

30106 - Mathematics II

Syllabus Information

Academic year: 2023/24

Subject: 30106 - Mathematics II

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: Second semester

Subject type: Basic Education

Module:

1. General information

The basic mathematical methods which form part of the number of tools with which all engineers must count on to solve any problem that might appear on their work. This subject provides the student with the capacity to solve mathematical problems that might appear in engineering about differential and integral calculus and geometry.

These approaches and objectives are aligned with the Sustainable Development Goals (SDGs) of the United Nations Agenda 2030 (<https://www.un.org/sustainabledevelopment/es/>) and certain specific targets, such that the acquisition of the learning results of the subject will contribute to some extent to the achievement of targets 4.4 and 4.5 of Goal 4, and targets 9.5 and 9.c of Goal 16.

2. Learning results

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

3. Syllabus

COMPANY PROFILE

Algebra:

1. Linear equations in linear algebra.
2. Matrix algebra.
3. Determinants.
4. Vector spaces.
5. Eigenvalues and eigenvectors
6. Orthogonality and least squares.

Integral calculus:

1. Multiple integrals.
2. Curves.
3. Surfaces.
4. Vector analysis.

DEFENSE PROFILE

Algebra:

1. Matrix algebra
2. Elementary matrices.
3. Systems of linear equations.

4. Determinants.
5. Vector spaces.
6. Euclidean spaces.
7. Linear applications.
8. Diagonalization of endomorphisms and Jordan's canonical form.

4. Academic activities

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- 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).

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- Face-to-face classes; sessions to develop the content of the subject. These classes combine problem solving , theoretical explanations and the use of mathematical software. Student participation is encouraged in the teaching-learning process.
- Practical classes in the classroom; realization and progress of the different deliverables and group tasks under the supervision.
- Oral presentation of the work: by working groups.
- Individual or small group tutoring.
- Continuous study and personal work by students from the beginning of the term.
- Assessment tests.

5. Assessment system

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- 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. To pass the subject, the student must obtain a 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.

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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 have achieved the expected learning results through the assessment activities that will be distributed throughout the term.

Continuous assessment test 1 It will consist of a written exercise with a part of theoretical and practical questions and another part of development problems corresponding to the contents of topics 1 to 5. Its weight in the final grade is of 40%.

- Continuous assessment test 2. It will consist of a written exercise with a part of theoretical and practical questions and another part of development problems corresponding to the contents of topics 6 to 8 for which it is necessary to know the contents of the previous topics. Its weight in the final grade is 45%.

- Continuous evaluation test 3. It will consist of group assignments and their corresponding oral presentation. Concepts of the subject, application of numerical approximation methods and the use of mathematical software, as well as the oral expression of

the concepts and procedures used will be evaluated. Its weight in the final grade is 15%.

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 final grade greater than or equal to 5.

Global test:

First call

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. This global test will have a 100% weight in the final grade. It will consist of a two-part exam: a first part with theoretical-practical questions and a second part containing development problems and applied aspects. To pass the subject, 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. This global test will consist of a two-part exam: a first part with theoretical-practical questions and a second part containing development problems and applied aspects. It will have a weight of 100% in the final grade. To pass the subject, the student must obtain a final grade greater than or equal to 5.

Assessment instruments:	Weighting	RA-1	RA-2	RA-3	RA-4	RA-5	RA-6
Theoretical and practical examinations	85%			x	x	x	x
Group work and oral presentation	15%	x	x	x	x	x	x