

32100 - Calculus

Syllabus Information

Academic year: 2024/25

Subject: 32100 - Calculus

Faculty / School: 110 - Escuela de Ingeniería y Arquitectura

Degree: 653 -

ECTS: 6.0

Year: 1

Semester: First semester

Subject type: Basic Education

Module:

1. General information

The purpose of this subject is for students to acquire a solid foundation in the **fundamentals of Differential and Integral Calculus of functions of one and several variables** and in the **numerical solution of problems** in these disciplines; learn to solve a problem rigorously, selecting the most efficient techniques and strategies; and to be able to use a mathematical software for its solution.

The assessable contents do not provide direct capabilities for the achievement of the 2030 Agenda; however, they are essential to base subsequent knowledge that is related to the SDGs.

It is recommended to master the knowledge and skills acquired in Mathematics of the Baccalaureate of Science, such as:

- Complex numbers
- Trigonometry.
- Analysis of elementary functions.
- Derivation and integration of functions of one variable.
- Affine geometry.

2. Learning results

- Understand the fundamentals of differential and integral Calculus as well as numerical methods and algorithms, and their application in solving mathematical problems in the field of biomedical engineering.
- Solve mathematical problems of differential and integral calculus of functions of one and several variables that may arise in biomedical engineering.
- Apply numerical methods in the resolution of the corresponding mathematical problems.
- Use symbolic and numerical calculation tools reflexively.
- Handle mathematical language proficiently, in particular the language of basic mathematical applications.
- Possess scientific-mathematical thinking skills that allow them to ask and answer certain mathematical questions.

3. Syllabus

The contents of the subject cover the following topics:

- Real and complex numbers.
- Differential and integral calculus of functions of one and several variables.
- Series of real numbers and functions.
- Numerical methods for solving nonlinear equations, interpolation, and Numerical integration.

4. Academic activities

Theoretical and practical classes (40 h):

Presentation of theoretical contents accompanied by illustrative examples and problem-solving.

Problem sessions (8 h):

Problem-solving by students organized in subgroups and guided by the teacher.

Computer practice (12 h):

Analysis and programming of mathematical algorithms using symbolic and numerical programming software installed in the computer laboratories of EINA. The chosen software will allow working with symbolic, numerical and graphical calculations, facilitating the understanding of the proposed learning results. Each practice will consist of an exposition of the contents and the resolution of problems related to them.

Personal study.

Assessment tests.

5. Assessment system

A global assessment system composed of the following tests is proposed:

- Test on the theoretical and practical contents of the subject. Its grade will represent 80% of the final grade of the subject. The examination will be mainly practical, although it may contain theoretical or theoretical-practical questions. The following will be assessed:

- understanding of the mathematical concepts used to solve the problems, the use of efficient strategies and procedures in their resolution,
- clear and detailed explanations,
- the absence of mathematical errors in the solutions,
- correct use of terminology and notation,
- organised and clear presentation.

- Test on the topics developed in the practical sessions. Its grade will represent 20% of the final grade of the subject. Consideration will be given to:

- knowledge of the mathematical software commands needed to solve the problems, the correct interpretation of the results obtained,
- the ability to select the most appropriate method,
- clear and detailed explanations and/or reasoning to the questions asked.

The grade for the first call will be determined by the percentages indicated.

In addition to the global assessment system, a continuous evaluation system will also be proposed with tests throughout the semester to facilitate the gradual completion of parts of the course.

The assessment in the second call will be carried out through a global test similar to the abovementioned exam.

6. Sustainable Development Goals

4 - Quality Education