Differential Calculus

Academic Year: (2022 / 2023) **Review date: 05-05-2022**

Department assigned to the subject: Mathematics Department

Coordinating teacher: ROMERA COLMENAREJO, ELENA

Type: Basic Core ECTS Credits : 6.0

Year : 1 Semester : 1

Branch of knowledge: Engineering and Architecture

REQUIREMENTS (SUBJECTS THAT ARE ASSUMED TO BE KNOWN)
None

OBJECTIVES

Study of the fundamental Mathematical Analysis of one variable, in particular the Differentiation.

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. Fundamental theorems
    2.3 Uniform continuity

3. DERIVATIVES AND THEIR APPLICATIONS
    3.1 Definition, properties, 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 of functions. Punctual and uniform convergence
    6.2 Series of functions. Punctual and uniform convergence
    6.3 Taylor series

LEARNING ACTIVITIES AND METHODOLOGY
THEORETICAL-PRACTICAL CLASSES. [44 hours with 100% classroom instruction, 1.76 ECTS]
Knowledge and concepts students must acquire. They will receive the class notes
and will have basic reference texts to facilitate the follow-up of the classes and the development
of subsequent work. Exercises will be solved, they will be practised with
problems by the student and there will be workshops and tests of
assessment to acquire the necessary skills.

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
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.

% end-of-term-examination:	60
% of continuous assessment (assigments, laboratory, practicals…):	40

BASIC BIBLIOGRAPHY
 - M. SPIVAK Calculus, Cambridge University Press, Fourth edition, 2008

ADDITIONAL BIBLIOGRAPHY
 - B.P. DEMMIDOVICH Problemas y ejercicios de Anlálisis Matemático, Paraninfo, 1980

 - D. PESTANA, J.M. RODRÍGUEZ, E. ROMERA, E. TOURÍS, V. ÁLVAREZ, A. PORTILLA Curso práctico de Cálculo
y Precálculo, Ariel (Planeta), 2019
 - G.L. BRADLEY, K.J. SMITH Calculus , Pearson, 2012

 - S.L. SALAS, E. HILLE, G. ETGEN Calculus one and several variables, Wyley, 10th edition, 2007

 - T.M. APÓSTOL Mathematical Analysis, Addison-Wesley, 1974