

Bachelor Degree in Business Administration and Management and Business Transformation

Course: Mathematics applied to management

Subject: Mathematics

Credits: 6 ECTS

Program: Bachelor

Modality: On-sita

Year: First

Semester: First

Academic Year: 2026–2027

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2. Presentation

02.1 Description

The subject of Mathematics II, which is taught in the second semester of the first year of the Degree in Marketing and Digital Communication is the second and last subject of the subject of mathematics.

The course is divided into two parts: the first focuses on linear algebra, studying in some detail systems of linear equations, matrices and determinants, and also vectors and linear applications; the second part, considered as the continuation of mathematics I, focuses on the study of differential calculus and optimization of functions of various variables.

02.2 Relevant professional applications

The student will understand that mathematics does not represent a subject in itself, but must be understood as a tool to be used later in other fields (finance, economic analysis, etc.), a tool with which they can analyze different cases and make coherent professional decisions.

3. Learning outcomes of the degree

- RAT6 – The graduate will be able to understand the different data analysis techniques used to assess the feasibility of a business project.
- RAT9 – The student will be able to provide clear and precise explanations of any knowledge/information, both orally and in writing, in Catalan, Spanish and a third language, particularly English.
- RAT10 – The student will be able to apply digital technologies (at the right time) in his/her field of expertise.
- RAT13 – The graduate will be able to analyze the economic operations of companies, which have been carried out in the financial markets.
- RAT16 – The graduate will be able to understand the economic-financial information of business entities and institutions in relation to their environment. RAT18 – El estudiante podrá proponer soluciones innovadoras, creativas y emprendedoras en situaciones propias del ámbito profesional.
- RAT19 – The student will be able to evaluate the sustainability and social impact of the proposals presented, with ethical, environmental and professional responsibility.
- RAT20 – The student will be able to apply the gender perspective in the professional tasks.
- RAT21 – The graduate will be able to verify the economic-financial information of business organizations and institutions with regard to their environment, by analyzing the companies' profit and loss accounts.

4. Learning outcomes of the subjects

- RAM1 - The student will be able to demonstrate clearly the fundamental concepts related to linear algebra, differential calculus and integral calculus by performing written exercises.
- RAM2 - The student will be able to correctly solve enunciation problems using Venn diagrams with the basic techniques of linear algebra, by solving written case studies.
- RAM3 - The student will be able to adequately solve systems of linear equations through individual written exercises.
- RAM4 - The student will be able to correctly solve the diagonalization of third order square matrices through individual written exercises.
- RAM5 - The student will be able to precisely solve succession and function limits through individual written exercises.
- RAM6 - The student will be able to correctly calculate the convergence of a numerical series its sum by individual written exercises.

5. Contents

The course is divided into two parts: the first focuses on linear algebra, studying in some detail systems of linear equations, matrices and determinants, and also vectors and linear applications; The second part focuses on the study of differential calculus and the optimization of functions of various variables.

Topic 1. The Real Numbers

- 1.1. Real Number Sets
- 1.2. Some properties of real numbers
- 1.3. Exponents and radicals
- 1.4. Operations with algebraic expressions
- 1.5. Factoring
- 1.6. Fractions

Topic 2. Real Variable Functions and Graphical Representation Functions

- 2.1. Special functions
- 2.2. Combinations of functions
- 2.3. Inverse functions
- 2.4. Graphs in rectangular coordinates
- 2.5. Symmetry

Topic 3: Matrix

- 3.1. Introduction and objectives
- 3.2. Concept
- 3.3. Types of matrices
- 3.4. Operations with matrices
- 3.5 Matrix representation of systems of linear equations

Topic 4: Determinants

- 4.1. Introduction and objectives
- 4.2. Concept
- 4.3. Calculation of determinants

- 4.4. Inverse matrix
- 4.5. Solving Systems of Equations

Topic 5: Basic concepts about functions of a variable

- 5.1. Introduction and objectives
- 5.2. Mathematical functions
- 5.3. Domain and image
- 5.4. Graphical representation of linear functions: continuity of linear functions

Topic 6: Differential calculus of functions of a variable

- 6.1. Introduction and objectives
- 6.2. Preliminary concepts
- 6.3. Derived function
- 6.4. Calculation of derivatives

Topic 7: Applications of derivatives to the study of functions. Optimisation

- 7.1. Introduction and objectives
- 7.2. Growth and decrease
- 7.3. Relative extremes
- 7.4. Concavity and convexity. Turning points
- 7.5. Optimization

Topic 8: Integral calculus

- 8.1. Introduction and objectives
- 8.2. Concepts
- 8.3. Immediate integration
- 8.4. Fundamental theorem of calculus
- 8.5. Variable change method
- 8.6. Piecemeal method. Cyclical Special Cases
- 8.7. Applications of the defined integral

