

Academic Year/course: 2022/23

29910 - Mathematics III

Syllabus Information

Academic Year: 2022/23

Subject: 29910 - Mathematics III

Faculty / School: 110 - Escuela de Ingeniería y Arquitectura

Degree: 435 - Bachelor's Degree in Chemical Engineering

ECTS: 6.0

Year: 1

Semester: 435-First semester o Second semester
107-Second semester

Subject Type: Basic Education

Module:

1. General information

2. Learning goals

3. Assessment (1st and 2nd call)

4. Methodology, learning tasks, syllabus and resources

4.1. Methodological overview

The learning process that has been designed for this subject is based on the following:

- Exposition of contents and results on the subject together with problem solving and practical exercises in the classroom, encouraging student participation.
- Student daily work on classroom's activities.
- Application of the methods, concepts and results presented in the classroom to the resolution of problems and exercises by the students, both individually and in groups.
- Development of lab sessions in small groups using computer resources available at the School.
- Development of optional additional activities throughout the semester to provide incentives for continued and autonomous student work.
- Personal attention to the students during the office hours established by the teacher.

4.2. Learning tasks

The following activities are offered to the students to help them to achieve the expected results:

1) Classroom expositions.

3 hours a week will be devoted to theoretical and problem classes, to which will be added those that are necessary to carry out the teaching assignment of the subject. Theoretical results will be complemented with problem solving and

practical exercises to make the development of the subject as clear as possible.

A collection of problems and exercises will be available to the students. Some of them will be solved in the classroom, and others will be given as recommended material for the student.

2) Lab.

A 2 hours lab session every other week will take place using computer resources available at the School. The student will get a guide to be developed in each session.

In these T3 lab sessions, mathematical algorithms are analyzed and programmed using symbolic and numerical programming software installed in the EINA computer laboratories.

3) Supervised work.

Students may perform some assignments directed or supervised by the teacher, who will inform the students about its presentation or evaluation.

4.3. Syllabus

The contents of the course can be divided into two sections: Ordinary Differential Equations (ODE's) and Partial Differential Equations (PDE's).

Section 1: Ordinary Differential Equations:

- First-order equations: Geometric aspects. Existence and uniqueness of solutions. Basic methods of integration.
- Higher-order linear equations: homogeneous and nonhomogeneous. Equations with constant coefficients. Undetermined coefficients method. Variation of parameters. Reduction of order. Cauchy-Euler equation.
- Linear systems: homogeneous and nonhomogeneous systems. First-order systems with constant coefficients. Variation of parameters. Stability of first-order systems.
- Laplace transform. Application to the solution of Initial Value Problems.
- Numerical solutions of ordinary differential equations: Runge-Kutta methods.

Section 2: Partial Differential Equations:

- Fourier series.
- Separation of variables.
- Boundary-value problems for second-order linear equations: heat equation, wave equation and Laplace's equation.

4.4. Course planning and calendar

Schedule of classes and works' evaluation.

Classes and practical sessions in the laboratory are held according to the schedule and times established by the Engineering School, available on its website.

Each teacher will inform about the office hours.

Other activities will be planned and announced well in advance.

4.5. Bibliography and recommended resources

<http://psfunizar10.unizar.es/br13/egAsignaturas.php?codigo=29910>