COURSE GUIDE 2025/26

| **Faculty** | 151 - Faculty of Economics and Business. Álava Department | **Cycle** | . |
| **Degree** | GADEMP10 - Bachelor's Degree in Business Management & Administration | **Year** | First year |

COURSE

| 25824 - Mathematics I | **Credits, ECTS:** | 6 |

COURSE DESCRIPTION

¿Mathematics I¿ is a 1st course basic subject in the Degree of Business Administration and Management.

COMPETENCIES/LEARNING RESULTS FOR THE SUBJECT

The learning results of the subject will be:
¿ Understand and handle notation and mathematical language.
¿ Skills to manipulate algebraic expressions.
¿ Understand notions and problems of economic content expressed in mathematical language.
¿ Pose, solve and interpret algebra problems.
¿ Pose, solve and interpret problems of differential calculation of functions of a variable.

In addition, in this subject the students will work the following transversal competences:
¿ Autonomous learning
¿ Ability of analysis and synthesis
¿ Decision-making and problem-solving

Theoretical and Practical Contents

PART I: LINEAR ALGEBRA
Topic 1.- MATRICES AND VECTORS.
¿ Matrices: operations with matrices
¿ Types of matrices
¿ Vectors: operations with vectors
¿ Geometric meaning of vectors and operations between vectors
¿ Scalar product of vectors. Module (length) of a vector. Distance between two points.
¿ Linear dependency/independence between vectors
Topic 2.- DETERMINANTS AND IVERSE MATRICES
¿ Determinant of a square matrix
¿ Order determinant less than or equal to the third party
¿ Superior to third order determinant
¿ Properties of determinants
¿ Creating zeros in a determinant
¿ Inverse of a matrix.
¿ Properties of the reverse matrix
¿ Calculation of the inverse matrix
Topic 3.- RANGE THEORY AND SYSTEMS OF LINEAR EQUATIONS
¿ Linearly dependent and independent vectors
¿ Range of a matrix
¿ Properties of the range of a matrix
¿ Calculation of the range of a matrix
¿ System of linear equations. Matrix and vector expression
¿ Compatibility study: Rouché-Fröbenius theorem
¿ Homogeneous linear systems
¿ Matrix methods for solving linear systems
¿ Linear systems with economic significance
Topic 4.- DIAGONALIZATION OF MATRICES
¿ Approach to the problem
¿ Diagonalization of matrices
¿ Applications of diagonalization

PART II: CALCULATION IN A VARIABLE
Topic 5.- FUNCTIONS OF A VARIABLE
¿ More frequent functions
¿ Domain of a function
¿ Inverse function.
¿ Functions defined by pieces. Absolute value function.

Topic 6.- LIMITS, CONTINUITY AND DERIVATION OF FUNCTIONS
¿ Limits of a function at one point.
¿ Properties of the limits
¿ Operations with infinites. Indeterminations
¿ L¿hôpital rule for resolution of indeterminate limits.
¿ Continuity.
¿ Definition of derivative. Geometric meaning. Derivable function at one point.
¿ Successive derivatives. Chain rule.
¿ Derivation of implicit functions.
¿ Derivatives in economics.
Topic 7.- CONTINUITY AND DERIVABILITY
¿ Properties of continuous functions
¿ Properties of continuous and derivable functions
¿ The differential of a function. Meaning
¿ Polynomial approach of functions.
Topic 8.- INTEGTRATION
¿ Indefinite Integral.
¿ General and economic applications of the indefinite integral
¿ Defined integral: concept and properties.
¿ Economic applications of the defined integral

TEACHING METHODS

The organisation of this subject will be distributed according to the division that is established in the official schedule between master class sessions and classroom practice sessions.

In the master class sessions the various topics that make up the subject will be developed. These may have a theoretical or practical character. The theoretical classes have as objective the introduction and justification of the concepts and results that are part of the subject. The compression and expansion of the contents of the subject is favored by the use of the recommended basic manuals. With the practical orientation classes, it is intended that the student manage to properly assimilate and manage the concepts introduced in the theoretical part.

The practical classroom sessions seek to strengthen the knowledge and mastery of the learned procedures, as well as investigate their practical use in situations close to economic reality. To this end, these sessions are proposed as classes of directed work. These exercises will be performed individually and in some sessions cooperatively, and will be available on the e-gela platform

TYPES OF TEACHING

Types of teaching	M	S	GA	GL	GO	GCL	TA	TI	GCA
Hours of face-to-face teaching	51	0	9						
Horas de Actividad No Presencial del Alumno/a	72	0	18						

Legend:
M: Lecture-based S: Seminar GA: Applied classroom-based groups
GL: Applied laboratory-based groups GO: Applied computer-based groups GCL: Applied clinical-based groups
TA: Workshop TI: Industrial workshop GCA: Applied fieldwork groups

Evaluation methods

- Continuous evaluation
- End-of-course evaluation

Evaluation tools and percentages of final mark

- Written test, open questions   50%
- Exercises, cases or problem sets   50%

ORDINARY EXAMINATION PERIOD: GUIDELINES AND OPTING OUT

The lectures will be aimed at continuous evaluation and attendance and participation in teaching sessions. The student may choose between being evaluated with this continuous evaluation or a final evaluation.

In this subject we will work the transversal competence of problem solving and decision making based on reasoned judgments, autonomous learning and capacity for analysis and synthesis at level 1. For the development of this competence, a series of practical tasks will be proposed that will be described in detail in the guide for students.

A more detailed description of the continuous evaluation system can be found in the student's guide included in the e-gela

Although we will prioritize a continuous assessment, the students will have the right to be evaluated through the final evaluation system, regardless of whether they have participated in the system of continuous evaluation. Students who opt for a final evaluation system will be able to prove the achievement of knowledge and competences inherent in the subject through a single final test.

EXTRAORDINARY EXAMINATION PERIOD: GUIDELINES AND OPTING OUT

In the extraordinary call there will be a single final exam that will comprise 100 % of the subject. This will represent 100 % of the qualification of the call or 50 % if the student have passed the exercises included in the continuous exam.

MANDATORY MATERIALS

The e-gela platform of the UPV/EHU will be used as a repository of information, where the necessary material will be published for the follow-up of the subject (program, teaching guide, proposed problems, practice guide and complementary resources) as for the development of evaluation tests.

BIBLIOGRAPHY

Basic bibliography

Edwards, C.H., Penney, D.E., Calvis, D.T. 2018. Differential Equations and Linear Algebra C. Henry Edwards, Global Edition. Pearson Education

Detailed bibliography

Aleskerov, F., Ersel, H., Piontkovski, D. 2011. Linear Algebra for Economists. Springer.

Laurence D. Hoffmann, L.D., Bradley, GL. 2010. Calculus for Business, Economics, and the Social and Life Sciences. McGraw-Hill.

Journals

Web sites of interest

https://eGela.ehu.eus/
https://www.geogebra.org
https://www.wolframalpha.com
https://www.superprof.es/apuntes/escolar/matematicas/
https://www.socrative.com

OBSERVATIONS