COURSE DATA

DATA SUBJECT

Code: 34913
Name: Mathematics II
Cycle: Undergraduate Studies
ECTS Credits: 6
Academic year: 2025-26

STUDY (S)

Degree	Center	Acad. year	Period
1404 - Degree in Industrial Electronic Engineering	Escola Tècnica Superior d'Enginyeria	1	Second quarter

SUBJECT-MATTER

Degree	Subject-matter	Character
1404 - Degree in Industrial Electronic Engineering	Mathematics	BASIC

COORDINATION

LOPEZ UREÑA SERGIO

SUMMARY

This course develops the classic content of Mathematical Analysis: Differential calculus in several variables, ordinary differential equations, complex functions and Fourier series and Fourier and Laplace transforms. Addressed to engineering students, with contents based on relevant applications, maintaining a consistent order in the presentation and development of different concepts to be introduced. Lectures will be taught in Spanish, and practical sessions as indicated in the course data, which is available in the web page of the degree.

PREVIOUS KNOWLEDGE

RELATIONSHIP TO OTHER SUBJECTS OF THE SAME DEGREE

There are no specified enrollment restrictions with other subjects of the curriculum.

OTHER REQUIREMENTS

The contents of the course Mathematics I, which is taught in the first semester.

COMPETENCES / LEARNING OUTCOMES

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CG12 - Ability to solve a wide range of mathematical problems that may arise in engineering. Ability to apply the acquired knowledge about linear algebra, geometry, differential geometry, differential and integral calculus, differential equations and partial derivatives, numerical methods, numerical algorithms, statistics and optimisation.

CG3 - Knowledge of basic and technological subjects that allows students to learn new methods and theories and provides them with versatility to adapt to new situations.

CG4 - Ability to solve problems with initiative, decision-making skills, creativity and critical reasoning and to communicate and transmit knowledge, abilities and skills in the field of industrial engineering (with specific industrial electronics technology).

DESCRIPTION OF CONTENTS

1. Differential calculus of functions of several variables.

Partial derivatives, directional derivatives. Derivation of composite functions (chain rule). Graphical representation of functions.
Schedule: 6 h theory, 4 h problems, laboratory 1.5 h.

2. Multiple integration

Integral functions of two and three variables. Integration by change of variables. Fundamental theorems of integral calculus.
Schedule: 4 h theory, 2 h problems, laboratory 1

3. Ordinary differential equations

Equations of separable variables, linear equations of first order, linear differential equations of higher order with constant coefficients. Laplace Transformation. Application of the Laplace transform to solve differential equations.
Schedule: 8 h theory, 5 h problems, laboratory 2.5 h.

4. Sequences and series. Complex variable functions.

Sequences and series of complex numbers. Series convergence criteria.
Schedule: 7 h theory, 5 h problems, laboratory 2.5 h.

5. Series and Fourier transform

Fourier series. Trigonometric complex form. Fourier series representation of periodic functions. Introduction to Fourier transform.
Schedule: 5 h theory, 4 h problems, laboratory 2.5 h.

WORKLOAD

PRESENCIAL ACTIVITIES

Activity	Hours
Theory	30,00
Laboratory	10,00
Classroom practices	20,00
Total hours	**60,00**

NON PRESENCIAL ACTIVITIES

Activity	Hours
Attendance at other activities	0,00
Individual or group project	0,00
Independent study and work	15,00
Preparation of lessons	45,00
Preparation for assessment activities	27,00
Resolution of case studies	0,00
Total hours	**87,00**

TEACHING METHODOLOGY

In the lectures, the lecturer will gradually introduce mathematical concepts and their use mainly through examples. Standard procedures for solving problems related to the topic will be exposed as well (CG3, CG4, CG12).

Practical classes will be oriented to a deeper understanding of the theoretical concepts by means of the students' own work. The way to achieve active Student participation may vary depending on the number of students, but it will balance the Student individual work and the open discussion of selected exercises through presentation by the students and further analysis (CG3, CG4, CG12).

Laboratory sessions will be performed in reduced groups at the computer laboratories. The students will work individually or in couples in the solution of problems related to the theoretical and practical course contents, assisted by symbolic calculus software. The students will follow a guide supplied by the teachers (CG3, CG4, CG12).

EVALUATION

The assessment is carried out by:

- A partial and a final exam, of a theoretical-practical nature, with a weight of 70% of the final grade. If the partial exam is passed, then it has a weight of 35% and in the final exam, with another 35%, it will not be necessary to do the exercises corresponding to the partial exam contents. In case of not passing the partial exam, the final exam will have a weight of 70%. If the subject is suspended in the first attempt, in the second attempt the student must be examined in the final exam of all the contents. (B1, G3, G4)

- Continuous assessment: The weight of this part will be 30% of the final grade. One or more evaluation tests of the laboratory sessions (CG3, CG4, CG12) that globally represent 20% of the final grade and the evaluation of the practices (CG3, CG4, CG12), which represents 10% of the grade and it will be evaluated through the student's participation in the practice sessions and the delivery of problems proposed by the professor.

Continuous assessment tests are not recoverable. It is a requirement to pass the subject to obtain a minimum of 3.5 points out of 10 in the final exam of the subject.

The final grade is calculated using the following formula, provided that the previous restriction is verified:

NF = NE * 0.7 + NA * 0.3

where:

NF = Final grade of the course.

NE = Grade of the partial and final exams, both over 10 points. If the partial exam has been passed, then NE is the average of both grades. Otherwise, it is the grade of the final exam.

NA = Note of the continuous evaluation, over 10 points.

In any case, the assessment will be done in accordance with the Reglament d'Avaluació i Qualificació de la Universitat de València per a Títols de Grau i Màster (http://links.uv.es/7S40pjF).

Copying or plagiarism of any activity that is part of the evaluation will result in the impossibility of passing the course, and the student will then be subject to the appropriate disciplinary procedures indicated in the ACTION PROTOCOL FOR FRAUDULENT PRACTICES AT THE UNIVERSITY OF VALENCIA (ACGUV 123/2020).

REFERENCES

- G. James . Matemáticas avanzadas para la ingeniería. Segunda Edición. Pearson Education. (2002) ISBN: 970-26-0209-2
- E. Kreyszig. Matemáticas avanzadas para la ingeniería. LimusaWiley (2003) ISBN: 968-18-5310-5
- J.E. Marsden, A.J. Tromba. Cálculo vectorial. Cuarta Edición. Pearson Educación (1998) ISBN: 968-444-276-9
- M. Molero, A. Salvador, T. Menárguez, L. Garmendia. Análisis matemático para ingeniería. Pearson Education. (2007) ISBN: 978-84-8322-346-8.
- J. Stewart. Cálculo multivariable. Thomson Learning (2003) ISBN: 970-686-123-8
- G. L. Bradley y K. J. Smith, Cálculo de varias variables. Vol. II. Prentice Hall Iberia (1998) ISBN: 84-89660-77-8.