30100 - Mathematics I

Información del Plan Docente

Academic Year	2018/19
Subject	30100 - Mathematics I
Faculty / School	175 - Escuela Universitaria Politécnica de La Almunia 179 - Centro Universitario de la Defensa - Zaragoza
Degree	457 - Bachelor's Degree in Industrial Organisational Engineering 563 - Bachelor's Degree in Industrial Organisational Engineering 425 - Bachelor's Degree in Industrial Organisational Engineering
ECTS	6.0
Year	1
Semester	First semester
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 designed for this subject is based on the following:

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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.

Matemáticas I 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.

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- Lectures in which the main concepts are presented to the students, encouraging their active participation.
- Problem sessions alternating the presentation of worked out examples by the teacher and the solution of problems by the students themselves.
- Computer-based sessions using a suitable mathematical software.
- Personal and autonomous work of the students throughout the term.
- Personalized attention by mentoring sessions either individually or in-group.

4.2.Learning tasks

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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.
  - **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.

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In-class lectures:
In-class lectures will flexibly alternate the theoretical exposition and the presentation of worked-out examples by the teacher with problem solving periods in which the student will play the main role.
Computer-based sessions:
During the term, four computer-based sessions will take place, either in the classroom (using the students' personal laptops) or in the computer laboratory. These sessions will start with a brief theoretical introduction by the teacher, followed by a period of autonomous work by the students (with the help of the teacher) and will end with a short assessment task.
Autonomous work by the student
In addition to regular problem sheets, for each lesson the teachers will provide the students with self-evaluation exercises sheets in order to facilitate the training of the student in the main aspects of the subject. Also, some additional material (links to web sites, documents, etc.) will be made available for those students willing to deepen and broaden their knowledge.
Mentoring:
Teachers will be available for mentoring sessions in which the students can solve the questions and difficulties that may have arisen during their autonomous work.

4.3.Syllabus

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1.- Complex numbers.
2.- Real functions of one variable. Limits.
3.- Continuity.
4.- Differential Calculus.
5.- Classical theorems.
6.- Applications of Differentiation.
7.- Newton's method. Interpolation.
8.- Riemann's integral.
9.- The Fundamental Theorem of Calculus. Improper Integrals.
10.- Applications of Integration. Numerical quadrature.
11.- Functions of several variables: limits and continuity.
12.- Directional and partial derivatives.
13.- The Chain Rule.
14.- Tangent Planes and differentiability.
15.- Extrema. Extrema with constraints: Lagrange's multipliers.

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In-class lectures' program:

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Lesson 1: Sequences.
Lesson 2: Series.
Lesson 3: Functions of one and two real variables.
Lesson 4: Derivatives of functions of one real variable.
Lesson 5: Derivatives of functions of two real variables.
Lesson 6: Indefinite integrals.
Lesson 7: Definite integrals.
Lesson 8: Improper integrals.
Lesson 9: Integration of functions of two real variables.
Lesson 10: Vector calculus.

Computer-based sessions' program:
Session 1: Introduction to the mathematical software.
Session 2: Functions and functions approximation.
Session 3: Symbolic and numerical differentiation.
Session 4: Symbolic and numerical integration.

4.4.Course planning and calendar

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A detailed schedule will be published in the Moodle page of the subjet.

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

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The planning of in-class and computer-based sessions will be organized according to the previously presented program. Of course, this planning is subject to modifications according to the actual calendar. In particular, the dates of examinations and the deadlines for written assignments will be announced due time in Moodle.

4.5.Bibliography and recommended resources

Students are encouraged to make use of the material that is made available at the Moodle Platform.