001. COMPLEMENTOS DE MATEMATICAS.

CONTENTS   2 Semesters (3h+2h), (3h+2h)

Introduction to differential equations. Basic concepts. Intuitive meaning. Linear equations and equations reducible to a linear equation.
Linear equations of order higher than one.
Differential systems. Integration of first order systems. Some basic facts on equations and systems of higher order.
Some basic concepts of Matrix Albebra. Linear systems with constant coefficients.
Some basic facts on real function of several variables. The change of variables and its application to differential equations.
Intuitive and historical introduction to the problem of the existence of solutions.
An introduction to numerical methods for solving differential equations. Euler polygonal and associated best approximation methods. Picard method. Generalization to differential systems.
Linear systems and equations with variable coefficients. Special integration methods. Order reduction.
Stability in first approximation. Definitions.
Stability of the solutions of linear systems and equations. Criterion of Routh-Hurwitz. Linear approximation theorems.
Liapunov's direct method. Statement of the theorems on stability, asymptotic stability and unstability.
Boundary problems. Separation of variables. Harmonic functions a rectangle.
Harmonic functions on a disk. Fourier series expansion. Poisson kernel.
Legendre polynomials. Dirichlet problem on the sphere.
Other boundary problems. Bessel functions of the first kind.
Introduction to the operational calculus. Elementary study of the Laplace transform. Applications.
Complex variable. Elementary functions. Holomorphy. Cauchy's theorem and integral formula. Residue theorem.

TEXT (BASIC BIBLIOGRAPHY)

"Ecuaciones diferenciales ordinarias". Emilio Garbayo. Ed. Umbon.
"Curso teórico-práctico de Ecuaciones Diferenciales aplicado a la Física y Técnica". P. Puig Adam. Ed. Biblioteca Matemática.
"Derivadas parciales". Gillispie. Ed. Dossat.
"Matemáticas de la Física y de la Química". Margenau y Murphy. Epesa.
"Variable compleja". Phillips. Ed. Dossat.
"Funciones de variable compleja. Cálculo operacional. Teoría de la Estabilidad". M.L. Krasnov, A.I. Kiselev, G.I. Makánenko. Ed. MIR.
"Problemas de Cálculo Diferencial". J.A. Marín Tejerizo. S.A.E.T.A.
"Ecuaciones diferenciales modernas". Bronson. Schaum. McGraw Hill.

Professors:

Exams:
F1:   F2:   F3:   F4:   F5: