

## 30100 - Mathematics I

### Información del Plan Docente

<b>Academic Year</b>	2016/17
<b>Academic center</b>	175 - Escuela Universitaria Politécnica de La Almunia 179 - Centro Universitario de la Defensa - Zaragoza
<b>Degree</b>	425 - Bachelor's Degree in Industrial Organisational Engineering 563 - Bachelor's Degree in Industrial Organisational Engineering 457 - Bachelor's Degree in Industrial Organisational Engineering
<b>ECTS</b>	6.0
<b>Course</b>	1
<b>Period</b>	First semester
<b>Subject Type</b>	Basic Education
<b>Module</b>	---

### 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 designed for this subject is based on the following:

##### **Specialization in Business**

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.

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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.

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.

### DEFENCE PROFILE

- 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.

## 5.2.Learning activities

### Specialization in Business

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 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 trimester, in other words, 10 hours per week for 15 weeks of class.

A summary of a weekly timetable guide can be seen in the following table. These figures are obtained from the subject file in the Accreditation Report of the degree, taking into account the level of experimentation considered for the said subject is moderate.

Activity	Weekly school hours
Lectures	4
Other Activities	6

Nevertheless the previous table can be shown into greater detail, taking into account the following overall distribution: – 52 hours of lectures, with 50% theoretical demonstration and 50% solving type problems.

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– 8 hours of written assessment tests.

– 90 hours of personal study, divided up over the 15 weeks of the 2nd semester.

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

### DEFENCE PROFILE

#### *In-class lectures:*

In-class lectures will take place four hours a week, in two two-hour sessions. They 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, three computer-based sessions of two hours 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.

## 5.3.Program

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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.

### DEFENCE PROFILE

In-class lectures' program:

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.

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Lesson 8: Improper integrals.

Lesson 9: Integration of functions of two real variables.

Computer-based sessions' program:

Session 1: Introduction to the mathematical software.

Session 2: Polynomial approximation and interpolation.

Session 3: Numerical derivation and integration methods.

### 5.4.Planning and scheduling

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A detailed schedule will be published in the Moodle page of the subject.  
The dates of the final exams will be those that are officially published at <http://www.eupla.es/secretaria/academica/examenes.html>.

#### DEFENCE PROFILE

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.

### 5.5.Bibliography and recommended resources

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- Apostol, Tom M.. Calculus. Vol.2, Cálculo con funciones de varias variables y álgebra lineal, con aplicaciones a las ecuaciones diferenciales y a las probabilidades / Tom M. Apostol. - 2ª ed., 7ª reimp. Barcelona, [etc.] : Reverté, D.L. 2002
- Coquillat Blasco, Fernando. Cálculo integral : metodología y problemas / Fernando Coquillat . - Nueva ed. amp. Madrid : Tebar Flores, D.L. 1997
- Demidovich, B.P.. 5.000 problemas de análisis matemático / B.P. Demidóvich ; traducido del ruso por Emiliano Aparicio Bernardo Madrid : Paraninfo, 1976
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- Larson, Ron. Cálculo 1 : De una variable / Ron Larson, Bruce H. Edwards ; revisión técnica, Marlene Aguilar Abalo ... [et al.] ; [traducción: Joel Ibarra Escutia ... (et al.)]. - 9ª ed. México [etc.] : McGraw Hill, cop. 2010
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#### DEFENCE PROFILE

Cálculo diferencial e integral y sus métodos numéricos / Etelvina Javierre, Carmen Rodrigo, Eva Tresaco . - 1ª ed. Zaragoza : Centro Universitario de la Defensa, 2012.

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Franco Brañas, José Ramón. Introducción al cálculo : problemas y ejercicios resueltos / José Ramón Franco Brañas Madrid [etc.] : Prentice Hall, D.L. 2003.

Cálculo de una y varias variables (con prácticas en wxMaxima) / M<sup>a</sup>. Victoria Sebastián Guerrero, M<sup>a</sup>. Antonia Navascués Sanagustín . - 1<sup>a</sup> ed. Zaragoza : Prensas Universitarias de Zaragoza, 2011.

Matemáticas I. Cálculo diferencial / Dennis G. Zill, Warren S. Wright, Joel Ibarra. México: McGraw-Hill, 2015.

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Matemáticas III. Cálculo en varias variables / Dennis G. Zill, Warren S. Wright, Joel Ibarra. México: McGraw-Hill, 2015.