30005 - Mathematics III

Información del Plan Docente

Academic Year	2018/19
Subject	30005 - Mathematics III
Faculty / School	110 - Escuela de Ingeniería y Arquitectura
Degree	436 - Bachelor's Degree in Industrial Engineering Technology
ECTS	6.0
Year	1
Semester	Half-yearly
Subject Type	Basic Education
Module	

1.General information

1.1.Aims of the course

1.2.Context and importance of this course in the degree

1.3.Recommendations to take this course

2.Learning goals

2.1.Competences

2.2.Learning goals

2.3.Importance of learning goals

3.Assessment (1st and 2nd call)

3.1.Assessment tasks (description of tasks, marking system and assessment criteria)

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:

* 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.

4.2.Learning tasks

The course includes 6 ECTS organized according to:

- Lectures (1,68 ECTS): 42 hours.

- Laboratory sessions (0,6 ECTS): 15 hours.

- Guided assignments (0,6 ECTS): 15 hours.

- Autonomous work (3 ECTS): 75 hours.

- Exams (0,12 ECTS): 3 hours.

Notes:

Lectures: the teacher will explain the theoretical contents of the course and solve illustrative applied problems. These problems and exercises can be found in the problem set provided throughout the semester. Some of them will be recommended material for the student. Lectures run for 3 weekly hours. Although it is not a mandatory activity, regular attendance is highly recommended.

Laboratory sessions: sessions will take place every 2 weeks (6 sessions in total) and last 2 hours each. For its development a mathematical software that offers good performance for the symbolic, numerical and graphic calculation will be used. Students are divided into groups to be formed at the beginning of the course. A script for each of the sessions will be provided that will contain a brief summary of the theoretical contents that are being used and an explanation of the commands needed to solve the proposed problems, as well as a list of exercises that student must solve. These sessions are held individually and may propose activities carried out by groups of two students per computer.

Guided assignments: Students will be able to develop tutored projects in groups, guided by the teacher through interviews. The teacher will inform in detail about the delivery of the work and will be able to ask questions on the same.

Tutorials: the teacher's tutorial hours will be posted on Moodle and the degree website to assist students with questions and doubts. It is beneficial for the student to come with clear and specific questions.

4.3.Syllabus

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

30005 - Mathematics III

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. Linear 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 ODE: 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 PDE.

4.4.Course planning and calendar

For further details concerning the timetable, classroom and further information regarding this course, please refer to the Escuela de Ingeniería y Arquitectura de la Universidad de Zaragoza (EINA), website, https://eina.unizar.es/

4.5.Bibliography and recommended resources