COURSE DATA

Data Subject	
Code	34667
Name	Mathematics II
Cycle	Grade
ECTS Credits	6.0
Academic year	2023 - 2024

Study (s)

Degree	Center	Acad. year	Period
1400 - Degree in Computer Engineering	School of Engineering	1	Second term

Subject-matter

Degree	Subject-matter	Character
1400 - Degree in Computer Engineering	9 - Mathematics	Basic Training

Coordination

Name	Department
MOYA BEDON, ANDRES	16 - Astronomy and Astrophysics

SUMMARY

This subject is taught in the second semester of the first year of the Degree in Computer Engineering.

This subject develops the classic contents of Mathematical Analysis: Differential and integral calculus in one and several variables, ordinary differential equations, and functions of complex variable. It is aimed at engineering students, with the contents selected as to take into account the applications that are given in the corresponding subjects, maintaining a coherent order in the presentation and development of the different concepts that are introduced.

The first objective of this course is to introduce the basic concepts of differential and integral calculus, both with real functions of a real variable and in the case of several variables. Based on basic notions of differential and integral calculus and linear algebra (the latter acquired in the subjects ‘Mathematics I’ of the first semester), the student must acquire the fundamental notions about ordinary differential equations and systems of linear, first-order differential equations. In particular, the student must be able to apply the Laplace transformation to the resolution of equations and systems of linear differential equations. The concept of a convergent series of complex numbers and series of functions of complex variable, especially of power series, will also be introduced.

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

1400 - Degree in Computer Engineering

- G8 - Knowledge of basic subject areas and technologies that serve as a basis for learning and developing new methods and technologies, and of those which provide versatility to adapt to new situations.
- G9 - Ability to solve problems with initiative, decision making, autonomy and creativity. Ability to communicate and transmit the knowledge, skills and abilities of a computer engineer.
- B3 - Ability to understand and master the basics of discrete mathematics, logic, algorithms and computational complexity and their application for solving problems in engineering.
- B1 - Ability to solve the mathematical problems that may arise in engineering. Ability to apply knowledge of linear algebra, differential and integral calculus, numerical methods, numerical algorithms, statistics and optimisation.

LEARNING OUTCOMES

Learning Outcomes:

1. Understand basic concepts in mathematics
2. Solve engineering problems by applying advanced mathematical concepts
3. Understand the mathematical formalisms that may arise in engineering
4. Structure the solution of engineering problems mathematically
5. Model real entities using mathematical tools
6. Interpret mathematical results applied to the physical world

Skills to be acquired:

- Learn to perform basic operations with numbers (real and complex) and to simplify mathematical expressions.
- Capacity of logical-mathematical thinking and use of mathematical language.
- Distinguish the properties of the different types of basic mathematical functions and know how to represent them graphically.
- Understand the concept of derivative and its use to determine the intervals of growth and decrease of a function.

- Understand the concept of integral of a function and its relation with the area included under its graph.
- Understand the concept of partial derivative. Use of the chain rule for the derivation of compound and implicit functions.
- Understand the concept of double and triple integral and its relationship with the calculation of areas and volumes.
- Manage the elementary methods to solve ordinary differential equations and systems.
- Understand the concept of series and use of some convergence criteria.

Social skills:

- Correct exposure (oral or written) of issues of scientific content.
- Logical reasoning and critical capacity.
- Ability to ask what is not understood in an expert's presentation.
- Discover connections with other disciplines of interest to the student.
- Consult the teaching guide, interpreting it in a flexible way in the planning of the personal study.

DESCRIPTION OF CONTENTS

1. Differential calculus of functions of one variable.

Elementary functions, continuity. Derivatives of elementary functions. The chain rule. Successive derivatives. Taylor's formula. Graphic representation of a function. Functions of complex variables. Power series.

2. Differential calculus of functions of several variables.

Partial derivatives, directional derivatives. Derivation of compound functions (chain rule). Implicit derivation. Curves and surfaces. Basic convex optimization.

3. Integral calculus of functions of one variable and several variables.

Primitives. Integration by parts. Change of variable. Definite integral. Calculation of areas and averages. Integrals of functions of two and three variable. Integration by change of variables. Fundamental theorems of integral calculus.

4. Ordinary differential equations.

Equations of separable variables and homogeneous, linear equations of first order and linear differential equations of higher order with constant coefficients. Systems of differential equations. Laplace transformation. Application of the Laplace transformation.

WORKLOAD

ACTIVITY	Hours	% To be attended
Theory classes	30,00	100
Classroom practices	20,00	100
Laboratory practices	10,00	100
Preparation of evaluation activities	30,00	0
Preparing lectures	30,00	0
Preparation of practical classes and problem	30,00	0
TOTAL	**150,00**	

TEACHING METHODOLOGY

Based on the following strategies:

a) Lectures

b) Interactive activities: problem-based independent learning.

Theoretical activities: Lectures (single group)

Practical activities: Problem resolution (single group)

Lab: Work in computer rooms (several subgroups)

EVALUATION

The evaluation will be done as follows:

By default, the evaluation with be a continuous evaluation. It consists of two periodic exams, with a weight in the final mark of 10% each, the accomplishments of the laboratory, with a weight on the final mark of 30%, and a final exam with a weight of 50%. Attendance and active participation in class with be regarded positively.

That is, if we note:

EC (continuous evaluation mark)
CT1 (control 1)
CT2 (control 2)
LAB (Laboratory)
EX (final exam mark)

Then

EC= 10% CT1+ 10% CT2+ 30% LAB + 50% EX

If the laboratory practices are not accomplished, the final mark will be “Not presented” at both calls.

If any of the controls are not done, the weight of the final exam will increase in proportion to covering this missing part. That is, the weight of the final exam will be 60% (1 control not done) or 70% (both controls not done).

The final mark will be the maximum between EC and EX, that is, FINAL MARC = Max{EC, EX}

In any case, the evaluation of the subject will be done in accordance with the Regulation of evaluation and qualification of the Universitat de València for the degree and master's degrees approved by the Government Council of May 30, 2017 (ACGUV 108/2017)

REFERENCES

Basic

- L. Gascón, A. Pastor, V. del Olmo, D. García-Sala, Análisis Matemático I. Un curso de cálculo para Informática. Ed. Tébar, Madrid, 2000
- J.E. Marsden, A.J. Tromba. Cálculo vectorial. Cuarta Edición. Pearson Educación (1998) ISBN: 968-444-276-9
- G. James . Matemáticas avanzadas para la ingeniería. Segunda Edición. Pearson Education. (2002) ISBN: 970-26-0209-2