

## 30100 - Mathematics I

### Syllabus Information

**Academic year:** 2023/24

**Subject:** 30100 - Mathematics I

**Faculty / School:** 175 - Escuela Universitaria Politécnica de La Almunia  
179 - Centro Universitario de la Defensa - Zaragoza

**Degree:** 425 - Bachelor's Degree in Industrial Organisational Engineering  
563 - Bachelor's Degree in Industrial Organisational Engineering

**ECTS:** 6.0

**Year:** 1

**Semester:** First semester

**Subject type:** Basic Education

**Module:**

### 1. General information

Basic mathematical methods are part of the many tools that all professionals in Engineering and Defense must have to solve the problems that arise in their work. This subject belongs to the basic training module and provides students with the ability to solve mathematical problems that may arise in engineering: differential and integral calculus.

These approaches and objectives are aligned with the following Sustainable Development Goals (SDGs) of the United Nations Agenda 2030 (<https://www.un.org/sustainabledevelopment/es/>), so that the acquisition of the learning results of the subject provides training and knowledge, skills and competencies to contribute to some extent to the achievement of objectives 4.4 and 4.5 of Goal 4, and objectives 9.5 and 9.b of Goal 9

### 2. Learning results

1. Solves mathematical problems that may arise in Engineering.
2. Have the ability to apply the acquired knowledge of Differential and Integral Calculus; Numerical Methods and Numerical Algorithms.
3. Know how to use numerical methods in the solution of some mathematical problems.
4. Knows the reflexive use of symbolic and numerical calculation tools
5. Possess scientific-mathematical thinking skills that allow them to ask and answer certain mathematical questions.
6. Be skilled in handling mathematical language; in particular, symbolic and formal language.

### 3. Syllabus

#### COMPANY PROFILE

1. Complex numbers
2. Real functions of a real variable. Limits and continuity.
3. Differential calculus of functions of one variable.
4. Integral calculus of functions of one variable.
5. Functions of various variables. Limits and continuity.
6. Differential calculus of functions of several variables.

#### DEFENSE PROFILE

- Topic 1: Real functions of a real variable.
- Topic 2: Derivation of functions of a real variable.
- Topic 3: Indefinite integral.
- Topic 4: Definite integral.
- Topic 5: Improper integral.
- Topic 6: Real functions of several real variables.
- Topic 7: Derivation of real functions of several real variables.
- Topic 8: Integration of real functions of several real variables.
- Topic 9: Vector Calculus.
- Topic 10: Successions and series.

## 4. Academic activities

### COMPANY PROFILE

- Theoretical classes, in which the fundamental concepts are presented, complemented with detailed examples that illustrate them.
- Practical classes, in which problems are proposed to be solved using the concepts and methods previously considered and with the support of specific computer software.
- Assessment tests.
- Personal work of the student (individually or in groups).

### DEFENSE PROFILE

- Theoretical-practical tests of short duration, such as test-type questionnaires or short developments.
- Applied tests of short duration, such as test-type questionnaires or short developments.
- Written tests oriented to the detailed resolution of theoretical and practical problems.
- Applied software testing.
- Lectures.
- Personal study and work; tutoring.

## 5. Assessment system

### COMPANY PROFILE

- Written tests: There will be two written tests along the term. They will test theoretical and practical aspects of the subject. They are related to learning results 1, 2, 3, 4, 5 and 6. Its weight in the final grade will be 80%.
- Assessment criteria: In order to evaluate the evolution of the students in class, 4 periodical controls will be carried out in class, which will consist of practical exercises. The learning results to which are related are 1, 2, 3, 4, 5 and 6. Its total weight in the final grade will be 20%.

The final grade (100%) will be calculated by adding weighted the grade of each evaluation milestone, without the requirement of to achieve a minimum grade in each of the tests. In order to pass the course, the student must obtain a final grade equal or higher than 50%.

If the student has not passed any of these activities during the semester, they will have the opportunity to pass the subject by means of a global test in the two official exams.

Assessment criteria: The assessment criteria are the same. The following will be valued:

- understanding of the mathematical concepts used to solve the problems;
- use of strategies and efficient proceedings for their resolution,
- clear and detailed explanations with justification for the answers,
- absence of mathematical errors in the development and the solutions,
- adequately interpret the results obtained,
- correct use of terminology and notation
- organised and clear presentation.

### DEFENSE PROFILE

#### First call :

#### Continuous assessment

The student will be able to pass the total of the subject by the continuous assessment procedure. The student must demonstrate that they has achieved the expected learning results through the assessment activities that will be distributed throughout the term.

1. Continuous assessment test 1 (EC1) It will consist of a test consisting of theoretical and practical questions of short duration, applied questions of short duration and questions oriented to the detailed resolution of problems. This test corresponds to topics 1, 2, 3, 4, 5 and 6. Its weight in the final grade is 55%.

2. Continuous assessment test 2 (EC2) It will consist of a test consisting of theoretical and practical questions of short duration, applied questions of short duration and questions oriented to the detailed resolution of problems. This test corresponds to topics 7, 8, 9 and 10. Its weight in the final grade is 40%.

3. Applied software (SW) testing. It will consist of problem solving through the use of a mathematical software . Its weight in the final grade is 5%.

The final continuous assessment grade (100%) will be calculated according to the specific weight of each assessment instrument, without the requirement of achieving a minimum grade in each of the tests. To pass the subject, the student must obtain a grade equal or higher than 5.

#### Global test:

Students who do not pass the subject by continuous assessment or who would like to improve their grade, will have the right to take the global test set in the academic calendar, prevailing, in any case, the best of the grades obtained (final grade of continuous assessment, grade of the global test). This global test will have a 100% weight in the final grade . It will consist of a test consisting of theoretical and practical questions of short duration, applied questions of short duration and questions oriented to the detailed resolution of problems. This global test covers the entire syllabus. To pass the course, the student must obtain a final grade greater than or equal to 5.

Second call:

Students who do not pass the subject in the first call may sit for a global test set in the academic calendar for the second call. It will consist of a test consisting of short theoretical-practical questions , short applied questions and questions oriented to the detailed resolution of problems and will have a weight of 100% in the final grade. This global test covers the entire syllabus. To pass the subject, the student must obtain a grade equal or higher than 5.

Assessment criteria The following criteria will be followed in the evaluation according to the nature of the test:

- Understanding of the mathematical concepts used to solve the problems.
- The use of appropriate strategies and procedures in their resolution.
- The absence of mathematical errors in the development and solutions.
- Clear and detailed explanations with justification in the answers.
- The correct interpretation of the results obtained.
- Correct use of terminology and notation specific to the subject.
- Orderly, clear and organized exposition of the procedures used.
- Proper use of computer tools and/or mathematical software (if applicable).
- The result and final quality of the work (if applicable).

Assessment instruments VS: Learning Results (LR)

<b>Assessment instruments:</b>	<b>Weighting</b>	RA1	RA2	RA3	RA4	RA5	RA6
Test EC1	55%	X	X	X		X	X
EC2 Test	40%	X	X	X		X	X
SW Practice	5%	X	X	X	X	X	X