COURSE DATA

Data Subject	
Code	34668
Name	Mathematics III
Cycle	Grade
ECTS Credits	6.0
Academic year	2020 - 2021

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
LOPEZ MACHI, RAFAEL FRANCISCO	255 - Applied Mathematics
YAÑEZ AVENDAÑO, DIONISIO FELIX	363 - Mathematics

SUMMARY

The main thematic subjects are: Numerical Methods, Statistics and Optimization.

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

Matemàtiques I and Matemàtiques II

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 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.

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 three parts:

1.- Theory part: The evaluation of this part will consist of an evaluation exam or exams of the theoretical and practical contents of the subject. This part may be recovered on second call and its grade will represent 50% of the overall grade.

2.- Part of practices: Evaluation of the participation in the practices of the subject. This part is divided into two subparts:

a) Laboratory practice exam, with a score of 50% of the mark for the practical part. It is a test that will be carried out in the computer lab at the end of the practices and **cannot be recovered on second call**.

b) Exam of the practical notebook. During the practices, the student will make a notebook with the exercises, algorithms and results of all the practices. A test will be carried out on this notebook on the same date as the theory exam, where the work done during the practices will be evaluated. With a score of 50% of the mark of the practical part, this test may be recovered on second call. To be evaluated of this part, the attendance of at least 50% of the practical classes **must be accredited**.

The mark of the practical part will suppose 40% of the global mark.

3.- The attendance and participation in the theory and practical classes will suppose, at the teacher's discretion, 10% of the global mark.
The overall mark for the course will be obtained from the marks obtained in the previous sections and in accordance with the established percentages, provided that the marks in sections 1 and 2 exceed 40% of the maximum mark corresponding to each of them.

REFERENCES

Basic

- Referencia b1: Métodos Numéricos: Introducción, Aplicaciones y Programación. A. Huerta, J. Sarrate, A. Rodriguez-Ferrer. Edicions UPC
  Referencia b2: Análisis Numérico. Burden y Faires. Thomson Learning
  Referencia b3: Curs dEstadística. Colomer Mª Angels. Ed. Universitat de Lleida, 1997
  Referencia b4: Problemas resueltos de Métodos Numéricos. A. Cordero, J.L. Hueso, E. Martinez, J.R.Torregrosa, Ed. Thomson.

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: Linear and Nonlinear Programming, 2009. David G. Luenberger, Yinvu Ye.
  Referencia c5: Estadística Aplicada Básica. Moore David S.Ed. Antoni Bosch, 1998.

ADDENDUM COVID-19

This addendum will only be activated if the health situation requires so and with the prior agreement of the Governing Council

The teaching method for this subject will follow the teaching model approved by the Academic Committee of the GII / GIM degrees (https://go.uv.es/catinfmult/ModeloDocenciaGIIGIM). If facilities are closed because of COVID-19, lectures will be replaced by synchronous sessions that will run according to the degree timetable, using the tools provided by the university.

The weights for each activity will remain the same as specified in the teaching guide.