uc3m | Universidad **Carlos III** de Madrid

Calculus I

OBJECTIVES

By the end of this content area, students will be able to have:

1.   Knowledge and understanding of the mathematical principles underlying their branch of engineering.
2.   The ability to apply their knowledge and understanding to identify, formulate and solve mathematical problems using established methods.
3.   The ability to select and use appropriate tools and methods to solve mathematical problems.
4.   The ability to combine theory and practice to solve mathematical problems.
5.   The ability to understanding of mathematical methods and procedures, their area of application and their limitations.

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 Improper integrals.
        4.4 Applications: areas, lengths and volumes by sections.

LEARNING ACTIVITIES AND METHODOLOGY

The docent methodology will include:
- Master classes,
- Practical classes
- Selfevaluations.
- Partial controls.
- Tutorials.
- Final examination.

% end-of-term-examination: 60

% of continuous assessment (assigments, laboratory, practicals…):   40

BASIC BIBLIOGRAPHY

 - D. Pestana, J. M. Rodríguez, E. Romera, E, Touris, V. Álvarez y A. Portilla Curso práctico de Cálculo y Precálculo, Ariel Ciencia, 2000
 - Ron Larson y Bruce H. Edwards   Calculus I (single variable), Cengage Learning (9th edition).

 - Salas/Hille/Etgen Calculus. Una y varias varaibles (Volumen I)., Reverté, S. A., Cuarta edición 2005

ADDITIONAL BIBLIOGRAPHY

 - BURGOS, J Cálculo infinitesimal de una variable, McGraw - Hill.

 - EDWARDS, C. H., PENNEY, D. E. Cálculo diferencial e integral, Prentice Hall.

 - SPIVAK, M. Cálculus, Reverté.

 - STEWART, J. Cálculo, conceptos y contextos, Thomson.

 - THOMAS, G. B., FINNEY, R. L. Cálculo una variable, Addison-Wesley.