Advanced mathematical methods I

Academic Year: (2022 / 2023) **Review date: 29/04/2022 16:25:41**

Department assigned to the subject: Mathematics Department

Coordinating teacher: CUERNO REJADO, RODOLFO

Type: Compulsory ECTS Credits : 6.0

Year : 1 Semester : 2

REQUIREMENTS (SUBJECTS THAT ARE ASSUMED TO BE KNOWN)

Mathematical Methods I.

OBJECTIVES

In this second course of Calculus the students should acquire the mathematical background needed to understand and apply the concepts and techniques appearing in Statistics which involve several real variables. In particular they should become acquainted with functions of several variables, their properties of continuity, partial differentiability, differentiability and the calculus of double integrals. Moreover, they will apply also these skills to solve optimization problems.

DESCRIPTION OF CONTENTS: PROGRAMME

1.- Vectors and scalar product. Basic topological concepts.
2.- Functions of several variables. Graphs and level sets. Limits and continuity.
3.- Partial derivatives. Directional derivatives. Differentiability: Tangent plane.
4.- Double integral: properties. Evaluation of double integrals: iterated integrals. Changes of variables.
5.- Applications of the double integral.
6.- Chain rule. Higher order derivatives.
7.- Quadratic approximation: Taylor's theorem.
8.- Maxima and minima. Lagrange multipliers.

LEARNING ACTIVITIES AND METHODOLOGY

The course will be taught mostly through lectures, with supporting material available on the web. These classes should be complemented with the students' autonomous reading on some aspects of the syllabus, especially concerning motivation and applications.

Some of the lectures will be devoted to solving exercises singled out from the collection of exercises the students will be given at the beginning of the semester. The students' work throughout the semester will be monitored through periodic tests. These tests which will be written exams containing one or more short questions regarding the content of certain topics specified in advance. The tests can take place during teaching hours, or can also be taken out of the classroom schedule. Grades for the tests will be made available to the students the week following the test.

ASSESSMENT SYSTEM

% end-of-term-examination/test:	50
% of continuous assessment (assigments, laboratory, practicals…):	50

Four partial tests will be made, one roughly every three weeks, with a global weight of 50% of the final grade. The remianing 50% correponds to the final exam.

Percentage of the final exam: 50 %
Percentage of the rest of the evaluation: 50 %

BASIC BIBLIOGRAPHY

- James Stewart Cálculo multivariable, Thomson.

- Jerrold E. Marsden, Anthony J. Tromba Vector Calculus, Pearson Educación, 2004

- Ron Larson y Bruce H. Edwards Cálculo 2, Mc Graw Hill, 9ª edición 2010

- Salas, Hille y Etgen. Calculus (volumen II)., Reverté.