Calculus II

Academic Year: (2023 / 2024) **Review date: 11-05-2023**

Department assigned to the subject: Mathematics Department

Coordinating teacher: ARVESU CARBALLO, JORGE

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 Data Science and Engineering. To do so it is necessary to be familiar with the n-dimensional Euclidean space, making a special emphasis in dimensions 2 and 3, visualizing the more important subsets. He/she must be able to manage (scalar and vector) functions of several variables, as well as their continuity, differentiability, and integrability properties. The student must solve optimization problems with and without restrictions and will apply the main theorems of integration of scalar and vector functions to compute, in particular, lengths, areas and volumes, and moments of continuum distributions.

DESCRIPTION OF CONTENTS: PROGRAMME

1. The Euclidean space Rn and its sets.
2. Scalar and vector functions of n real variables.
3. Limits, continuity and differentiability.
4. Higher order derivatives and local behavior of functions.
5. Differential operators and geometric properties.
6. Optimization with and without constraints.
7. Multiple integration. Techniques and changes of variables.
8. Line and surface integrals.
9. Integral theorems of vector calculus in R2 and R3.

LEARNING ACTIVITIES AND METHODOLOGY

The learning methodology will include:
- Attendance to master classes, in which core knowledge will be presented that the students must acquire. The recommended bibliography will facilitate the students' work
- Resolution of exercises by the student that will serve as a self-evaluation method and to acquire the necessary skills
- Exercise classes, in which problems proposed to the students are discussed
- Tests
- Final Exam
- Tutorial sessions
- The instructors may propose additional homework and activities

ASSESSMENT SYSTEM

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

- Continuous assessment: 2 mid-term tests, whose average will be 40% of the course score.

- Final exam: 60% of the course score.

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

BASIC BIBLIOGRAPHY

- J. E. Marsden, A. J. Tromba Vector Calculus, W. H. Freeman, 2012

- Jon Rogawski Calculus, W H Freeman & Co; 2nd ed. edición, 2011

- M. D. Weir, J. Hass, G. B. Thomas Thomas' Calculus, Multivariable, Addison-Wesley, 2010

ADDITIONAL BIBLIOGRAPHY

- J. Stewart Calculus, Cengage, 2008

- M. Besada, F. J. García, M. A. Mirás, C. Vázquez Cálculo de varias variables. Cuestiones y ejercicios resueltos, Garceta, 2011

- M. J. Strauss, G. L. Bradley, K. J. Smith Multivariable Calculus, Prentice Hall, 2002

- P. Pedregal Tercero Cálculo Vectorial, un enfoque práctico, Septem Ediciones, 2001

- R. Larson, B. H. Edwards Calculus II, Cengage, 2009

- S. Salas, E. Hille, G. Etgen Calculus. One and several variables, Wiley, 2007

- T. M. Apostol Calculus, Wiley, 1975