

## SUBJECT TEACHING GUIDE

G855 - Mathematical Methods for Engineering

Degree in Electrical Engineering

Academic year 2022-2023

1. IDENTIFYING DATA					
Degree	Degree in Electrical 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	G855 - Mathematical Methods for Engineering				
Number of ECTS credits allocated	6	Term	Semester based (1)		
Web					
Language of instruction	Spanish	English Friendly	No	Mode of delivery	Face-to-face

Department	DPTO. MATEMATICA APLICADA Y CIENCIAS DE LA COMPUTACION				
Name of lecturer	MARIA DOLORES FRIAS DOMINGUEZ				
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Office	E.T.S. de Ingenieros de Caminos, Canales y Puertos. Planta: + 1. DESPACHO PROFESORES (1046)				
Other lecturers	CARMEN MARIA SORDO GARCIA SARA PEREZ CARABAZA VERA EGOROVA				

### 3.1 LEARNING OUTCOMES

- Knowledge of basic numerical methods to solve mathematical problems that admit a mathematical formulation.
- Ability to discern the best method among those available for a particular problem, assessing the complexity of the method and the presence and control of numerical errors.
- Knowledge of basic statistical concepts.
- Use mathematical software and gain working knowledge with computers and programming environments to tackle problems that arise in engineering applications

#### 4. OBJECTIVES

Introduce students to mathematical problem solution techniques, making use of numerical and statistical methods applied to model scientific and technical problems

The student must learn how to use mathematics to solve problems that arise in physics and engineering.

#### 6. COURSE ORGANIZATION

##### CONTENTS

1	Part I: Statistics
1.1	Descriptive statistics
1.2	Probability
1.3	Common probability distributions
1.4	Statistical Quality Control
2	Numerical Method and Optimization
2.1	Basic computer arithmetic
2.2	Approximate solution for non-linear equations
2.3	Polynomial approximation of real-values functions. Optimization.
2.4	Numerical integration and differentiation.
2.5	Numerical integration of Ordinary Differential Equations

#### 7. ASSESSMENT METHODS AND CRITERIA

Description	Type	Final Eval.	Reassessn	%
Part I: Statistics	Written exam	No	Yes	10,00
Part I: Statistics	Written exam	No	Yes	15,00
Part I: Statistics	Laboratory evaluation	No	No	10,00
Part II: Numerical Methods	Activity evaluation with Virtual Media	No	Yes	25,00
Part II: Numerical Methods	Work	No	Yes	15,00
Part II: Numerical Methods	Laboratory evaluation	Yes	Yes	25,00
<b>TOTAL</b>				<b>100,00</b>

##### Observations

In the extra exam call, students are only allow to repeat the failed exams.  
It will consist of two parts, one for Statistics and one for Numerical Methods, with their corresponding weights.  
The final mark for the extra call will be the weighted average of the different evaluation methodologies indicated in this guide .  
The mark in each part of the subject (Statistics and Numerical Methods) must be greater than or equal to 3.

The online evaluation of these works, practical laboratory exercises and written tests is foreseen, in the case of a new health alert for COVID-19 make it impossible to carry out the evaluation in person

##### Observations for part-time students

Part-time students (and only these) will be able to take the written exams simultaneously in the period established for the exams if they so request at the beginning of the year.  
Practical exams will take place as for the rest of the students to ensure the same evaluation of knowledge and competence.  
The works proposed throughout the year may be done individually and delivered in electronic format.

## 8. BIBLIOGRAPHY AND TEACHING MATERIALS

### BASIC

Chapra S.C.; Canale R.2005. "Métodos Numéricos para Ingenieros". Ed. McGRaw-Hill.

Mathews J., Kurtis D.1999." Métodos Numéricos con MATLAB". Prentice Hall.

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

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>

Cohen, Y.; Cohen, J.Y. 2008. "Statistics and data with R: an applied approach through examples". Chichester:: John Wiley &  
Sons. ISBN: 978-0-470-75805-2. <http://catalogo.unican.es/cgi-bin/abnetopac/?TITN=292113>