

SUBJECT TEACHING GUIDE

G985 - Mathematical Methods for Engineering

Degree in Industrial Electronic Engineering and Automatic Control Systems
 First Degree in Industrial Electronic Engineering and Automatic Control Systems

Academic year 2024-2025

1. IDENTIFYING DATA					
Degree	Degree in Industrial Electronic Engineering and Automatic Control Systems First Degree in Industrial Electronic Engineering and Automatic Control Systems			Type and Year	Core. Year 2 Core. Year 2
Faculty	School of Industrial Engineering and Telecommunications				
Discipline	Subject Area: Mathematics Basic Training Module				
Course unit title and code	G985 - 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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Other lecturers	CARMEN MARIA SORDO GARCIA SARA PEREZ CARABAZA VERA EGOROVA 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. SUBJECT PROGRAM

CONTENTS

1	Part I: Statistics
1.1	Descriptive statistics: Sample and population. Type of data. Tables of frequency, statistics and graphs.
1.2	Probability and random variable: Definition and properties. Conditional probability. Independence of events. Discrete and continuous random variables. Probability, density, and distribution functions.
1.3	Common probability distributions: Common discrete and continuous distributions. Approximations using the normal distribution.
1.4	Statistical Quality Control: Introduction to statistical quality control. Control charts.
2	Part II: 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.
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	15,00
Part I: Statistics	Written exam	No	Yes	10,00
Part I: Statistics	Laboratory evaluation	No	No	10,00
Part II: Numerical Methods	Activity evaluation with Virtual Media	No	Yes	30,00
Part II: Numerical Methods	Laboratory evaluation	Yes	Yes	35,00
TOTAL				100,00
Observations				
<p>The final grade for the course will be obtained as a weighted average of all previous assessment activities (Statistics block - 35%, Numerical Methods block - 65%), provided that the final grade for each block is greater than or equal to 3 out of 10. The extraordinary exam will consist of two distinct parts, one for each block of the course, with each part having the same weight as the recoverable parts of the corresponding block.</p> <p>During the extraordinary exam period, students may only take the exams for the recoverable assessments they have failed. The grades obtained during the course are kept until the extraordinary exam session.</p>				
Observations for part-time students				
<p>Part-time students (and only them) will be able to take the written exams simultaneously during the established exam period if they request it at the beginning of the course.</p> <p>Attendance at lab exams is mandatory to ensure the evaluation of the same knowledge and skills as their classmates.</p> <p>The assignments proposed throughout the course can be done individually and submitted electronically.</p>				

8. BIBLIOGRAPHY AND TEACHING MATERIALS
BASIC
Chapra S.C.; Canale L. 2015. "Métodos Numéricos para Ingenieros". Ed. McGraw-Hill. ISBN: 9781456267346 https://go.exlibris.link/jHfjZG7N
Mathews J., Kurtis D. 1999. "Métodos Numéricos con MATLAB". Prentice Hall. ISBN: 84-8322-181-0 https://catalogo.unican.es/cgi-bin/abnetopac?TITN=163396
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