALUATION

Students who fail the ordinary evaluation must make the final examination of the extraordinary call, which will cover all topics in the syllabus.

The criteria of assessment for the ordinary evaluation will not be considered in the extraordinary evaluation, and the grade of the student will be based solely on the result of the extraordinary examination.

7. COURSE SYLLABUS

1.- COURSE SYLLABUS:

THEORETICAL:

Topic 1: LINEAR ECONOMIC MODELS

- 1.1. Linear relationships between economic magnitudes. Vector spaces.
- 1.2. Systems of Linear Equations.
- 1.3. Diagonalization and Quadratic Forms.
- 1.3. Economic Applications.

Topic 2: REAL FUNCTIONS OF ONE AND SEVERAL REAL VARIABLES

- 2.1. Analysis of functions of several variables as an extension of the functions of a real variable.
- 2.2. Topology. Limits and Continuity.
- 2.3. Derivative as rate of change Directional derivatives, partial derivatives, gradient, Hessian matrix.
- 2.4. Economic applications: marginal values and elasticity, indifference curves.

Topic 3: HOMOGENEOUS FUNCTIONS

- 3.1. Definition and concept of homogeneous function of real variables.
- 3.2. Euler's theorem
- 3.3. Economic applications: returns to scale and Cobb Douglas functions.

Topic 4: DIFFERENTIABILITY AND OPTIMIZATION

- 4.1. Differential concept. Approach.
- 4.2. Elementary indefinite integrals
- 4.3 Free optimization of functions of several variables.
- 4.4. Initiation to optimization with equality constraints. Lagrange multipliers.

PRACTICAL:

At the end of each theoretical block, a series of practical exercises will be carried out. The teacher shall solve some exercises with the participation of the students. The students must solve some problems given as homework and hand them back to the teacher. Such homework, as well as other complementary and support documentation, will be available in the Students Portal.

8. BIBLIOGRAPHY

1.- BASIC BIBLIOGRAPHY:

ANTON, H. (2004): Elementary Linear Algebra, Wiley

CALVO, M.; ESCRIBANO, M.C.; FERNÁNDEZ, G.; GARCÍA, M.C.; IBAR, R.; ORDÁS, P. (2003): Problemas Resueltos de Matemáticas aplicadas a la economía y la empresa. Editorial Paraninfo.

CHIANG, A.C. and WAINWRIGHT, K. (2013): Fundamental methods in Mathematical Economics, Tata Mgraw Hill

GUTIÉRREZ, S.; FRANCO, A. (2003): Matemáticas aplicadas a la Economía y a la Empresa. Editorial Paraninfo.

HUGHES-HALLETT, D and others (2012): Calculus, Wiley (6th Edition)

STEWART, J (2001): Calculus, Brooks Cole (7th Edition)

SYDSAETER, K.; HAMMOND, P. (2010):
Matemáticas para el Análisis Económico. Edit. Prentice Hall.

2.- ADDITIONAL BIBLIOGRAPHY:

A. THEORETICAL:

BALBÁS, A.; GIL, J.A.; GUTIÉRREZ, S. (1990):
Análisis Matemático para la Economía I y II. Editorial. Paraninfo.

BLANCO, S.; GARCÍA, P. ; DEL POZO, E. (2004) :
Matemáticas Empresariales I. Enfoque teórico-práctico. Vol. 1. Álgebra Lineal. Edit. Paraninfo.

BLANCO, S.; GARCÍA, P.; DEL POZO, E. (2004):
Matemáticas Empresariales II. Enfoque teórico-práctico. Vol. 2. Cálculo Diferencial. Edit. Paraninfo.

BRANDLEY; SMITH (1998):
Cálculo I y II. Edit. Prentice Hall.

CHIANG, A. (1992):
Métodos Fundamentales de Economía Matemática. Edit. Mc Graw Hill.

GRAFFE, J. (1990):
Matemáticas para economistas. Edit. Mc Graw Hill.

HOFFMAN, L.D. and BRADLEY, G.L. (2007): Calculus for Business, Economics and the Social and Life Sciences, Mcgrall Hill (10th Edition)

JACQUES, I. (2003): Mathematics for Economics and Business, Prentice Hall

LOWELL, M. (2004): Economics with Calculus, World Scientific

PERLOFF, J.M. (2016): Microeconomics: Theory and Applications with Calculus, Pearson

PISKUNOV (1990):
Cálculo Diferencial e Integral. Edit. Montaner y Simón.

QUINTANILLA, J. (2020):
Matemáticas avanzadas para Economía y ADE. Servicio publicaciones Universidad de Córdoba.

SÁNCHEZ, M. (2014):
Matemáticas avanzadas para la Economía. Ed. Sanz y Torres, S.L.

B. PRACTICAL:

ALEGRE Y OTROS (1991):
Ejercicios Resueltos de Matemáticas Empresariales I y II. Edit. Paraninfo.

CABALLERO FERNÁNDEZ Y OTROS (2000):
Matemáticas aplicadas a la economía y a la empresa, 434 ejercicios resueltos y comentados. Editorial Pirámide.

DOWLING, E.T. (1982):

Matemáticas para economistas. Teoría y 1752 problemas resueltos. Edit. Mc Graw Hill. Serie Schawn.

FRANCO, J.R. (2003):

Introducción al Cálculo. Problemas y ejercicios resueltos. Editorial Pearson. Prentice Hall.

MARTIN, P.; ÁLVAREZ, J.; GARCÍA, A.; GETINO, J.; GONZÁLEZ, A.; LÓPEZ, D. (2004):

Cálculo. Delta Publicaciones.

SANZ, VÁZQUEZ, ORTEGA (1998):

Problemas de Álgebra Lineal. Cuestiones, ejercicios y tratamiento en Derive. Edit. Prentice Hall.

VILAR, J.L.; GIL, J.A.; GUTIÉRREZ, S.; HERAS, A. (1993):

Cálculo Diferencial para la Economía. Un enfoque teórico-práctico. Edit. Paraninfo.

3.- WEB RESOURCES:

- American Mathematical Society: www.ams.org
- Asociación Española de Profesores Universitarios de Matemáticas para la Economía y la Empresa, ASEPUMA: www.asepuma.org
- Divulgamat: www.divulgamat.es
- GeoGebra: www.geogebra.com
- Instituto GeoGebra Maslana de Madrid: <https://geogebra.smpm.es/>
- Mathematical Association of America: www.maa.org
- Real Sociedad Matemática Española: www.rsme.es
- Sociedad Española de Matemática Aplicada: www.sema.org.es
 - Wolfram Alpha: www.wolframalpha.com

9. ATTITUDE IN THE CLASSROOM

1.- REGULATIONS

Students must behave in accordance with the Faculty and University regulations. This includes both attending class punctually and on a regular basis and displaying a participative attitude in class whilst at the same time carrying out the academic tasks and exercises set by the teacher.

Any infringement of Academic Integrity (plagiarism, misuse of electronic devices in the classroom; mobile telephones, tablets or computers or misuse of unauthorized information during examinations) as well as signing registers for absent classmates will result in the loss of entitlement to Continuous Evaluation and any other disciplinary action which may be applicable. The teaching unit will decide on the disciplinary action to be applied in each individual case

10. EXCEPTIONAL MEASURES

Should an exceptional situation occur which prevents continuing with face-to-face teaching under the conditions previously established to this end, the University will take appropriate decisions and adopt the necessary measures to guarantee the acquisition of skills and

attainment of learning outcomes as established in this Course Unit Guide. This will be done in accordance with the teaching coordination mechanisms included the Internal Quality Assurance System of each degree.