32200 - Mathematics I

Syllabus Information

Academic year: 2024/25
Subject: 32200 - Mathematics I
Faculty / School: 179 - Centro Universitario de la Defensa - Zaragoza
Degree: 646 -
ECTS: 6.0
Year: 1
Semester: First semester
Subject type: Basic Education
Module:

1. General information

The main objective of this subject is for students to acquire knowledge and skills to approach and solve mathematical problems related to differential and integral calculus, developing a conceptual and practical mastery of the fundamentals of calculus for application in various academic and professional contexts.

This subject contributes to the training of Officers of the General Corps of the Army and Spanish Guardia Civil, providing the knowledge and calculation skills and problem-solving abilities that allow them to achieve the graduate profile required to correctly perform the duties assigned to them as officers.

Among the recommendations for taking this subject is having completed high school studies, preferably with a scientific-technological orientation. Additionally, it is necessary to have a good disposition to undertake continuous work and effort from the beginning of the course.

2. Learning results

At the end of the course students must be able to:

- CON5.- Have sufficient knowledge of basic sciences (mathematics, statistics, physics) and applied sciences (economics, other technologies beyond signals and communication, etc.) to be able to advance in the subjects that make up this degree.
    - CON5.1: Recognize the fundamentals and mathematical tools of differential and integral calculus of one and several variables.
- CON6.- Know the fundamentals of process analysis and modeling, data governance and information for decision making in order to be able to use the digital environment with agility, including the legal and ethical dimension.
    - CON6.1: Select the appropriate methodology to address each type of problem of differential and integral calculus of one and several variables.
- HAB2.- Solve problems, analyze and synthesize (information) to evaluate and make judgments with agility, initiative and creativity, identifying opportunities for improvement and adapting to complex situations.
    - HAB2.1: Solve, by analysis and choice of the appropriate method, differential and integral calculus problems in one and several variables.
    - HAB2.2: Use appropriate mathematical software to solve differential and integral calculus problems in one and several variables.
    - HAB2.3: Demonstrate skills of scientific-mathematical thinking and reasoning, using mathematical language appropriately.
- COM5.- Design and carry out a new task or project in a different way using creativity and curiosity to add value with an entrepreneurial attitude.
    - COM5.1: Combine in an original way the methods of differential and integral calculus to solve problems and simple applied works that may arise in the professional field, interpreting the results obtained.

3. Syllabus

Topic 0. Basic Calculus concepts.
Topic 1. Functions of a real variable.
Topic 2. Differentiation of functions of a real variable.
Topic 3. Indefinite Integral.
Topic 4. Definite Integral.
Topic 5. Improper Integral.
Topic 6. Functions of several real variables.
Topic 7. Differentiation of functions of several real variables.
Topic 8. Integration of functions of several real variables.

4. Academic activities

- **Classroom-based sessions:**
  - A01 - Problem solving.
  - A08 - Individual assignments and activities.
  - A09 - Group assignments and activities.
  - A11 - Interactive lectures.
  - A13 - Other activities derived from innovation projects.
- **Autonomous study and personal work by students:**
  - A01 - Problem solving.
  - A08 - Individual assignments and activities.
  - A09 - Group assignments and activities.

5. Assessment system

FIRST CALL:

Continuous assessment

Students may pass the subject through the continuous assessment procedure. The continuous assessment instruments (CAI) are the following:

1. CAI1. Written exercise aimed at the detailed resolution of problems from topics 0, 1, 2, 3, 4, and 5. Weight in the final grade: 40%.
2. CAI2. Written exercise aimed at the detailed resolution of problems from topics 6, 7, and 8. Weight in the final grade: 40%.
3. CAI3. Completion of several short-duration activities with theoretical-practical questions from topics 0 to 8. Weight in the final grade: 15%.
4. CAI4. Completion of an activity oriented towards the use of mathematical software. Weight in the final grade: 5%.

The final continuous assessment grade (100%) will be calculated according to the specific weight of each CAI. To pass the course, students must achieve a final grade greater than or equal to 5.

Global assessment

Students who do not pass the subject through continuous assessment or who wish to improve their grade will be entitled to sit the global test set in the academic calendar, with the best of the grades obtained prevailing in any case. This global test will have a weight of 100% in the final grade.

It will consist of an exam with questions aimed at the detailed resolution of problems, as well as theoretical-practical questions. To pass the course, the student must achieve a final grade greater than or equal to 5.

SECOND CALL:

Students who do not pass the subject in the first sitting may sit an overall exam set in the academic calendar for the second call. This global test will have a weight of 100% in the final grade and will follow the same structure as the global test of the first call. To pass the course, the student must achieve a final grade greater than or equal to 5.

The **assessment criteria** for all assessment instruments correspond to the specific learning outcomes detailed in section 2.

Assessment instrument	Weighting	CON5.1	CON6.1	HAB2.1	HAB2.2	HAB2.3	COM5.1
CAI1	40%	X	X	X		X	X
CAI2	40%	X	X	X		X	X
CAI3	15%	X	X	X		X	X
CAI4	5%	X	X	X	X	X	X
Global test	100%	X	X	X	X	X	X

6. Sustainable Development Goals

4 - Quality Education
9 - Industry, Innovation and Infrastructure
16 - Peace, Justice and Strong Institutions