



COMILLAS

UNIVERSIDAD PONTIFICIA

ICAI

ICADE

CIHS

Syllabus
2024 - 2025

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 (E-2)
Involved programs	Grado en Administración y Dirección de Empresas (E-2) [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) - Bilingüe en inglés [First year] Grado en Psicología y 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

Teacher Information	
Teacher	
Name	María Gloria Martín Antón
Department	Departamento de Métodos Cuantitativos
Office	Alberto Aguilera 23 [C434]
E-Mail	gmartin@icade.comillas.edu
Teacher	
Name	Luis Ángel Calvo Pascual
Department	Departamento de Métodos Cuantitativos
Office	4th floor, west wing
E-Mail	lcalvo@icai.comillas.edu
Teacher	
Name	Ana Zapatero González
Department	Departamento de Métodos Cuantitativos
Office	4th floor, west wing
E-Mail	azapatero@icade.comillas.edu
Teacher	
Name	Francisco de Asís de Ribera Martín
Department	Departamento de Métodos Cuantitativos



Office	4th floor, west wing
E-Mail	fadribera@comillas.edu
Teacher	
Name	Juan Iribas de la Puerta
E-Mail	jiribas@icade.comillas.edu
Teacher	
Name	Miriam González de Rábago
Department	Department of Applied Mathematics
E-Mail	mgderabago@icai.comillas.edu
Teacher	
Name	Patricia Yagüe Inglada
Department	Departamento de Métodos Cuantitativos
E-Mail	pyague@icade.comillas.edu
Teacher	
Name	Pedro Ciller Cutillas
Department	Departamento de Métodos Cuantitativos
E-Mail	pedro.ciller@comillas.edu

SPECIFIC DATA OF THE SUBJECT

Contextualization of the subject

Contribution to the professional profile of the degree

To succeed in the modern business world, the student with a bachelor degree in Business is required to exhibit skills that require abstraction. The ability to build quantitative models as well as to synthesize complex information by making use of a formal language are skills that will be taught in the subject

Prerequisites

None. However, It is highly recommended that a student attends the pre-entry Mathematics course offered by the Campus Preuniversitario during the last week of August.

Competencies - Objectives

Competences

GENERALES

CG1	Adquirir una base de conocimientos sólida y relevante sobre la disciplina científica y empresarial	
	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 intregal.
- 1.3 The properties of the Riemman intregal.
- 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	CG1, CG2, CG14, CE8
General classes on the introduction to the subject	
Public presentations of topics and coursework	
Solutions to problems and exercises	

Non-Presential Methodology: Activities

Office hours and extra sessions	CG1, CG2, CG14, CE8
Group activities	
Supervised work	

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

Evaluation activities	Evaluation criteria	Weight
<ul style="list-style-type: none"> Written final exam with theory and problems May include true/false questions or test 	<ul style="list-style-type: none"> Comprehensive and identical for all students enrolled in the subject Obtain at least a 4 in the written final exam 	70 %
<p>WRITTEN MIDTERM EXAM</p> <ul style="list-style-type: none"> 1st midterm exam on Topic 1 2nd midterm exam on Topic 2 3rd midterm exam on Topic 3 <p>Homework and another assigned works</p>	<ul style="list-style-type: none"> The average score over the three partial exams Homework and another assigned works: positive valorations 	30 %

Ratings

FINAL SCORE:

Written final exam: 70%

Written midterm exams: 25% over the average score, after dropping the lowest

- 1 st midterm exam on Topic 1
- 2 nd midterm on Topic 2
- 3 rd midterm on Topic 3

Coursework: positive impact on grade 5%

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

FINAL COMMENTS

- There is only one possibility to do written midterm exams just in timetable date. It is only possible to recover the exam with a justification for a serious cause and it will always be done with all classmates in a similar situation on a Friday afternoon.
- Use of fraudulent means used will result in a 0 in the corresponding activity. Furthermore, the student may be subject to disciplinary action.
- Use of any artificial intelligence tools should be clearly stated so as not to be mistaken as work done by the student. In the lack of



COMILLAS

UNIVERSIDAD PONTIFICIA

ICAI

ICADE

CIHS

Syllabus
2024 - 2025

such clarification the work may be subject to consideration as fraudulent.

- Failure to attend classes according to the regulations set by each faculty may result in the student not being allowed to take the final exam.

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
- <http://www.wolframalpha.com/>
- <https://www.geogebra.org/>
- E-LERNING COMILLAS PREU-MAT