Calculus II

Academic Year: (2019 / 2020) **Review date: 27/04/2020 17:03:34**

Department assigned to the subject: Mathematics Department

Coordinating teacher: ESPINOLA GONZALES, JESUS EDILBERTO

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

OBJECTIVES

The student must be able to state, solve and understand, from a mathematical point of view, problems related to Engineering and of Electrical Power Engineering. First of all, a comprehensive approach to Euclidean spaces with a special emphasis in the two-dimensional and three-dimensional cases as well as their most relevant subsets will be done. He must handle the main properties of functions in several variables related to continuity, differentiability and integrability both in the scalar and vector cases. The study of problems related to optimisation, with and without constraints, constitutes a nice application of Taylor formula and local extrema. Iterated integrals on domains as well as the integration on lines and surfaces will provide the basic background for the analysis of areas and volumes, moments of inertia as well as heat flows. The student must know ordinary differential equations, concepts and problems, and be able to solve the main first and second order equations.

By the end of this content area, students will be able to have:
1. Knowledge and understanding of the mathematical principles of calculus of several variables underlying electrical power engineering;
2. The ability to apply their knowledge and understanding to identify, formulate and solve mathematical problems of calculus of several variables using established methods;
3. The ability to choose and apply relevant analytical and modelling methods;
4. The ability to select and use appropriate tools and methods to solve mathematical problems in terms of calculus of several variables;
5. The ability to combine theory and practice to solve mathematical problems of calculus of several variables;
6. Understanding of the applicable methods and techniques and their limitations.

DESCRIPTION OF CONTENTS: PROGRAMME

The Euclidean space. Functions of several variables. Continuity and differentiability. Polar, spherical and cylindrical coordinates. The chain rule. Directional derivatives. Gradient, divergence and curl. Free and conditional optimization. Multidimensional Iterated integration. Changes of variables. Integration along trajectories. Integration on surfaces. Computation of areas, volumes, centers of mass , moments of inertia and. other applications of the integral. Theorems of Green, Stokes and Gauss. Introduction to differential equations. Laplace transform.

LEARNING ACTIVITIES AND METHODOLOGY

The academic methodology includes:
- 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

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

The evaluation will be based in the following criteria:
- Partial evaluation controls (40%).
- Final examination (60%).

BASIC BIBLIOGRAPHY

- MARSDEN, TROMBA VECTOR CALCULUS, W. H. FREEMAN, 2003

- NAGLE FUNDAMENTALS OF DIFERENTIAL EQUATIONS, PEARSON-ADDISON WESLEY, 2008

- SALAS, S. CALCULUS: ONE AND SEVERAL VARIABLES, WILEY, 2007

- UÑA, SAN MARTIN, TOMEO PROBLEMAS RESUELTOS DE CALCULO EN VARIAS VARIABLES, THOMSON.

- ZILL D. A FIRST COURSE IN DiFFERENTIAL EQUATIONS WITH MODELING APPLICATIONS, BROOKS/COLE, 2013

ADDITIONAL BIBLIOGRAPHY

- APOSTOL. CALCULUS, John Wiley & Sons. .