



COMILLAS

UNIVERSIDAD PONTIFICIA

ICAI

ICADE

CIHS

Syllabus
2026 - 2027

TECHNICAL SHEET OF THE SUBJECT

Data of the subject	
Subject name	Business Mathematics I
Subject code	E000011441
Main program	Bachelor's Degree in Business Administration and Management
Involved programs	Grado en Administración y Dirección de Empresas (E-2) [First year] Grado en Administración y Dirección de Empresas y Grado en Derecho [First year] Grado en Administración y Dirección de Empresas con Mención en Internacional (E-4) [First year] Grado en Administración y Dirección de Empresas y Grado en Relaciones Internacionales [First year] Grado en Administración y Dirección de Empresas (E-2) - en inglés [First year] Grado en Psicología y Grado en Administración y Dirección de Empresas [First year] Grado en Psicología + Grado en Administración y Dirección de Empresas [First year]
Level	Reglada Grado Europeo
Quarter	Semestral
Credits	6,0 ECTS
Type	Básico
Department	Departamento de Métodos Cuantitativos
Coordinator	GLORIA MARTÍN ANTON

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SPECIFIC DATA OF THE SUBJECT

Contextualization of the subject
Contribution to the professional profile of the degree
A graduate in Business Administration needs a strong capacity for abstract thinking in order to operate effectively in the business world. The ability to perform quantitative modelling and to use a formalized language, both of which are largely developed through this course, are essential skills.
Prerequisites
None. Students are encouraged to use the videos from the PREUMAT course, which are available to them through Moodle.

Competencies - Objectives	
Competences	
GENERALES	
CG1	Adquirir una base de conocimientos sólida y relevante sobre la disciplina científica y empresarial



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	RA1	Capacidad de expresarse en lenguaje matemático
	RA2	Capacidad de utilización de las matemáticas en otras materias del grado
CG14	Capacidad para aprender y trabajar autónomamente.	
	RA1	Desarrolla habilidades necesarias para el estudio e investigación independiente
	RA2	Encuentra por sí mismo aplicaciones y extensiones de los conceptos y metodologías estudiadas
CG2	Capacidad de gestionar información y datos provenientes de fuentes diversas para hacer un análisis crítico y un correcto diagnóstico de la realidad empresarial.	
	RA1	Capacidad para la formulación en lenguaje matemático de los problemas que surgen en la gestión empresarial y de la resolución de los mismos.
ESPECÍFICAS		
CE8	Conocimiento de técnicas matemáticas que permiten modelizar y resolver problemas en el ámbito económico-empresarial	
	RA1	Ante un enunciado de un problema empresarial es capaz de utilizar los instrumentos matemáticos que mejor representan el problema.
	RA2	Apoyándose en el análisis gráfico, verbal y los datos cuantitativos y cualitativos es capaz de integrarlos en modelos gradualmente más complejos.
	RA3	Es capaz de aplicar correctamente a los problemas empresariales el álgebra lineal, análisis funcional, cálculo integral y búsqueda de óptimos.

THEMATIC BLOCKS AND CONTENTS

Contents - Thematic Blocks
BLOQUE I: INTEGRAL THEORY
TOPIC 1: INTEGRAL THEORY
1.1 The concept of primitive function.
1.2 The concept of Riemman integral.
1.3 The properties of the Riemman integral.
1.4 The integral function.
BLOQUE II: LINEAR ALGEBRA
TOPIC 2: VECTOR SPACES



