

29705 - Mathematics II

Syllabus Information

Academic year: 2023/24

Subject: 29705 - Mathematics II

Faculty / School: 110 - Escuela de Ingeniería y Arquitectura

Degree: 434 - Bachelor's Degree in Mechanical Engineering

ECTS: 6.0

Year: 1

Semester: 434-First semester o Second semester

107-Second semester

Subject type: Basic Education

Module:

1. General information

The main objective of the subject is the acquisition by students of a solid foundation in the fundamentals of Linear Algebra and Geometry, as well as skills in their operations and procedures. Through rigorous problem solving, selecting the most effective techniques and strategies available, the critical reasoning and abstract that characterizes this discipline is enhanced. At the same time, the aim is to introduce the student to the numerical resolution of problems related to the contents of the subject, through the use of mathematical software, giving priority to the analysis and interpretation of the results obtained.

These approaches and objectives are aligned with the Sustainable Development Goals (SDGs) of the 2030 Agenda for Sustainable Development [Sustainable Development Goals \(SDGs\) of the 2030 Agenda for Sustainable Development Agenda 2030 of the United Nations](#), specifically, the learning activities planned in this subject will contribute to some extent to the achievement of Goals 4, 12 and 13.

The recommended profile to take the course is to have a good previous training in mathematics, at the level of Mathematics I and II of Bachillerato, of scientific-technological orientation. Among the contents of Bachillerato, it is advisable to know the resolution of systems of linear equations and the basic concepts related to the theory of matrices. It is also recommended to have passed Mathematics I of the Bachelor's Degree.

2. Learning results

1. Know how to solve mathematical problems that may arise in Engineering.
2. Have the ability to apply the acquired knowledge of Linear Algebra, Euclidean Geometry and Differential Geometry.
3. Know how to use numerical methods, with some mathematical software, for the resolution of certain mathematical problems that arise.
4. Know the reflexive use of symbolic and numerical calculation tools.
5. Possess scientific-mathematical thinking skills that allow them to ask and respond correctly and rigorously to certain mathematical questions.
6. Be skilled in handling mathematical language; in particular, symbolic and formal language.

3. Syllabus

Block 1. Linear Algebra.

1. Matrices, determinants and ranks.
2. Systems of linear equations and numerical methods.
3. Vector spaces.
4. Linear applications.
5. Diagonalization.

Block 2. Geometry.

1. Euclidean geometry: scalar product, orthogonalization and applications.
2. Differential geometry: curves in space, Frenet's trihedron, representation of plane curves.

4. Academic activities

The classroom credits (2.4 credits = 60 hours) are divided into:

- **Lectures** (40 hours): theoretical contents and problem solving are presented, with no explicit separation between the two.
- **Computer practices** (12 hours): mathematical algorithms are analyzed and implemented by means of symbolic and

numerical programming software installed in EINA's computer laboratories.

- **Problem sessions** (8 hours): complement to the theory classes in which the students will have a greater role in solving the problems.

The non-face-to-face credits (3.6 credits = 90 hours) are divided into:

- **Supervised work** (24 hours)
- **Self-study** (60 hours)
- **Assessment tests** (6 hours)

5. Assessment system

In all the tests performed, the correctness of the answers, developments and results will be assessed, as well as the interpretation and verification of the results obtained.

Theoretical-practical exam (70%): To pass this part it is necessary to obtain a grade of no less than 4 out of 10. If the grade is lower than 4, that will be the Final Grade of the course, regardless of the grades obtained in the following two sections.

Computer Practices (20%): The assessment method will be informed at the beginning of the term.

Teamwork (10%): The group work will consist of solving problems of application of the knowledge of the subject to practical cases. Each group must present a final report of the work and the resolution of the same, if necessary, with the mathematical software used in the practicals.

The Computer Practice and Teamwork grade is saved for the two official exams of the term. If the student wishes, they may waive the Practical and Work grades, and must take the corresponding tests in the Global Test.

Global test: It consists of a written exam taken at each official call in which the three parts (Theoretical-Practical, Practical, Work) can be evaluated, being necessary to obtain a minimum of 4 points out of 10 in the theoretical-practical part.