Academic Year/course: 2022/23

27602 - Mathematics I

Syllabus Information

Academic Year: 2022/23
Subject: 27602 - Mathematics I
Faculty / School: 109 - Facultad de Economía y Empresa
Degree: 450 - Degree in Marketing and Market Research
ECTS: 6.0
Year: 1
Semester: First semester
Subject Type: Basic Education
Module:

1. General information

2. Learning goals

3. Assessment (1st and 2nd call)

4. Methodology, learning tasks, syllabus and resources

4.1. Methodological overview

The objective of this course is that the students develop the analytical skills, rigor and intuition needed for using mathematical concepts and results. As a result, they should be able to apply these abilities to the analysis of problems of an economic nature. Therefore, the teaching methodology should 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.

The teaching methodology is planned for face-to-face classes. However, if necessary for health reasons, teaching could be delivered on line

4.2. Learning tasks

Type 1 activities Lectures (1.2 ECTS: 30 hours). At the same time, some exercises will be solved with the participation of the students to help them understand the theoretical concepts presented. These classes are face-to-face and will be taught to the whole group.

Type 2 activities Practice sessions in classroom (1.2 ECTS: 30 hours). The students will apply the theoretical contents in order to solve, with the teacher's help, more complex 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 practice session so that the students can prepare them beforehand. These classes are face-to-face and will be taught separately to each subgroup.

Type 6 activities Teaching assignments (Up to 24 hours, 0.96 credits). It 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; collective tutorials on specific subjects, the use of which will be recorded in a document;

solving problems of an economic nature by using some of the mathematical tools taught during the classes, etc. These activities may also be devoted to the teaching of more advanced topics, intended for the students interested in learning 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. These classes could include computer practice if the schedule allows it.

Type 7 activities Autonomous work and study (from 60 hours).

Type 8 activities Assessment. Final exam and midterm exams: (6 hours)

Total: 150 hours (6 credits ECTS)

If the availability of teaching staff is less than the teaching assignment and type 6 activities cannot be carried out, type 7 activities shall be substituted.

The assessment will be prepared to be carried out as face-to-face examination, but if health circumstances do not allow it, they will be carried out by doing it entirely online or in a blended way. In the case of online exams, it is important to highlight that, the student may be recorded, and he or she can exercise his or her rights by the procedure indicated in.

https://protecciondatos.unizar.es/sites/protecciondatos.unizar.es/files/users/lopd/gdocenc

The necessary software will be used to check the possibility of plagiarism. The detection of plagiarism or copying in an activity will imply that the activity or exam will be marked 0/10.

4.3. Syllabus

Chapter 1. Matrices

1.1. Determinants. Applications: calculation of the rank of one matrix, calculation of the inverse matrix and Cramer's Rule.

1.2. Rn:Generating systems. Basis.

1.3. Diagonalization of square matrices:

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

1.3.2. Diagonalization of a square matrix.

1.3.3.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 Rn to Rm

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.

4.4. Course planning and calendar

Further information concerning the timetable, classroom, office hours, assessment dates and other details regarding this course, will be provided on the first day of class or please refer to the ?Facultad de Economía y Empresa? website.