

27602 - Mathematics I

Información del Plan Docente

Academic Year	2016/17
Academic center	109 - Facultad de Economía y Empresa
Degree	450 - Degree in Marketing and Market Research
ECTS	6.0
Course	1
Period	First semester
Subject Type	Basic Education
Module	---

1. Basic info

1.1. Recommendations to take this course

1.2. Activities and key dates for the course

2. Initiation

2.1. Learning outcomes that define the subject

2.2. Introduction

3. Context and competences

3.1. Goals

3.2. Context and meaning of the subject in the degree

3.3. Competences

3.4. Importance of learning outcomes

4. Evaluation

5. Activities and resources

5.1. General methodological presentation

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. To achieve this, the contents taught will consist of:

5.2. Learning activities

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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. Time allotted: 3 hours each subgroup.

Out of class work : 3.6 ECTS credits.

5.3.Program

PART I. MATRICES

Preliminary chapter: Set \mathbb{R}^n .

1.- Matrices, determinants, and systems of linear equations.

1.1.- Elementary matrices

1.2.- Determinant of a square matrix. 1.3.- Matrix inversion.

1.4.- Rank of a matrix.

1.5.- Systems of linear equations.

1.5.1.- Rouché-Frobenius theorem.

1.5.2.- Solving systems of linear equations.

2.- Diagonalisation of square matrices.

2.1.- Eigenvalues and eigenvectors of a matrix.

2.2.- Characteristic polynomial.

2.3.- Diagonalisable matrices.

3.- Real quadratic forms.

3.1.- Quadratic forms: definitions.

3.2.- Diagonal form of a quadratic form.

3.3.- Classification of quadratic forms.

3.4.- Restricted quadratic forms.

PART II. DIFFERENTIAL AND INTEGRAL CALCULUS

Preliminary chapter: Basics of Topology in \mathbb{R}^n .

4. Real-valued functions of one real-valued variable.

4.1. Real-valued functions of one real-valued variable.

4.2. Limits and continuity.

4.3. Differentiability.

4.4. Higher-order derivatives. Taylor's theorem.

5. Introduction to the theory of integration

5.1. Indefinite integral.

5.1.1. Primitive function and indefinite integral. Properties.

5.1.2. Some techniques of integration: change of variables, integration by parts, and integration of rational functions.

5.2. Definite integral.

5.2.1. Riemann integral. Properties.

5.2.2. Applications.

6. Functions from \mathbb{R}^n to \mathbb{R}^m .

6.1. Scalar-valued and vector-valued functions. Level set.

6.2. Limits and continuity. Properties.

5.4.Planning and scheduling

5.5.Bibliography and recommended resources