SUBJECT TEACHING GUIDE

G985 - Mathematical Methods for Engineering

First Degree in Industrial Electronic Engineering and Automatic Control Systems

Academic year 2026-2027

1. IDENTIFYING DATA					
Degree	First Degree in Industrial Electronic Engineering and Automatic Control Systems			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	G985 - Mathematical Methods for Engineering				
Number of ECTS credits allocated	6	Term		Semester based (1)	
Knowledge Field	Industrial engineering, mechanical engineering, automation engineering, industrial organization engineering and navigation engineering				
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	PAULA CAMUS BRAÑA
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Office	E.T.S. de Ingenieros de Caminos, Canales y Puertos. Planta: + 1. DESPACHO PROFESORES (1027)
Other lecturers	MARIA DOLORES FRIAS DOMINGUEZ SARA PEREZ CARABAZA DIEGO RUIZ ANTOLIN

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

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.
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.
Regarding the exams, an individual oral defense may subsequently be requested in cases where it is necessary to clarify or verify any aspect of the completed exam.

Observations for part-time students

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.
Attendance at lab exams is mandatory to ensure the evaluation of the same knowledge and skills as their classmates.
The assignments proposed throughout the course can be done individually and submitted electronically.

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