30005 - Mathematics III

1.Basic info

1.1.Recommendations to take this course

1.2.Activities and key dates for the course

2.Initiation

2.1.Learning outcomes that define the subject

2.2.Introduction

3.Context and competences

3.1.Goals

3.2.Context and meaning of the subject in the degree

3.3.Competences

3.4.Importance of learning outcomes

4.Evaluation

5.Activities and resources

5.1.General methodological presentation

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

- Study and the daily personal work of the student in relation to what has been taught in the classroom.
- An account of the contents and problem solutions in blackboard classes, encouraging students to participate.
- Application of concepts and methods presented in the attended sessions overseen by the teacher to the solving of problems, both individually or in a group.
- Problem solutions in practical laboratory sessions, taking advantage of the calculations and graphics offered by a computer.
- Personalized attention to students during tutorial sessions that the teacher establishes.

5.2.Learning activities

5.3.Program

The contents of the course can be divided into two sections: Ordinary Differential Equations (ODEs) and Partial Differential Equations (PDEs).

Section 1: Ordinary Differential Equations:

- First-order equations: Geometric aspects. Existence and uniqueness of solutions of initial value problems. Basic methods of integration.
- Higher-order linear equations: Homogeneous linear equations with constant coefficients. Nonhomogeneous linear equations with constant coefficients. Undetermined coefficients method. Linear equations with variable coefficients. Variation of parameters. Nonlinear equations of order n. Reduction of order.
- Linear systems: Homogeneous linear systems with constant coefficients. Stability of systems. Nonhomogeneous linear systems with constant coefficients. Variation of parameters.
- Laplace Transforms. Applications to the solution of initial value problems.
- Numerical solution of systems of ODEs: Runge-Kutta methods.

Section 2: Partial Differential Equations:

- Fourier series.
- Separation of variables for second-order linear equations.
- Numerical solutions of boundary value problems with boundary or initial conditions for PDEs.

5.4.Planning and scheduling

5.5.Bibliography and recomended resources