Universidad Zaragoza

1542

Year : 2018/19

28810 - Mathematics III

Syllabus Information

Academic Year:	2018/19
Subject:	28810 - Mathematics III
Faculty / School:	175 -
Degree:	424 - Bachelor's Degree in Mechatronic Engineering
ECTS:	6.0
Year:	2
Semester:	First semester
Subject Type:	Basic Education
Module:	

General information

Aims of the course

Context and importance of this course in the degree

Recommendations to take this course

Learning goals

Competences

Learning goals

Importance of learning goals

Assessment (1st and 2nd call)

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

Methodology, learning tasks, syllabus and resources

Methodological overview

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

Strong interaction between the teacher/student. This interaction is brought into being through a division of work and responsibilities between the students and the teacher. Nevertheless, it must be taken into account that, to a certain

degree, students can set their learning pace based on their own needs and availability, following the guidelines set by the teacher.

The current subject, is conceived as a stand-alone combination of contents, yet organized into three fundamental and complementary forms, which are: the theoretical concepts of each teaching unit, the solving of problems or resolution of questions, at the same time supported by other activities.

The organization of teaching will be carried out using the following steps:

Theory Classes: Theoretical activities carried out mainly through exposition by the teacher, where the theoretical supports of the subject are displayed, highlighting the fundamental, structuring them in topics and or sections, interrelating them. Practical Classes: The teacher resolves practical problems or cases for demonstrative purposes. This type of teaching complements the theory shown in the lectures with practical aspects. Individual Tutorials: Those carried out giving individual, personalized attention with a teacher from the department. Said tutorials may be in person or online.

Learning tasks

The programme offered to the student to help them achieve their target results is made up of the following activities...

Involves the active participation of the student, in a way that the results achieved in the learning process are developed, not taking away from those already set out, the activities are the following:

- Face-to-face generic activities:
  - Theory Classes: The theoretical concepts of the subject are explained and illustrative examples are developed as support to the theory when necessary.
  - Practical Classes: Problems and practical cases are carried out, complementary to the theoretical concepts studied.
- Generic non-class activities:
  - Study and understanding of the theory taught in the lectures.
  - Understanding and assimilation of the problems and practical cases solved in the practical classes.
  - Preparation of seminars, solutions to proposed problems, etc.
  - Preparation of the written tests for continuous assessment and final exams.

The subject has 6 ECTS credits, which represents 150 hours of student work in the subject during the trimester, in other words, 10 hours per week for 15 weeks of class.

Syllabus

1. Ordinary Differential Equations: basic concepts, existence and uniqueness.
2. Analytic solvability.
3. Qualitative aspects: fixed points and linear stability.
4. Numerical methods: Euler, Runge-Kutta.
5. Higher orden ODE: Oscillators; resonance. Beam stability.
6. Higher order numerical methods (FDM y FEM).
7. Introduction to Partial Differential Equations: separation of variables; vibrations.
8. Laplace Transform.
9. Laplace Transform Applications.
10. Discrete time systems.
11. The Z Transform.
12. Z Transform Applications.
13. Fourier Series and Fourier Transform.
14. Applications of Fourier Series and Transforms.
15. Discrete Time Fourier Transform: FFT and Applications.

Course planning and calendar

The dates of the final exams will be those that are officially published at https://eupla.unizar.es/asuntos-academicos/examenes.

1	1	ODE: Introduction, 1st order				
2		Linear equation, Systems	1st test	5	ODE 1st order	
3		Linear stability				
4		Numerical Methods				
5	2	2nd order ODE				
6		Oscillators, resonance	2nd test	5	Oscillators	
7		Beam Stability				
8			1st Exam	40	ODE, Oscillators	
9	3	Signals and systems				
10		Laplace Transform				
11		Applications	3rd test	5	Laplace Transf.	
12		Z Transform				
13	4	Fourier Series and Transform	4th test	5	Z/Fourier Transf.	
14	5	PDE: Introduction				
15		Separation of variables	2nd Exam	40	Systems, PDE	

Bibliography and recommended resources

Main resources

- Subject presentations (available in the subject's Moodle webpage)
- Problem sheets (available in the subject's Moodle webpage)
- Symbolic calculus tool Maxima http://andrejv.github.io/wxmaxima/.