2.1 Vector spaces

2.2 Generators

2.3 Linear dependence vs linear independence

2.4 Basis and dimension of a vector space. Change of basis

2.5 Vector subspaces

2.6 Scalar product, norm and orthonormal vector

TOPIC 3: LINEAR MAPPING

3.1 The concept of linear mapping. Analytic expression and change of basis

3.2 Diagonalization of square matrices.

3.3 Diagonalization of symmetric matrices.

TOPIC 4: QUADRATIC FORM

4.1 The concept of quadratic form

4.2 The kinds of quadratic forms

4.3 Classification criteria for a quadratic forms

TEACHING METHODOLOGY

General methodological aspects of the subject

In-class Methodology: Activities

Theoretical classes

General classes on the introduction to the subject

Public presentations of topics and coursework

Solutions to problems and exercises

CG1, CG2, CG14, CE8

Non-Presential Methodology: Activities

Office hours and extra sessions

Group activities

Supervised work

CG1, CG2, CG14, CE8



SUMMARY STUDENT WORKING HOURS

CLASSROOM HOURS		
Lecciones de carácter expositivo	Ejercicios y resolución de casos y de problemas	Sesiones tutoriales
34.00	21.00	16.00
NON-PRESENTIAL HOURS		
Sesiones tutoriales	Estudio individual y/o en grupo y lectura organizada	
9.00	70.00	
ECTS CREDITS: 6,0 (150,00 hours)		

EVALUATION AND CRITERIA

The use of AI to produce full assignments or substantial parts thereof, without proper citation of the source or tool used, or without explicit permission in the assignment instructions, will be considered plagiarism and therefore subject to the University's General Regulations.

Evaluation activities	Evaluation criteria	Weight
- Final examination consisting of theoretical and practical questions. - Students will be assessed on their reasoning skills and their mastery of the course concepts.	- The examination is common to all students enrolled in the course. - To have the continuous assessment mark taken into account, students must obtain a minimum score of 4 out of 10 in the final examination.	70 %
WRITTEN MIDTERM EXAM 1st midterm exam on Topic 1 2nd midterm exam on Topic 2 y 3 3st midterm with the note around 4 Quiz Homework and another assigned works	- The average score over the three partial exams - Homework and another assigned works: positive valorations	30 %

Ratings

FINAL SCORE:

Written final exam: 70%

Written assessments: 25%, based on the average of the following three marks:

- Mark obtained in Written Test 1: Topic 1



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- Mark obtained in Written Test 2: Topics 2 and 3
- Average mark obtained from around the four in-class quizzes

Coursework: positive impact on grade 5%

- Final week Quiz
- Class participation.
- Participation in individual as well as general office hours
- Class presentation Voluntary submission of work
- MatLab exercises
- Critical way of using AI

FINAL COMMENTS

- Any student action aimed at obtaining a higher grade fraudulently will result in a score of zero for the corresponding assessment tool, without prejudice to any disciplinary consequences that may arise.
- If artificial intelligence tools are used in any submission, it is necessary to clearly state that such tools were used. The resulting product must not be mistaken for the student's own work in order to avoid being considered a fraudulent action. The use of AI will be strictly prohibited in any exam or continuous assessment test.
- Using AI to create complete assignments or significant parts of them without citing the source or the tool, or without explicit permission in the assignment description, will be considered plagiarism and will be regulated in accordance with the University's General Regulations.
- Failure to attend class, according to the academic rules of each Faculty, may result in the student being unable to sit for the ordinary exam.
- If a student cannot take a test, it can only be rescheduled with a medical certificate or other relevant documentation. If the absence is not justifiable—due to illness or a serious incident—the test will not be rescheduled.
- Exams can only be rescheduled in the case of a serious, justified cause and will always take place with all students in similar situations on a Friday afternoon.

EXTRAORDINARY CALL

- The better of the two marks obtained will be used; either 100% of the exam or applying 70% plus 30%.

BIBLIOGRAPHY AND RESOURCES

Basic Bibliography

Giménez Abad, M^a J., Martín Antón, G. y Serrano Rey, A.: Matemáticas para ADE. Teoría y ejercicios. Editorial Pearson. Madrid 2020

Complementary Bibliography

- Martínez Estudillo, Francisco J.: "Introducción a las Matemáticas para la Economía". Editorial DDB. 2005
- Sydsaeter, K. y Hammond, P.J.: "Matemáticas para el análisis económico". Editorial Prentice Hall. 1999
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