Academic Year/course: 2024/25

30706 - Mathematics 2

Syllabus Information

Academic year: 2024/25
Subject: 30706 - Mathematics 2
Faculty / School: 110 - Escuela de Ingeniería y Arquitectura
Degree: 470 - Bachelor's Degree in Architecture Studies
ECTS: 6.0
Year: 1
Semester: Second semester
Subject type: Basic Education
Module:

1. General information

The purpose of Mathematics 2 is to complete the formative aspects of Mathematics not developed in the previous subject of Mathematics 1, addressing the elements of geometry, algebra, and basic differential and integral calculus necessary in the technical subjects of the degree and that will be required by the Architect in his later professional development.

It corresponds to a university subject of basic training and it implies an approach to the characteristic features of Mathematics such as abstraction, rigor and logical sense. It has a fundamentally practical orientation and with it closes the training cycle of Mathematics.

These approaches and objectives are aligned with the Sustainable Development Goals (SDGs) of the United Nations 2030 Agenda for Sustainable Development Agenda (https://www.un.org/sustainabledevelopment/es/)

2. Learning results

- Knowledge of the basic aspects of geometry and the mathematical and numerical analysis required for architecturalcalculus.
- Ability to express, both orally and in writing and using scientific language, the basic concepts of the subject as well as the problem solving process.
- Ability to analyze and develop problem-solving strategies and models and distinguish the best solution among several alternatives.
- Skill in applying mathematical and logical reasoning, differentiating the characteristic elements of a problem, determining their of a problem, determine its degree of significant accuracy and allowable errors.

3. Syllabus

I. **Linear algebra**

1. Bilinear forms. Matrix representation. Change of base. Orthogonality. Symmetric bilinear forms. Sylvester's Law of inertia. Classification of quadratic forms.

2. Spaces with scalar product. Orthonormal bases. Gram-Schmidt orthogonalization method. QR factorization.

II. **Differential and integral calculus in several variables**

3. Functions of various variables. Limits and continuity.

4. Differential calculus of real and vector functions of several variables. Partial and directional derivatives. Gradient. Differentiation. Tangent plane. Higher order derivatives. Chain rule. Local extremes.

5. Double and triple integrals. Variable changes.

III. **Differential geometry of curves and surfaces**

6. Curves and surfaces in space. Parameterized curves. Arc length. Tangent and normal vectors. Triedro from Frenet. Curvature and torsion. Parameterized surfaces. Normal vector.

4. Academic activities

- **Lectures: 40 hours** Theoretical-practical sessions in which the contents of the subject are developed.

- **Types of problems: 8 hours** Exercises similar to those seen in the master classes and proposed in the problem sheets are worked on.

- **Practical computer training: 12 hours** Addresses the numerical contents of the subject and geometric aspects of easy visualization with the appropriate mathematical software.

- **Personal study: 86 hours**

- **Evaluation: 4 hours**

5. Assessment system

The subject will be evaluated as follows:

- **Intermediate test:** Of voluntary and eliminatory character on the contents corresponding to the first thematic block of the subject.

- **Assessment of practices:** Each practical session will be evaluated by submitting a questionnaire at the beginning of the following session, and in the final session there will be a test to verify the learning of the topics developed in the practical sessions. Half of the grade will correspond to the handouts of the questionnaires of the sessions and the other half to the face-to-face exam.

- **Final test:** There will be a final written test on the theoretical and practical contents of the subject.

The grade for the subject will be the weighted sum of the grades obtained in the **final written exam (85%) and the practical evaluation (15%).**

Students who do not opt for the previous assessment system, will take a single global test of the subject in which they must demonstrate the acquisition of knowledge and competences foreseen in this subject.

6. Sustainable Development Goals

4 - Quality Education