VNIVERSITAT Ǧ ID VALÈNCIA

COURSE DATA

Data Subject	
Code	34836
Name	Mathematics III
Cycle	Grade
ECTS Credits	6.0
Academic year	2023 - 2024

Study (s)			
Degree	**Center**	**Acad. year**	**Period**
1407 - Degree in Multimedia Engineering	School of Engineering	2	First term

Subject-matter		
Degree	**Subject-matter**	**Character**
1407 - Degree in Multimedia Engineering	7 - Matemáticas	Basic Training

Coordination	
Name	**Department**
GUERRERO CORTINA, FRANCISCO	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 that require 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 fiability of the results obtained.
- To stablish conections 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

1405 - Grado en Ingenieria Multimedia

- G6 - Know the basic subject areas and technologies that serve as a basis to learn and develop new methods and technologies and those that provide versatility to adapt to new situations.

- 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.

- MM28 - Be able to solve problems with initiative, decision-making and creativity and to communicate and transmit the knowledge, abilities and skills of a multimedia engineer.

LEARNING OUTCOMES

The expected resuls 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

Capabilty to interpret mathematical results in physical contexts

Capability to structure the process of solution to engineering problems including mathematical concepts and terms.

DESCRIPTION OF CONTENTS

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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. Inference and decision

Statistics vocabulary. Central statistics (mode, means) and dispersion statistics (variance, standard deviation). Introduction to probability distributions. Normal distributions. Random variables and associated density functions. Credible 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 evaluation procedure is as follows:

1. There will be at least one exam to evaluate the knowledge gained in the course. The grades obtained will amount up to 50% of the final grade of the course

2. The evaluation of the participation of the student in the activities linked to the Laboratory will be carried out by one or more exams. In addition, the professor may require the presentation of a lab diary or specific homework. The grades obtained will amount up to 50% of the final grade of the course. The grade of laboratory will be 50% composed of the grade for the homework and the grade for the practical exam.

3. The dayly participation of the student in the development of the course, by attending lectures and other activities proposed by the professor, may amount to up to 10% of the final grade of the course.

In any case, the evaluation of this subject will be done in compliance withthe University Regulations in this regard, approved by the GoverningCouncil on 30th May 2017 (ACGUV 108/2017).

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.