

30701 - Mathematics 1

Syllabus Information

Academic year: 2023/24

Subject: 30701 - Mathematics 1

Faculty / School: 110 - Escuela de Ingeniería y Arquitectura

Degree: 470 - Bachelor's Degree in Architecture Studies

ECTS: 6.0

Year: 1

Semester: First semester

Subject type: Basic Education

Module:

1. General information

The subject of Mathematics 1 is proposed, in part, as a formalization of the concepts seen in previous subjects, and also as an extension of them, with special emphasis on their applications to the architectural field. The aim of is to establish the basic pillars necessary for the correct assimilation of the subject itself, as well as those subjects related to it, such as Physics, Drawing or Theory of Structures, in which Mathematics finds diverse applications and for which it constitutes a valuable tool.

This is a basic subject whose evaluable contents, by themselves, do not yet provide direct capabilities to the student to contribute to the achievement of the United Nations Agenda 2030 (<https://www.un.org/sustainabledevelopment/es/>), however are essential to base the subsequent knowledge of the rest of the degree that is related more directly to the SDGs and therefore to the United Nations Agenda 2030.

2. Learning results

- Knowledge of the basic aspects of geometry and the mathematical and numerical analysis required for architectural calculus.
- Ability to express, both orally and in writing and using scientific language, the basic concepts of the subject as well as the process of problem solving.
- 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

P1. Algebra

- 1.1. Introduction. Algebraic structures. Group, ring, body.
- 1.2. Vector spaces. Fundamental properties.
- 1.3. Linear applications. Matrix representation.
- 1.4- Diagonalization of matrices. Applications.

P2. Affine and Euclidean geometry

- 2.1- Geometric applications of Linear Algebra.
- 2.2- Some basic concepts about Affine Geometry.
- 2.3- Metric geometry. The divine proportion.

P3. Calculation of functions of one variable

- 3.1- Real functions of real variable. Limits and continuity.
- 3.2- Derivability and differentiability. Applications of the derivative.
- 3.3- Integration of real functions of real variable. Geometric applications of integral calculus.
- 3.4- Numerical methods for solving nonlinear equations. Approximation and interpolation of functions.
Numerical integration.

4. Academic activities

Lectures: 40 hours

Theoretical-practical sessions in which the contents of the subject will be explained.

Problems: 8 hours

The exercises carried out in the lectures will be extended. Active student participation will be encouraged.

Computer practices: 12 hours

Six two-hour computer-based practice sessions. They will explain those contents of the subject that for a better understanding require their treatment with a computer.

Directed works: 8 hours

Students organized in small groups must develop a topic in which they will study various applications to the architectural field, both certain concepts learned throughout the course and others related to it.

Personal study: 78 hours

Assessment tests. 4 hours

5. Assessment system

Intermediate test corresponding to the part of Linear Algebra, *voluntary, eliminatory* with a *b grade*.

Practice test that will account for 15% of the overall grade in which students must solve with the computer exercises similar to those developed in each of the practice sessions. Previously, each practical will be evaluated by means of a questionnaire at the beginning of the following session. In the final session there will be a test to verify the learning of the topics developed in the different practice sessions. Half of the grade will correspond to the handouts of the questionnaires of the sessions and the other half to the exam in the room.

Directed Works account for 15% of the overall grade. These papers will be presented orally. Both the material presented, as well as the order and clarity of the presentation will be valued. Likewise, the ability to respond to the questions posed, both by the teacher and the rest of the group, will be taken into account. The use of the English language in such presentation will be positively valued.

Final exam of the course accounting for 70% of the overall grade. Covering all the contents explained in the subject, the students will have to solve problems similar to those seen in class and to those proposed in the corresponding problem sheets in the . In addition, for their correct resolution, they must show their adequate understanding of the fundamental theoretical concepts of the subject.

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