## Circuit and algorithms design

**Academic Year: ( 2023 / 2024 )**                                                    Review date: 30-03-2023

**Department assigned to the subject: Mathematics Department**

**Coordinating teacher: PEREZ PARDO, JUAN MANUEL**

**Type: Electives  ECTS Credits : 6.0**

**Year :   Semester :**

### REQUIREMENTS (SUBJECTS THAT ARE ASSUMED TO BE KNOWN)

Linear Algebra. Calculus I & II. Advanced Mathematics.

### OBJECTIVES

GENERAL ABILITIES (PO a):

- To acquire the ability to model real-world situations mathematically, with the aim of solving practical problems in engineering.
- To be able to apply the knowledge about liner algebra, differential and integral calculus, ordinary differential equations and numerical methods and algorithms.
- To be able to use mathematical software in specific situations with applications in egineering.

SPECIFIC ABILITIES (PO a):
- To be able to use the basic functionality of MATLAB.
- To be able to program and debug algorithms by using MATLAB.
- To acquire the ability to apply basic numerical methods for solving problems in engineering.

### DESCRIPTION OF CONTENTS: PROGRAMME

- Introduction to Matlab.
- Error analysis.
- Numerical solution of linear systems.
- Iterative methods for solving nonlinear systems of equations.
- Interpolation with splines.
- Solution of least squares problems
- Numerical integration.
- Numerical solution of ordinary differential equations.

### LEARNING ACTIVITIES AND METHODOLOGY

Lecture sessions:  2.5 ECTS credits ( PO: a).
Laboratory sessions: 3.5 credit ECTS  (PO: a).

### ASSESSMENT SYSTEM

We follow a continuous-assessment system (40%) plus a final exam (60%):

 - The continuous-assessment part will be based on the elaboration of several lab. computer programs, which will cover the theoretical concepts explained in the lecture sessions.

 - The final exam (contributing with weight 60% to the final mark) is compulsory, and will be held at the end of the semester. (PO: a.)

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| **% end-of-term-examination:** | 60 |
| **% of continuous assessment (assigments, laboratory, practicals…):** | 40 |

### BASIC BIBLIOGRAPHY

 - C. Moler Numerical Computing with MATLAB, SIAM, 2004

 - D. J. Higham and N. J. Higham Matlab Guide, SIAM, 2000

- J.H. Mathews y K.D. Fink Métodos Numéricos con MatLab, Prentice Hall, 2000

## ADDITIONAL BIBLIOGRAPHY

- G. W. Stewart Afternotes goes to Graduate School, SIAM , 1998
- G. W. Stewart  Afternotes on Numerical Analysis, SIAM, 1996
- R.L. Burden y J.D. Faires Numerical Analysis, Thomson, 1998