

**COURSE DATA****DATA SUBJECT****Code:** 34914**Name:** Mathematics III**Cycle:** Undergraduate Studies**ECTS Credits:** 6**Academic year:** 2026-27**STUDY (S)**

Degree	Center	Acad. year	Period
1404 - Degree in Industrial Electronic Engineering	Escola Tècnica Superior d'Enginyeria	1	Second quarter

**SUBJECT-MATTER**

Degree	Subject-matter	Character
1404 - Degree in Industrial Electronic Engineering	Mathematics	BASIC

**COORDINATION**

CORDERO CARRION ISABEL

PASTOR MURCIA VICENTE JAVIER

**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

## **COMPETENCES / LEARNING OUTCOMES**

### **1404 - Degree in Industrial Electronic Engineering**

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.

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).

## **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. Inference and Decision

Random variables and associated density functions. Confidence Intervals.

## 7. Regression

Linear and nonlinear regression. Goodness of fit.

## 8. Basic convex optimization

Basic convex optimization.

## WORKLOAD

### PRESENCIAL ACTIVITIES

Activity	Hours
Theory	15,00
Laboratory	30,00
Classroom practices	15,00
<b>Total hours</b>	<b>60,00</b>

### NON PRESENCIAL ACTIVITIES

Activity	Hours
Attendance at other activities	0,00
Individual or group project	15,00
Independent study and work	10,00
Preparation of lessons	40,00
Preparation for assessment activities	25,00



Resolution of case studies	0,00
<b>Total hours</b>	<b>90,00</b>

## TEACHING METHODOLOGY

- In the theoretical classes the professor will introduce the concepts associated with each chapter, as well as their use in the resolution of specific problems (CG3).
- In the practical classes, the students will do exercises about the theoretical contents, in an individual way and in a group, in order to favor the knowledge of theoretical concepts (CG4, CG12).
- The work in the practical session in the informatic class is oriented to the resolution of specific problems by the student. They will use an informatic environment to help them the structured programming (CG4, CG12).
- Work in a group will be promoted through the elaboration of works that can be presented to the professor and the rest of the students during the class (CG4).

## EVALUATION

The evaluation procedure of the knowledge and skills obtained by the students will be done during the whole period and consists of the following evaluation blocs:

1. Evaluation exam or exams of the theoretical-practical contents of the subject, with up to 50% of the final grade of the course (CG3).
2. Continuous evaluation of the participation in the practical laboratories of the subject, elaboration of lab diary. For this evaluation, one or more exams will be carried out. Moreover, the professor can ask for presentation of specific works and lab diaries to complete the evaluation. Total evaluation of all the activities in this part is up to 50% of the final grade of the course. Assistance to laboratory sessions is a non recoverable activity and obligatory in order to pass the subject (CG4, CG12).
3. Assistance to theoretical classes, practical classes and participation in the development of the subject will have, according to the professor opinion, up to 10% of the final grade of the course (CG4).

The final grade of the subject will be computed from the qualifications of the previous parts, according to the established percentages by the professor, if the qualifications from points 1 and 2 pass 40% of the maximum qualification in each of the previous parts.

The qualification of the exercises and/or specific works is non recoverable and will be kept for the two convocatories of each academic course.

In any case, the evaluation system will follow that established in the *¿Reglamento de Evaluación y Cualificación¿* of the University of Valencia for Grades and Masters (<https://webges.uv.es/uvTaeWeb/MuestraInformacionEdictoPublicoFrontAction.do?accion=inicio&idEdictoSeleccionado=5639>).



Copying or plagiarism of any activity that is part of the evaluation will result in the impossibility of passing the course, and the student will then be subject to the appropriate disciplinary procedures indicated in the ACTION PROTOCOL FOR FRAUDULENT PRACTICES AT THE UNIVERSITY OF VALENCIA ([ACGUV 123/2020](#)).

## REFERENCES

- Métodos Numéricos: Introducción, Aplicaciones y Programación. A. Huerta, J. Sarrate, A. Rodríguez-Ferrer. Edicions UPC
- Anàlisi Numèric. Burden y Faires. Thomson Learning
- Curs d'Estadística. Colomer M<sup>a</sup> Àngels. Ed. Universitat de Lleida, 1997
- Problemas resueltos de Métodos Numéricos. A. Cordero, J.L. Hueso, E. Martínez, J.R. Torregrosa, Ed. Thomson.
- Aproximació Numèrica. S. Amat, F. Aràndiga, J.V. Arnau, R. Donat, P. Mulet, R. Peris. P.U.V.
- Mètodes Numèrics per a l'àlgebra lineal. F. Aràndiga, R. Donat, P. Mulet. P.U.V
- Càlcul Numèric. F. Aràndiga, P. Mulet. P.U.V.
- Linear and Nonlinear Programming, 2009. David G. Luenberger, Yinyu Ye.
- Estadística Aplicada Bàsica. Moore David S. Ed. Antoni Bosch, 1998.