

**Información del Plan Docente**

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|-------------------------|----------------------------------------|
| <b>Academic Year</b>    | 2017/18                                |
| <b>Faculty / School</b> | 109 - Facultad de Economía y Empresa   |
| <b>Degree</b>           | 449 - Degree in Finance and Accounting |
| <b>ECTS</b>             | 6.0                                    |
| <b>Year</b>             | 1                                      |
| <b>Semester</b>         | First semester                         |
| <b>Subject Type</b>     | Basic Education                        |
| <b>Module</b>           | ---                                    |

**1.General information****1.1.Introduction****1.2.Recommendations to take this course****1.3.Context and importance of this course in the degree****1.4.Activities and key dates****2.Learning goals****2.1.Learning goals****2.2.Importance of learning goals****3.Aims of the course and competences****3.1.Aims of the course****3.2.Competences****4.Assessment (1st and 2nd call)****4.1.Assessment tasks (description of tasks, marking system and assessment criteria)****5.Methodology, learning tasks, syllabus and resources****5.1.Methodological overview**

The objective of this subject is that the students should develop the analytical skills, rigour and intuition needed for using mathematical concepts and results and that they should be able to apply these abilities to the analysis of problems of an economic nature. Therefore, the teaching should aim to provide students with a solid mathematical knowledge and to train them in a way of reasoning that will allow them thereafter to successfully solve a wide variety of questions in an economic scenario.

## 5.2.Learning tasks

The programme offered to the students to help them achieve the learning results includes the following activities :

**Theoretical lessons** which will be based on lectures to present the concepts and results corresponding to the contents. At the same time, some exercises will be solved with the participation of the students to help them comprehend the theoretical concepts presented. These classes are face-to-face and will be given to the full group. Time allotted: 1.2 ECTS credits (30 hours).

**Practical lessons** , in which the students will apply the theoretical results in order to solve, with the teacher's help, more complete exercises, and problems of an economic nature. Problem sheets will be available for the students and the teacher will announce in advance the problems that will be solved in each practical lesson so that the students can prepare them beforehand. These classes are face-to-face and will be given separately to each subgroup. Time allotted: 1.2 ECTS credits (30 hours each subgroup).

**Seminars** (practical classes P6), which may consist of a number of different activities designed to support the learning process, including: follow-up of some simple projects that had been assigned to small teams of students and the presentation of these projects; answering questions that students may have regarding some of the contents taught; solving problems of an economic nature by using some of the mathematical tools taught during the classes, etc. These seminars may also be devoted to the teaching of more advanced topics, intended for the students interested in learning some further mathematical tools that would allow them to deal with more general problems. In this way, the students are shown that both Mathematics and Economics are vibrant sciences with many facets to be studied.

**Out of class work** : 3.6 ECTS credits.

## 5.3.Syllabus

### TABLE OF CONTENTS

**Preliminaries:** Determinants.Applications: calculation of the rank of a matrix, calculation of the inverse matrix and Cramer's Rule

### Chapter 1. Diagonalization of square matrices

1.1.  $\mathbb{R}^n$ : Spanning sets. Basis.

1.2. Eigenvalues and eigenvectors of a square matrix: definition and calculation.

1.3. Diagonalization of a square matrix.

1.4. Application to the calculation of matrix powers.

**Chapter 2. Real quadratic forms**

- 2.1. Quadratic forms: definition. Matrix expression and polynomial expression.
- 2.2. Diagonal expression of a quadratic form.
- 2.3. Classification of a quadratic form according to its sign.
- 2.4. Constrained quadratic forms.

**Chapter 3. Functions from  $\mathbb{R}^n$  to  $\mathbb{R}^m$** 

- 3.1. Preliminaries: topological concepts.
- 3.2. Functions: domain, range and graph. Level sets of scalar functions.
- 3.3. Continuity of a function.
- 3.4. Differentiation of a function. Partial derivatives. Gradient vector. Jacobian matrix.
- 3.5. Differentiability. Directional derivative of differentiable functions.
- 3.6. Differentiation of composed functions: Chain's Rule. Tree diagrams.
- 3.7. Higher order derivatives. Schwarz's Theorem. Hessian matrix. Taylor's Theorem.
- 3.8. Implicit function Theorem. Differentiation of implicit functions.
- 3.9. Homogeneous functions. Euler's Theorem.
- 3.10. Basic integration methods of function of one variable. Barrow's Rule.

**5.4.Course planning and calendar**

According to the calendar approved by the university for 2017-18.

**5.5.Bibliography and recommended resources**

[BB: Bibliografía básica / BC: Bibliografía complementaria]

- [BB] Anton, Howard. Elementary linear algebra : with supplemental applications / Howard Anton, Chris Rorres . -

## 27502 - Mathematics I

- 10th ed. New York [etc.] : John Wiley and Sons, cop. 2011
- [BB] Balbás de la Corte, Alejandro. Análisis matemático para la economía. I, Cálculo diferencial / Alejandro Balbás de la Corte, José Antonio Gil Fana, Sinesio Gutiérrez Valdeón . [reimp.] Madrid : AC, D.L. 2005
- [BB] Ejercicios resueltos de matemáticas empresariales / P. Alegre... [et al.] . 1ª ed., 3ª reimp. Madrid : AC, 2005
- [BB] Gutiérrez Valdeón, Sinesio. Álgebra lineal para la economía / Sinesio Gutiérrez Valdeón . - 2ª ed., 1ª reimp. Madrid : AC, 2002
- [BB] Jarne Jarne, Gloria. Matemáticas para la economía : álgebra lineal y cálculo diferencial / Gloria Jarne Jarne, Isabel Pérez-Grasa, Esperanza Minguillón Constante Madrid [etc] : McGraw-Hill, D.L. 2010
- [BB] Larson, Ron. Calculus / Ron Larson, Bruce Edwards . - 10th ed., International ed. Australia [etc.] : Brooks/Cole Cengage Learning, cop. 2014
- [BB] Lay, David C.. Linear algebra and its applications / David Lay . - 4th ed., Pearson New International ed. Harlow : Pearson Education, cop. 2014
- [BB] Matemáticas universitarias introductorias con nivelador Mymathlab tutor interactivo online / Franklin D. Demana ... [et al.] ; traductor, Víctor Hugo Ibarra Mercado, Javier Enríquez Brito ; revisión técnica, Ernesto Filio López, Luis Ángel Filio Rivera, Javier Alfaro Pastor México [etc.] : Pearson Educación, 2009
- [BB] Minguillón Constante, Esperanza. Matemáticas para la economía : álgebra lineal y cálculo diferencial. Libro de ejercicios / Esperanza Minguillón Constante, Gloria Jarne Jarne, Isabel Pérez-Grasa Madrid [etc] : McGraw-Hill, D.L. 2010
- [BB] Zabal Cortés, Trinidad. Matemáticas I : Manual para los grados de carácter económico. Curso 2015-2016 / Trinidad Zabal. Zaragoza : Universidad, Facultad de Economía y Empresa, Taller de Edición e Impresión, 2015

### Listado de URL

- ACTIVIDAD DE APRENDIZAJE A TRAVÉS DEL DESCUBRIMIENTO DE ERRORES EN LA ASIGNATURA "MATEMÁTICAS I" DE LOS GRADOS DE CARÁCTER ECONÓMICO  
[[http://www.unizar.es/aragon\\_tres/Matl/erroresMI.htm](http://www.unizar.es/aragon_tres/Matl/erroresMI.htm)]
- Curso básico de matemáticas para estudiantes de economía [[http://www.unizar.es/aragon\\_tres/](http://www.unizar.es/aragon_tres/)]