28805 - Mathematics II

Syllabus Information

Academic Year: 2019/20
Subject: 28805 - Mathematics II
Faculty / School: 175 - Escuela Universitaria Politécnica de La Almunia
Degree: 424 - Bachelor's Degree in Mechatronic Engineering
ECTS: 6.0
Year: 1
Semester: Second semester
Subject Type: Basic Education
Module: ---

1.General information

1.1.Aims of the course

Mathematical methods are a basic tool in Engineering. The aims of the course are precisely the knowledge of these tools, in a way that is both theoretical and applied to real problems (using mathematical software). This knowledge and techniques will serve as the basis for other subjects.

1.2.Context and importance of this course in the degree

The subject is compulsory and forms part of the basic education of the students.

It is taught in the first semester of the first course and its content is part of the basis for other subjects. The practical approach of the subject helps to achieve this objective.

The unifying character of Mathematics simplifies problems dealt with in other subjects and makes evident the similarities in apparently different problems.

1.3.Recommendations to take this course

This subject is the continuation of Mathematics I.

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 methodology followed in this course is oriented towards the achievement of the learning objectives. . A wide range of teaching and learning tasks are implemented, such as:

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.

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

4.2.Learning tasks

The course includes the following learning tasks:

- **Face-to-face generic activities**:
    - **Lectures**: The theoretical concepts of the subject are explained and illustrative examples are developed as a support to the theory when necessary.
    - **Practice Sessions**: Problems and practical cases are carried out, complementary to the theoretical concepts studied.
    - **Individual Tutorials**: Those carried out giving individual, personalized attention with a teacher from the department. Said tutorials may be in person or online.
- **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 summaries and reports.

    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 semester, in other words, 10 hours (Lectures: 4 h.; Other Activities: 6 h.) per week for 15 weeks of class.

The overall distribution is:

- 52 hours of lectures, with 50% theoretical demonstration and 50% solving type problems.
- 8 hours of written assessment tests.
- 90 hours of personal study, divided up over the 15 weeks of the semester.

There is a tutorial calendar timetable set by the teacher that can be requested by the students who want a tutorial.

4.3.Syllabus

The course will address the following topics:

 1.- Introduction to Octave.
 2.- Systems of Linear Equations.
 3.- Determinants.
 4.- Numerical linear algebra.
 5.- Vector Spaces.
 6.- Orthogonality and Least Squares
 7.- The Geometry of Vector Spaces.
 8.- Diagonalization.
 9.- Singular value decomposition.
10.- Multiple integrals: double integrals.
11.- Multiple integrals: change of variables; triple integrals.
12.- Plane and space curves: curvature and torsion.
13.- Line Integrals: the fundamental theorem for line integrals; Green's theorem.
14.- Surfaces: normal vector.
15.- Surface Integrals: Stokes' theorem, Gauss' theorem.

4.4.Course planning and calendar

A detailed schedule will be published on the Moodle page on the subject.

The dates of the final exams will be those that are officially published on the School website.

4.5.Bibliography and recommended resources

http://biblos.unizar.es/br/br_citas.php?codigo=28805&year=2019