

Academic Year: ( 2022 / 2023 )

Review date: 31-05-2022

Department assigned to the subject: Mathematics Department

Coordinating teacher: MARTINEZ RATON, YURI

Type: Basic Core ECTS Credits : 6.0

Year : 1 Semester : 2

Branch of knowledge: Engineering and Architecture

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

Calculus I

Linear Algebra

**OBJECTIVES**

By the end of this content area, students will be able to have:

1. Knowledge and understanding of the mathematical principles of differential and integral Calculus of several variables underlying their branch of engineering.
2. The ability to apply their knowledge and understanding to identify, formulate and solve problems related to differential and integral Calculus using established methods.
3. The ability to select and use appropriate tools and methods to solve problems of differential and integral Calculus.
4. The ability to combine theory and practice to solve problems of differential and integral Calculus.
5. The ability to understanding of mathematical methods of differential and integral Calculus and procedures, their area of application and their limitations.

**DESCRIPTION OF CONTENTS: PROGRAMME**

1. Differential calculus on several variables:
  - 1.1 Functions of several variables. Limits and continuity.
  - 1.2 Derivatives. Differentiability.
  - 1.3 Vectorial functions and differential operators.
  - 1.4 Chain rule and directional derivatives.
2. Local study of functions of several variables.
  - 2.1 Derivatives of higher order.
  - 2.2 Extrema of functions of several variables.
  - 2.3 Conditioned extrema.
3. Integration on  $\mathbb{R}^n$ :
  - 3.1 Multiple integral.
  - 3.2 Changes of variable on multiple integrals.
  - 3.3 Applications.
4. Line and surface integrals:
  - 4.1 Line integrals and conservative fields.
  - 4.2 Surface integrals.
  - 4.3 Green, Stokes and Gauss theorems.

**LEARNING ACTIVITIES AND METHODOLOGY**

The docent methodology will include:

- Master classes, where the knowledge that the students must acquire will be presented. To make easier the development of the class, the students will have written notes and also will have the basic texts of reference that will facilitate their subsequent work.
- Resolution of exercises by the student that will serve as self-evaluation and to acquire the necessary skills.
- Problem classes, in which proposed problems are discussed and developed.
- Partial controls.
- Final exam.
- Tutorials.

## ASSESSMENT SYSTEM

The evaluation will be based in the following criteria:

- Partial evaluation controls (40%).
- Final examination (60%).

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

## BASIC BIBLIOGRAPHY

- MARSDEN, TROMBA CALCULO VECTORIAL, ADDISON WESLEY.
- SALAS, HILLE, ETGEN CALCULUS, VOLUMEN II, REVERTE.
- SPIEGEL MATEMATICAS AVANZADAS PARA INGENIERIA Y CIENCIAS, MC GRAW HILL (SERIE SCHAUM).
- UÑA, SAN MARTIN, TOMEO PROBLEMAS RESUELTOS DE CALCULO EN VARIAS VARIABLES, THOMSON.

## ADDITIONAL BIBLIOGRAPHY

- APOSTOL CALCULUS, REVERTE.
- BRADLEY, SMITH CALCULO DE VARIAS VARIABLES (VOLUMEN 2), PRENTICE HALL.
- BURGOS CALCULO INFINITESIMAL DE VARIAS VARIABLES, MC GRAW HILL.
- LARSON, HOSTETLER, HEYD CALCULO II, PIRAMIDE.
- LIASHKO, BOIARCHUK, GAI, GOLOVACH ANTI-DEMIDOVICH (VOLUMENES 3 Y 4), URSS.
- STEWART, CALCULO: CONCEPTOS Y CONTEXTOS, THOMSON.
- WREDE, SPIEGEL CALCULO AVANZADO, MC GRAW HILL (SEIRE SCHAUM).
- ZILL, WRIGHT CALCULO DE VARIAS VARIABLES, MC GRAW HILL , 2011