Topic 9. Multi-variable functions

- 9.1. Multivariable Functions
- 9.2. Partial derivatives
- 9.3. Applications of partial derivatives
- 9.4. Optimizing Multi-Variable Functions
- 9.5. Hessian Matrix
- 9.6. Maximums and minimums for two-variable functions
- 9.7. Lagrange Method

Topic 10: Introduction to Finance

- 10.1. Introduction and objectives
- 10.2. Financial capital
- 10.3. Financial Law. Properties
- 10.4. Financial Transaction
- 10.5. Interest rates

- 10.6. Arithmetic Progressions and Simple Interest
- 10.7. Geometric Progressions and Compound Interest
- 10.8. Capital valuation
- 10.9. Project evaluation

Topic 11: Introduction to Set Theory and Combinatorics

- 11.1. Introduction and objectives
- 11.2. Basis of Set Theory
- 11.3. Main sets and their relationships
- 11.4. Bases of combinatorics
- 11.5. Variations and permutations
- 11.6. Combinations
- 11.7. Combinatorial numbers

Application through examples and exercises of Corporate Social Responsibility to ensure a better sustainable community and continuity in the awareness of its importance.

6. Metodology

Learning outcomes developed	Teaching methodology	Training activities
Knowledge	Master class	Teacher's presentations
	Instructional sessions	Student's presentations
	Tutoring	Meetings for the resolution of doubts
	Learning based on readings	Reading and analysis of documents
Skill	Learning based on projects	Problem solving
	Learning based on audio-visual	Audiovisual analysis
	Case-based learning	Search and processing of information. Problem solving

7. Evaluation

Evaluation system	Weight
Continuous evaluation: exercises, problems, reporting, papers, case studies	40 %
Mid-term exam	20 %
Final exam	40 %

The regulations include the obligation of 75% attendance.

- Absences are divided into two categories: justified and unexcused. Excused absences are those that can be demonstrated with a proof. All other absences are considered unjustified absences.
- The supporting documents must be delivered within a maximum period of 7 days to the teaching staff and clearly include the student's personal data as well as the date and time in which the student did not attend to a class.

Continuous assessment

The final grade for the subject is calculated based on the weighting of three evaluation blocks, divided into evaluable activities:

A. Midterm exam: 20%

B. Exercises, problems, preparation of reports, assignments, presentations: 40%

1. Four evaluable activities: 5% each
2. A group assignment or report: 10%
3. A group presentation: 10%

C. Final exam: 40%

These three blocks will only be weighted if the final exam grade is equal to or greater than 4.0. If the final exam grade is less than 4.0, the subject cannot be passed.

In the event that the subject is failed and, in turn, the final exam grade is less than 5.0, the student can recover the final exam with an additional test. If the weighted grade for the activities in section B is less than 5, this is also recoverable. With the result obtained, the final grade for the subject will be calculated according to the previous criteria.

Students who do not attend evaluative activities with a weight greater than 50% will receive an overall course grade of "Not presented."

Single Evaluation

The single evaluation consists of a single exam that is equivalent to 100% of the course grade. The exam, and therefore the subject, is passed with a grade of 5 out of 10 in this final test. In case of obtaining a grade lower than 5.0, the student has the right to a make-up exam.

To benefit from the single evaluation, it is necessary to send a written request to the coordination during the first 15 business days of the course.

The regulations establish a mandatory attendance requirement of 75%.

Regular attendance at in-person teaching activities is a fundamental academic requirement for the proper acquisition of the course competencies and learning outcomes. Accordingly, students must attend at least **75% of all scheduled sessions**.

Failure to meet this minimum attendance requirement will result in the loss of the right to sit the final examination for the course. Consequently, the student will receive a failing grade, with no possibility of accessing reassessment procedures or second-chance examinations, in accordance with the University's current academic regulations.

1. Absences are divided into two categories: **excused** and **unexcused**. Excused absences are those that can be supported by appropriate documentation. All other absences will be considered unexcused.
2. Supporting documentation for excused absences must be submitted to the teaching staff within a maximum of **7 days** and must clearly include the student's personal details, as well as the date and time period during which attendance in class was prevented.

8. Bibliography

- College Mathematics for Business, Economics, Life Sciences, and Social Sciences plus MyLabMathematics with Pearson eText, Global Edition, 15th Edition, 2021 Raymond A. Barnett
Raymond A. Barnett, Michael R. Ziegler, Karl E. Byleen, Christopher J. Stocke
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- R. Larson, B. Edwards. Cálculo, Tomo I. Décima edición. Ed. Cengage Learning, 2016.