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Academic Year: ( 2024 / 2025 )

Review date: 26-08-2024

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Department assigned to the subject: Mathematics Department

Coordinating teacher: GONZALEZ DOÑA, FRANCISCO JAVIER

Type: Basic Core ECTS Credits : 6.0

Year : 1 Semester : 1

Branch of knowledge: Engineering and Architecture

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## REQUIREMENTS (SUBJECTS THAT ARE ASSUMED TO BE KNOWN)

None

## OBJECTIVES

Study of the fundamental Mathematical Analysis of one variable.

## DESCRIPTION OF CONTENTS: PROGRAMME

### 1. REAL VARIABLE FUNCTIONS

- 1.1 The real line: sets of numbers, properties, absolute values
- 1.2 Elementary functions and curves
- 1.3 Polar coordinates

### 2. LIMITS AND CONTINUITY

- 2.1 Limits of functions. Properties and fundamental theorems
- 2.2 Continuity of functions
- 2.3 Fundamental theorems

### 3. DERIVATIVES AND THEIR APPLICATIONS

- 3.1 Definition, properties, and derivatives of elementary functions.
- 3.2 Meaning of the derivative. Extrema.

### 4 LOCAL STUDY OF A FUNCTION

- 4.1 Graphic representation
- 4.2 Taylor polynomial and its applications

### 5. SEQUENCES AND SERIES OF REAL NUMBERS

- 5.1 Sequences of numbers
- 5.2 Series of positive numbers
- 5.3 Absolute and conditional convergence

### 6. SEQUENCES AND SERIES OF FUNCTIONS

- 6.1 Sequences and series of functions.
- 6.2 Taylor series

### 7. INTEGRATION IN ONE VARIABLE

- 7.1 Calculus of primitives
- 7.2 Fundamental Theorem of Calculus
- 7.3 Applications

## LEARNING ACTIVITIES AND METHODOLOGY

THEORETICAL-PRACTICAL CLASSES. [44 hours with 100% classroom instruction, 1.76 ECTS]

Knowledge and concepts students must acquire. Students receive course notes and will have basic reference texts to facilitate following the classes and carrying out follow up work. Students partake in exercises to resolve practical problems and participate in workshops and evaluation tests, all geared towards acquiring the necessary capabilities.

TUTORING SESSIONS. [4 hours of tutoring with 100% on-site attendance, 0.16 ECTS]

Individualized attendance (individual tutoring) or in-group (group tutoring) for students with a teacher.

STUDENT INDIVIDUAL WORK OR GROUP WORK [98 hours with 0 % on-site, 3.92 ECTS]

FINAL EXAM. [4 hours with 100% on-site, 0.16 ECTS]

Global assessment of knowledge, skills and capacities acquired throughout the course.

## METHODOLOGIES

THEORY CLASS. Classroom presentations by the teacher with IT and audiovisual support in which the subject's main concepts are developed while providing material and bibliography to complement student learning.

PRACTICAL CLASS. Resolution of practical cases and problems, posed by the teacher, and carried out individually or in a group.

TUTORING SESSIONS. Individualized attendance (individual tutoring sessions) or in-group (group tutoring sessions) for students with a teacher as a tutor.

## ASSESSMENT SYSTEM

<b>% end-of-term-examination:</b>	60
<b>% of continuous assessment (assignments, laboratory, practicals...):</b>	40

SE1 - FINAL EXAM. [60 %]

Global assessment of knowledge, skills and capacities acquired throughout the course.

SE2 - CONTINUOUS EVALUATION. [40 %]

Assesses papers, projects, class presentations, debates, exercises, internships and workshops throughout the course.

## BASIC BIBLIOGRAPHY

- D. PESTANA, J.M. RODRÍGUEZ, E. ROMERA, E. TOURÍS, V. ÁLVAREZ, A. PORTILLA Curso práctico de Cálculo y Precálculo, Ariel (Planeta), 2019
- S.L. SALAS, E. HILLE & G.J. Etgen Calculus: One and Several Variables, Wiley, 2006

## ADDITIONAL BIBLIOGRAPHY

- B.P. DEMMIDOVICH Problemas y ejercicios de Análisis Matemático, Paraninfo, 1980
- G.L. BRADLEY, K.J. SMITH Calculus, Pearson, 2012
- M. SPIVAK Calculus, Cambridge University Press, Fourth edition, 2008
- T.M. APOSTOL Calculus vol. 1, Wiley, 1991

