

## SUBJECT TEACHING GUIDE

G1019 - Mathematical Methods for Engineering

Degree in Industrial Technologies Engineering

Academic year 2022-2023

1. IDENTIFYING DATA					
Degree	Degree in Industrial Technologies Engineering			Type and Year	Core. Year 2
Faculty	School of Industrial Engineering and Telecommunications				
Discipline	Subject Area: Mathematics Basic Training Module				
Course unit title and code	G1019 - Mathematical Methods for Engineering				
Number of ECTS credits allocated	6	Term	Semester based (1)		
Web	<a href="https://personales.unican.es/casase/MMI/">https://personales.unican.es/casase/MMI/</a>				
Language of instruction	Spanish	English Friendly	Yes	Mode of delivery	Face-to-face

Department	DPTO. MATEMATICA APLICADA Y CIENCIAS DE LA COMPUTACION				
Name of lecturer	EDUARDO CASAS RENTERIA				
E-mail	eduardo.casas@unican.es				
Office	E.T.S. de Ingenieros Industriales y de Telecomunicación. Planta: - 4. DESPACHO PROFESORES (S4019)				
Other lecturers	MARIA DOLORES FRIAS DOMINGUEZ SARA PEREZ CARABAZA DIEGO RUIZ ANTOLIN				

### 3.1 LEARNING OUTCOMES

- Knowledge of the statistics basic elements
- Knowledge of the elementary numerical methods for the approximate solution of problems arising in scientific applications
- To get familiar with the use and programming of specific software (Matlab and Octave) to address the solution of mathematical problems

#### 4. OBJECTIVES

Introduce the student in the scientific computing, addressing the solution of problems through numerical and statistical methods

Introduce the student in the different categories of numerical methods and their efficient way of implementation in the computer to calculate the solution with a given accuracy

Instill in our students a proper use of statistical software to solve scientific problems in engineering.

#### 6. COURSE ORGANIZATION

##### CONTENTS

1	Part I: Numerical Methods
1.1	Basic elements of computational arithmetic
1.2	Approximate solution of scalar nonlinear equations
1.3	Approximation of real-valued functions of one real variable by polynomials
1.4	Numerical integration
1.5	Numerical integration of ordinary differential equations
2	Part II: Statistics
2.1	Descriptive statistics. Probability and random variable. Common statistical distributions
2.2	Statistical quality control

#### 7. ASSESSMENT METHODS AND CRITERIA

Description	Type	Final Eval.	Reassessn	%
Test of Numerical Methods	Laboratory evaluation	No	Yes	66,67
Practical computer exercises of Statistics	Laboratory evaluation	No	Yes	8,00
Theoretical-practical exam of Statistics	Written exam	Yes	Yes	25,33
<b>TOTAL</b>				<b>100,00</b>

##### Observations

To pass the subject the student must have a grade of at least 5 points, according to the percentages established in each block. It is also necessary that both in the Statistics and Numerical Methods part, the rating exceeds 30% of the assigned score

##### Observations for part-time students

Students enrolled on a part-time basis (and only these) can perform the written tests and practical tests simultaneously in the period established for the exams if they so request at the beginning of the academic year.

## 8. BIBLIOGRAPHY AND TEACHING MATERIALS

### BASIC

A. Aubanell, A. Benseny y A. Delshams: "Útiles Básicos de Cálculo Numérico". Editorial Labor, S.A.. Barcelona 1993.

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R.L. Burden y J.D. Faires: "Numerical Analysis". PWS-Kent Publishing Company. Boston 1988.

D. Kahaner, C. Moler y S. Nash: "Numerical Methods and Software". Prentice Hall, Englewood Cliffs. New Jersey 1989.

<http://catalogo.unican.es/cgi-bin/abnetopac/?TITN=19404>

G.W. Stewart: "Afternotes on Numerical Analysis". SIAM. Philadelphia, 1996.

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Luceño, A.; González, F.J. 2003. "Métodos Estadísticos para Medir, Describir y Controlar la Variabilidad". Santander:

Universidad de Cantabria. ISBN: 978-84-8102-750-1. <http://catalogo.unican.es/cgi-bin/abnetopac/?TITN=214714>