Universidad Zaragoza

29805 - Mathematics III

Syllabus Information

Academic year: 2023/24
Subject: 29805 - Mathematics III
Faculty / School: 110 - Escuela de Ingeniería y Arquitectura
326 - Escuela Universitaria Politécnica de Teruel
Degree: 440 - Bachelor's Degree in Electronic and Automatic Engineering
      444 - Bachelor's Degree in Electronic and Automatic Engineering
ECTS: 6.0
Year: 1
Semester: 440-First semester o Second semester
107-Second semester
444-Second semester
Subject type: Basic Education
Module:

1. General information

The objective of the subject is to introduce students to the solution of Differential Equations problems in an exact and numerical way . The use of mathematical software for the analysis of mathematical models of engineering problems described by means of Differential Equations will also be introduced. These approaches and objectives are aligned with some of the Sustainable Development Goals, SDGs, of the 2030 Agenda (https://www.un.org/sustainabledevelopment/es/). Specifically, the learning results of the subject will contribute to the achievement of target 12.2 of Goal 12, and target 9.1 of Goal 9.

It is recommended that the student possesses the knowledge acquired in the subjects of Mathematics I and Mathematics II: differential and Integral Calculus, Linear Algebra, as well as the numerical methods characteristic of these topics.

2. Learning results

- Solve mathematical problems that may arise in Engineering.
- Have aptitude to apply the acquired knowledge of Differential Equations, Partial Derivative Equations; and Numerical Methods.
- Know how to use numerical methods in the solution of some mathematical problems.
- Know the reflexive use of symbolic and numerical calculation tools.
- Possess scientific-mathematical thinking skills that allow them to ask and answer certain mathematical questions.
- Skilled in handling mathematical language; in particular, symbolic and formal language.

3. Syllabus

Block 1: Ordinary Differential Equations

- First order equations: Existence and uniqueness of solutions. Elementary methods of integration. Applications.
- Higher order linear equations: Equations with constant coefficients. Cauchy-Euler equation.

Applications.

- Linear systems: First order systems with constant coefficients. Applications.
- Laplace transform. Applications.

Block 2. Partial Differential Equations

- Fourier series. Method of separation of variables. Numerical resolution of contour problems.

The following topics will be covered in the internship:

- Qualitative study of first order differential equations and systems.
- Applications of second-order differential equations: models of vibrational motion

- Methods for the numerical resolution of ODEs.
- Analysis of systems by means of Laplace transform.

4. Academic activities

- Theory classes (38 hours). Theoretical content will be presented along with examples and practical issues.
- Problem solving (10 hours). Some of the exercises from the collection of problems of the subjectwill be solved.
- Computer practices (12 hours). There will be 6 practical computer sessions of 2 hours in which will be analyzed and mathematical algorithms will be programmed using appropriate scientific software.
- Supervised work (24 hours): optionally, students can do group work with applications of the subject to engineering.
- Study (60 hours).
- Assessment tests (6 hours)

At EUPT this subject is taught in two different modalities: face-to-face (the above applies) and blended learning. In the blended mode of the EUPT, students will be guided by the faculty through telematic tutorials and will have the necessary materials for the realization of the practices.

5. Assessment system

Río Ebro Campus (Zaragoza).

Comprehensive test composed of questions and problems related to the lectures and problem classes (70% of the grade), a part related to the tutored work (10% of the grade) and to the laboratory practices (20% of the grade).

The student, optionally, will be able to take an exam of all the practices in the last laboratory session.

Optionally, students may carry out supervised work proposed by the teachers.

If the tests of items 2 and 3 are taken, you may choose not to take the corresponding parts in the overall test.

Teruel Campus.

Continuous assessment, which is defined for face-to-face and blended learning:

Presential modality:

- Partial written test (35%, minimum grade 4.5): Written test on the theoretical-practical contents and problems of the subject.
- Academic Work (10%): Assignments with theoretical-practical exercises.
- Computer practice (20%): Work in the practical sessions and final practical exam.
- Final Exam (35%, minimum grade 4.5): Written test on the theoretical-practical contents and problems of the subject.

Semi-attendance mode:

- Non-attendance academic work (30%).
- Final on-site exam (70%, minimum grade 4.5).

Global assessment: Students will have the right to a global assessment with a single exam of all the contents of the subjecton the official dates of the two exams.