SUBJECT TEACHING GUIDE

G734 - Mathematical Methods for Engineering

Degree in Mechanical Engineering

Academic year 2023-2024

1. IDENTIFYING DATA				
Degree	Degree in Mechanical 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	G734 - Mathematical Methods for Engineering			
Number of ECTS credits allocated	6	Term	Semester based (2)	
Web	https://personales.unican.es/alvareze/CalculoWeb/MNumericos/index.html			
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	ELENA ESPERANZA ALVAREZ SAIZ
E-mail	elena.alvarez@unican.es
Office	E.T.S. de Ingenieros Industriales y de Telecomunicación. Planta: - 5. DESPACHO (S5020)
Other lecturers	SARA PEREZ CARABAZA

3.1 LEARNING OUTCOMES
- Knowledge of basic numerical methods to solve mathematical problems approximately
- 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: Numerical methods and optimization
1.1	Basic computer arithmetic
1.2	Approximate solution of non-linear equations
1.3	Polynomial approximation of real-valued functions. Optimization.
1.4	Numerical integration
1.5	Numerical integration of Ordinary Differential Equations
2	Part II: Statistics
2.1	Descriptive statistics
2.2	Probability, random variables and common probability models
2.3	Statistical Quality Control

7. ASSESSMENT METHODS AND CRITERIA

Description	Type	Final Eval.	Reassessn	%
Part I: Numerical methods and optimization (25%)	Others	No	Yes	25,00
Part II: Numerical methods and optimization (40%)	Laboratory evaluation	No	Yes	40,00
Part I: Statistics (10%)	Written exam	Yes	Yes	25,00
Part II: Statistics (25%)	Laboratory evaluation	No	Yes	10,00
TOTAL				100,00

Observations
In those activities with a given format (report templates, limited space in written exams) there will be a penalty if the student does not conform to the format. Additionally, there will be a penalty when (among others):   - Answers are not justified   - Inadequate use of mathematical terminology and notation   Being especially serious: - the procedures that show a lack of competence in basic mathematical knowledge   - overlook of meaningless results (e.g. negative probabilities)

Observations for part-time students
Part-time students will follow the same rules as those of the rest of the students.

8. BIBLIOGRAPHY AND TEACHING MATERIALS

BASIC

Material del profesorado de la asignatura.

Chapra S.C., Canale R. (2015). "Métodos Numéricos para Ingenieros". Ed. McGRaw-Hill.
http://catalogo.unican.es/cgi-bin/abnetopac/?TITN=395562

Luceño A.; González F.J. "Metodos estadísticos para medir, describir y controlar la variabilidad". UC
https://catalogo.unican.es/cgi-bin/abnetopac/?TITN=214714