Calculus I

Academic Year: (2019 / 2020)	**Review date: 10-08-2019**

Department assigned to the subject: Mathematics Department

Coordinating teacher: PABLO MARTINEZ, ARTURO DE

Type: Basic Core ECTS Credits : 6.0

Year : 1 Semester : 1

Branch of knowledge: Engineering and Architecture

OBJECTIVES

The student will be able to formulate, solve and understand mathematically the problems arising in engineering. To do that, it is necessary, in this first course of Calculus, to be acquainted with the real functions of one variable, their properties of continuity, derivability, integrability and their graphic representation. The student will understand the concepts of derivative and integral and their practical applications. Also, he/she will manage sequences and series of real numbers and of functions that will apply to numeric approximation of functions and the resolution of equations.

DESCRIPTION OF CONTENTS: PROGRAMME

1.   Real variable functions.
1.1 The real line.
1.2 Elemmentary functions.
1.3 Limits of functions.
1.4 Continuity.

2.   Differential calculus in one variable.
2.1 Derivability.
2.2 Extrema of functions.
2.3 Rolle's and Mean Value theorems.
2.4 Graphic representation.
2.5 Taylor's polynomial.

3.   Sequences and series
3.1 Sequences of real numbers.
3.2 Series of real numbers.
3.3 Taylor series

4.   Integration in one variable.
4.1 Integrable functions, properties of the integral and calculus of primitives.
4.2 The Fundamental Theorem of Calculus.
4.3 Applications: areas, lengths and volumes by sections.
4.4 Improper integrals.

LEARNING ACTIVITIES AND METHODOLOGY

The docent methodology will include:

- 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.
- Small groups classes, in which problems proposed to the students are discussed and developed.
- Tutorials.

ASSESSMENT SYSTEM

The evaluation will be based in the following criteria:

- Partial evaluation controls (40%).
- Final examination (60%).

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

BASIC BIBLIOGRAPHY

- LARSON, R., EDWARDS, B. H. "Calculus of a single variable" 11th ed., Cengage Learning, 2017

- SALAS, S. L. , HILLE, E. , ETGEN, G. J. "Calculus, one and several variables", Vol. 1,, Wiley, 2007

- STRAUSS, M.J., BRADLEY, G.L., SMITH, K.J. "Calculus" 3th. ed., Pearson, 2002

ADDITIONAL BIBLIOGRAPHY

- EDWARDS, C. H., PENNEY, D. E. "Calculus" 6th ed., Pearson, 2002

- SPIVAK, M. "Calculus" 4th ed., Publish or Perish, 2008

- THOMAS, G. B., FINNEY, R. L. "Calculus and analytic geometry" 9th ed., Addison-Wesley.

BASIC ELECTRONIC RESOURCES

- John J. O'Connor and Edmund F. Robertson . The MacTutor History of Mathematics archive: http://www-history.mcs.st-and.ac.uk/
- OEIS® . La Enciclopedia On-Line de las Secuencias de Números Enteros: https://oeis.org/

- Wolfram Research . Wolfram Mathematica® Online Integrator: http://integrals.wolfram.com/

- Wolfram Research . Wolfram|Alpha: Computational Knowledge Engine: http://www.wolframalpha.com/