VNIVERSITAT DE VALÈNCIA

Course Guide
34745 Mathematics III

COURSE DATA

Data Subject	
Code	34745
Name	Mathematics III
Cycle	Grade
ECTS Credits	6.0
Academic year	2023 - 2024

Study (s)

Degree	Center	Acad. year	Period
1401 - Degree in Chemical Engineering	School of Engineering	1	Second term
1934 - D.D. in Chemistry-Chemical Engineering	Faculty of Chemistry	2	Second term

Subject-matter

Degree	Subject-matter	Character
1401 - Degree in Chemical Engineering	1 - Mathematics	Basic Training
1934 - D.D. in Chemistry-Chemical Engineering	2 - Segundo curso	Obligatory

Coordination

Name	Department
CORDERO CARRION, ISABEL	363 - Mathematics
MARTI RAGA, MARIA CARMEN	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 appplications.

The theory classes will be taught in Spanish and the practical classes and laboratory as it appears in the web site of the degree.

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

OUTCOMES

1401 - Degree in Chemical Engineering

- G3 - 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.
- G4 - 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.
- B1 - 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.

LEARNING OUTCOMES

The learning outcomes are the following:

- Have understanding and have a good command of basic mathematical concepts (skills G3 and B1).
- Solve engineering problems applying advanced mathematical concepts (skills G4 and B1).
- Understand mathematical formalism that can be raise in engineering (skills G3, G4 and B1).
- Structure the resolution of engineering problems from the mathematics perspective (skills G4 and B1).
- Model the physical phenomenon through mathematical tools (skills G3 and B1).
- Interpret mathematical results in physical contexts (skills G3 y B1).

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. Convergence 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

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 (skills G3 and B1).
- In the practice classes, the student will be asked to solve exercises, alone or in small groups, under the guidance of a professor (skills G4 and B1) .
- 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 (skills G4 and B1).
- The work in groups would be prometed through the presentation of reports (skills G4 and B1).

EVALUATION

The evaluation procedure of the knowledgement 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 (skills G3, G4 and B1).

2. Continous 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 no recoverable activity and obligatory in order to pass the subject (skills G4 and B1).

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 (skills G3, G4 and B1).

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 in each of the previous parts qualification.

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 Reglament d'Avaluació i Qualificació de la Universitat de València per a Títols de Grau i Màster (http://links.uv.es/7S40pjF).

REFERENCES

Basic

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

Additional

- 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, Yinvu Ye.
- Estadística Aplicada Básica. Moore David S.Ed. Antoni Bosch, 1998.