

Academic Year: ( 2022 / 2023 )

Review date: 31-05-2022

Department assigned to the subject: Department of Mathematics

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

The student will be able to formulate, solve and understand mathematically the problems arising in engineering. To do so it is necessary, in this second course of Calculus, to be familiar with the n-dimensional euclidean space, in particular in dimension 3, and with its more usual subsets. He/she must be able to manage (scalar and vectorial) several variables functions and its continuity, differentiability and integrability properties. The student must solve optimization problems with and without restrictions and will apply the main integration theorems to compute areas and volumes, inertial moments and heat flow.

## 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 Extremes of functions of several variables.
  - 2.3 Conditioned extremes.
3. Integration on  $R^n$ :
  - 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 problems proposed to the students are discussed and developed.
- Partial controls.
- Final control.
- 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 (SERIE SCHAUM).