COURSE DATA

Data Subject	
Code	34668
Name	Mathematics III
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	2	First term

Subject-matter

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

Coordination

Name	Department
JORNET SANZ, MARC	363 - Mathematics

SUMMARY

The main thematic subjects are: Numerical Methods and Statistics.

The general objectives of the course are the following:
• To understand the concept of approximation to the solution of a problem.
• To identify those situations requiring a numerical method in order to obtain a solution.
• To acquire the ability to structure a discrete problem in order to be able to solve it using a programming language.
• To learn to question the validity and / or the reliability of the results obtained.
• To establish connections with other subjects of interest in engineering applications.

PREVIOUS KNOWLEDGE

Relationship to other subjects of the same degree

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

Other requirements

It is essential to have acquired the contents of the Mathematics I and Mathematics II subjects, as well as to know the basic aspects of first-year programming.

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.
- 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

The expected results from the increase of knowledge due to course work are the following:

- A fair understanding of basic mathematical concepts.
- A fair understanding of physical models through mathematical tools
- Capability to interpret mathematical results in physical contexts
- Capability to structure the process of solution for engineering problems including mathematical concepts and terms.

DESCRIPTION OF CONTENTS

1. Numerical methods for the solution of nonlinear equations.

Roots of nonlinear equations. Methods of bisection, regula-falsi and Newton.

2. Polynomial Interpolation

Construction of the interpolating polynomial for tables. Error bounds for the interpolation error.

3. Numerical methods for the solution of linear systems.

The LU decomposition and its use in the solution of linear systems. Introduction to iterative methods for the solution of large linear systems.

4. Numerical Integration

Integration rules. Error bounds for numerical integration.

5. Numerical Methods for ordinary differential equations

The Euler method. Convergence of a numerical scheme. Order. First-order schemes versus higher-order schemes.

6. Inference and Decision

Random variables and associated density functions. Confidence Intervals.

7. Regression

Linear and nonlinear regression. Goodness of fit.

WORKLOAD

ACTIVITY	Hours	% To be attended
Laboratory practices	30,00	100
Theory classes	15,00	100
Classroom practices	15,00	100
Development of group work	10,00	0
Development of individual work	5,00	0
Study and independent work	10,00	0
Preparation of evaluation activities	25,00	0
Preparing lectures	15,00	0
Preparation of practical classes and problem	25,00	0
TOTAL	**150,00**	

TEACHING METHODOLOGY

The professor will explain the theoretical concepts to the class, including simple applications. In the practice classes, the student will be asked to solve exercises, alone or in small groups, under the guidance of a professor. In the laboratory, the student shall use the gained knowledge to solve more complex problems, for which the use of a computer is necessary or appropriate.

EVALUATION

The learning assessment will be divided into two parts:

1. Theory part: The theory evaluation will consist of an exam or exams of the theoretical-practical contents of the subject. This part may be recovered in the second call and its qualification will be 70% of the overall grade. To do average, the minimum mark will be 50% of this part.
2. Part of practices: Evaluation of the practices of the subject. It will consist of an evaluation exam or exams, or exercises delivered in the semester. The tests will be carried out in the computer lab. Your grade will account for 30% of the overall grade. This part cannot be recovered in the second call.

REFERENCES

Basic

- Referencia b1: Apunts de Matemàtiques per a Ciències i Enginyeries. Rafael Francisco López Machí, Vicente Javier Pastor Murcia. Roderic, UV. Disponible en https://roderic.uv.es/handle/10550/68257.
- Referencia b2: Estadística Bàsica per a lEnginyeria Tècnica en Informàtica de Gestió. Pablo Gregori, Irene Epifanio. Repositori Universitat Jaume I, UJI, 2010. Disponible en https://repositori.uji.es/xmlui/handle/10234/24282.

Additional

- Referencia c1: Aproximació Numèrica. S. Amat, F. Aràndiga, J.V. Arnau, R. Donat, P. Mulet, R. Peris. P.U.V.
- Referencia c2: Mètodes Numèrics per a l'àlgebra lineal. F. Aràndiga, R. Donat, P. Mulet. P.U.V
- Referencia c3: Càlcul Numèric. F. Aràndiga, P. Mulet. P.U.V.
- Referencia c4: Ampliación de Estadística para la Ingeniería Técnica en Informática de Gestión. Irene Epifanio, Pablo Gregori. Repositori Universitat Jaume I, UJI, 2010. Disponible en https://repositori.uji.es/xmlui/handle/10234/24181