

## Calculus II

Academic Year: ( 2017 / 2018 )

Review date: 06-09-2017

Department assigned to the subject: Mathematics Department

Coordinating teacher: ROMERA COLMENAREJO, ELENA

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

1. Ability to state, solve and understand mathematically problems related to Industrial Technologies.
2. Comprehensive approach to the euclidean n-dimensional space, specially in dimension three and the most relevant subsets.
3. Knowledge of the main properties of the functions in several variables, scalar and vectorial cases, their continuity, differentiability and integrability.
4. Resolution of problems of optimization with and without constraints.
5. Applications of integrals, among them the calculus of areas, volumes, moment of inertia and center of gravity of rigid solids.
6. Integration on lines and surfaces and the theorems by Green, Stokes and Gauss.

## DESCRIPTION OF CONTENTS: PROGRAMME

Chapter 1. n-dimensional Euclidean Space. Topologic structure. Functions of several variables.

Limits and continuity. Partial derivatives and differentiability. Gradient vector. Jacobian matrix. Chain rule and directional derivatives. Differential operators.

Chapter 2. Hessian matrix. Local extrema. Extremum problems with constraints.

Lagrange multipliers.

Chapter 3. Integration in  $\mathbb{R}^n$ . Iterated integrals. Fubini's Theorem.

Change of variables. Applications.

Chapter 4. Line integrals. Conservative fields. Surface integrals.

Green, Stokes and Gauss' Theorems.

## LEARNING ACTIVITIES AND METHODOLOGY

The learning activities will include:

- 1.- Master sessions.
- 2.- Problems sessions.
- 3.- Selfevaluations.
- 4.- Partial tests.
- 5.- Final exam.
- 6.- Tutorial activities.

**% end-of-term-examination:** 60**% of continuous assessment (assignments, laboratory, practicals...):** 40

## BASIC BIBLIOGRAPHY

- B.P. DEMIDOVICH Problemas de Análisis Matemático,, Editorial Paraninfo, 1991
- J.E.MARSDEN and A.J.TROMBA, Vector Calculus, Freemann, 2012

- S. L. SALAS, E. HILLE and G. ETGEN Calculus: one and several variables, Wiley, 2007

#### ADDITIONAL BIBLIOGRAPHY

- R. BURGOS Cálculo infinitesimal de una y varias variables, Mc-Graw Hill, 1995
- R. C. WREDE and M. R. SPIEGEL Schaum's Outline of Advanced Calculus, McGraw Hill, 2002
- R. G. BARTLE The Elements of Real Analysis,, John Wiley & Sons, 1976
- T. APOSTOL Calculus, Volumen 2, John Wiley&Sons, 1969