COURSE DATA

Data Subject	
Code	34913
Name	Mathematics II
Cycle	Grade
ECTS Credits	6.0
Academic year	2022 - 2023

Study (s)

Degree	Center	Acad. year	Period
1404 - Degree in Industrial Electronic Engineering	School of Engineering	1	Second term

Subject-matter

Degree	Subject-matter	Character
1404 - Degree in Industrial Electronic Engineering	1 - Mathematics	Basic Training

Coordination

Name	Department
LOPEZ UREÑA, SERGIO	363 - Mathematics

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.

OUTCOMES

1404 - Degree in Industrial Electronic Engineering

- 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).
- 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.

LEARNING OUTCOMES

This course allows for the following learning outcomes:

- The knowledge of basic concepts in mathematics (CG3, CG4, CG12).
- Solving engineering problems by applying concepts in advanced math (CG3, CG4, CG12).
- Being able to understand the mathematical formalisms that may arise in engineering (CG3, CG4, CG12).
- Modeling physical phenomena using mathematical tools(CG3, CG4, CG12).
- Interpret the mathematical results applied to the physical world(CG3, CG4, CG12).

To complement the above results, this subject also permits to acquire the following skills:

- Understand the concept of partial derivative. Using the chain rule for the derivation of composite and implicit functions.
- Manage the elementary methods for solving ordinary differential equations and systems.
- Understand the concept of series and deal with some convergence criteria.
- Representation of some complex functions in power series and understand the concept of convergence region.
- Represent functions in the frequency domain using Fourier series and transforms.

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

ACTIVITY	Hours	% To be attended
Theory classes	30,00	100
Classroom practices	20,00	100
Laboratory practices	10,00	100
Study and independent work	15,00	0
Preparation of evaluation activities	27,00	0
Preparing lectures	15,00	0
Preparation of practical classes and problem	30,00	0
TOTAL	**147,00**	

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).

REFERENCES

Basic

- 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

Additional

- G. L. Bradley y K. J. Smith, Cálculo de varias variables. Vol. II. Prentice Hall Iberia (1998) ISBN: 84-89660-77-8.