Calculus II

Academic Year: (2023 / 2024) **Review date: 18/05/2023 15:14:10**

Department assigned to the subject: Mathematics Department

Coordinating teacher: SALAS MARTINEZ, JESUS

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

LEARNING OUTCOMES

CB1. Students have demonstrated possession and understanding of knowledge in an area of study that builds on the foundation of general secondary education, and is usually at a level that, while relying on advanced textbooks, also includes some aspects that involve knowledge from the cutting edge of their field of study
CB2. Students are able to apply their knowledge to their work or vocation in a professional manner and possess the competences usually demonstrated through the development and defence of arguments and problem solving within their field of study.
CG1. Ability to solve problems with initiative, decision-making, creativity, critical reasoning and to communicate and transmit knowledge, skills and abilities in the field of Industrial Engineering.
CG11. Ability to solve mathematical problems that may arise in engineering. Ability to apply knowledge of: linear algebra; geometry; differential geometry; differential and integral calculus; differential and partial derivative equations; numerical methods; numerical algorithms; statistics and optimisation.
RA1. Knowledge and understanding: Have basic knowledge and understanding of science, mathematics and engineering within the industrial field, as well as knowledge and understanding of Mechanics, Solid and Structural Mechanics, Thermal Engineering, Fluid Mechanics, Production Systems, Electronics and Automation, Industrial Organisation and Electrical Engineering.
RA5. Engineering Applications: To be able to apply their knowledge and understanding to solve problems and design devices or processes in the field of industrial engineering in accordance with criteria of cost, quality, safety, efficiency and respect for the environment.

OBJECTIVES

The student will be able to formulate, solve and understand mathematically several problems related to the industrial technologies 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.
- Partial exams.
- Final Exam.
- Tutorial sessions.
- The instructors may propose additional homework and activities.

ASSESSMENT SYSTEM

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

The assesment will be based in the following:

- Two partial evaluation controls (40%)
- Final examination (60%).

Aditionally, the instructors may propose additional homeworks and activities to be evaluated.

BASIC BIBLIOGRAPHY

- DEMIDOVICH, B.P. Problemas de Análisis Matemático,, Editorial Paraninfo, 1991

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

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

- MARSDEN, J.E. ; TROMBA, A.J. Vector Calculus, Freemann, 2012

ADDITIONAL BIBLIOGRAPHY

- BURGOS, R. Cálculo infinitesimal de una y varias variables, Mc-Graw Hill, 1995

- APOSTOL, T. Calculus, Vol. 2, John Wiley & Sons, 1969

- BARTLE, R. G. The Elements of Real Analysis,, John Wiley & Sons, 1976

- WREDE, R. C. ; SPIEGEL, M. R. Schaum's Outline of Advanced Calculus, McGraw Hill, 2002