Universidad Zaragoza

Academic Year/course: 2023/24

29610 - Mathematics III

Syllabus Information

Academic year: 2023/24
Subject: 29610 - Mathematics III
Faculty / School: 110 - Escuela de Ingeniería y Arquitectura
Degree: 430 - Bachelor's Degree in Electrical Engineering
ECTS: 6.0
Year: 2
Semester: 107-First semester
430-First semester o Second semester
Subject type: Basic Education
Module:

1. General information

The main goal of the subject is to introduce students to the techniques for solving problems associated with differential equations, presenting the most appropriate analytical and numerical methods. It is also the purpose of the subject that the students know and handle some mathematical software that facilitates the resolution of the problems posed.

The knowledge and skills acquired in the subjects Mathematics I and Mathematics II taught in the first year of the degree are required.

These approaches and goals are aligned with the Sustainable Development Goals (SDGs) of the 2030 Agenda of United Nations (https://www.un.org/sustainabledevelopment/es/). Specifically, the learning activities foreseen in this subject will contribute in some measure to the achievement of Goals 4, 5, 8, 9 and 10.

2. Learning results

- Mathematically formulate, solve and interpret engineering problems.
- Apply the knowledge acquired about Ordinary Differential Equations and Partial Differential Equations.
- Use numerical methods in solving some mathematical problems.
- Know symbolic and numerical calculation tools.
- Possess scientific-mathematical thinking skills that allow them to ask and answer certain mathematical questions .
- Correctly use of mathematical language, in particular, symbolic and formal language.

3. Syllabus

- Block 1: Ordinary Differential Equations (ODE's):

  First order equations.

  Higher order linear equations.

  Linear systems. System stability.

  Laplace transform.

  Numerical resolution of ODEs: Runge-Kutta methods.

- Block 2. Partial Differential Equations (PDE's):

  Fourier series.

  Solving boundary problems by the method of separation of variables: heat equation, wave equation and Laplace equation

4. Academic activities

- Theory classes and problems: 48 h.

  Theoretical contents will be presented and will be completed with problem solving.

- Laboratory practices: 12 h. (6 sessions of 2 hours).

  In these practices, mathematical algorithms are programmed and implemented by means of symbolic and numerical programming software installed in EINA's computer laboratories. Students will be divided into groups and will use the

free MAXIMA software. Some of the topics indicated in the subject syllabus can be developed specifically in the practical classes.

- Directed works: 26 h.
- Study and personal work: 60 h.
- Assessment 4 h.

5. Assessment system

A global evaluation system is chosen, complemented with the performance of different activities and tests during the class period, in order to facilitate its follow-up. Consists of:

1. Global and written test composed of theoretical-practical questions and practical problems related to:

- Theory classes and problems (80% of the overall grade).
- Laboratory practices (20% of the overall grade).

The test, which lasts approximately three hours, will take place on the dates established by the center for each of the official calls.

2. Optionally, students may carry out work directed or supervised by the teaching staff. Its grade will represent 10% of the overall grade of the subject.

3. Optionally, students may take an exam of all the practices of the subject on a date prior to the global evaluation . The centre's computer resources and Maxima software will be used for this purpose. Its grade will represent 20% of the overall grade of the subject.

4. The faculty may choose to conduct an midterm written test in order to encourage students to study the subject and facilitate the passing of the same, valid only in the first call of the academic year.