

SUBJECT TEACHING GUIDE

G985 - Mathematical Methods for Engineering

Degree in Industrial Electronic Engineering and Automatic Control Systems

Academic year 2022-2023

| 1. IDENTIFYING DATA | | | | | |
|----------------------------------|---|------------------|--------------------|------------------|--------------|
| Degree | 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) | | |
| Web | | | | | |
| Language of instruction | Spanish | English Friendly | No | Mode of delivery | Face-to-face |

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|------------------|---|--|--|--|--|
| 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 | | | | |

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 |
| TOTAL | | | | 100,00 |

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>