241. **APPLIED MATHEMATICS FOR ELECTRIC ENGINEERS**

CONTENTS **1 Semester (3h+2h)**

Sets of equations.

Direct solution. Gaussian elimination. Gauss-Jordan. LU decomposition. Symmetric matrices factorization. Condition of sets of equations. Linear least squares; Gram-Schmidt method; Householder orthogonal transformation, Giuens and fast Giuens orthogonal transformations.
Iterative solution. Jacobi method. Gauss. Gauss-Serdel method. Relaxation methods. Minimization methods, conjugate directions; conjugate gradients. Linear least aguares and iterative solution.
Linear sets of equation and sparse matrices. Memory storage of sparse matrices. Elementary algebraic operation of sparse matrices. Solution of large scale sets of linear equations. Sparse symmetric matrices and Gaussian elimination; graph theory; minimum degree algorithm; Cuthill-Mckee algorithm. Sparse non-symmetric matrices and Gaussian elimination; graph theory. Sparse linear least squares.
Non linear set of equations. Rate and speed of convergence. Newton-Raphson method. Quasi Newton methods. Non-linear least squares.

Linear and Integer Programming.

The Linear Programming problem. The simplex method. The simplex algorithm. Initial basic solution. Practical implementation.
Duality and sensitivity analysis. The dual simplex algorithm.
Linear programs of special structure. Network flows. Dantzig-Wolfe decomposition. The cutting stock problem.
Integer programming. Gomory cutting plane algorithm. Branch and bound algorithms.

TEXT (BASIC BIBLIOGRAFHY)

"Tecnologías computacionales para sistemas de ecuaciones, optimización lineal y entera." J.L. de la Fuente. Ed. Reverté.

Teachers: J.L.de la Fuente

Exams:

F1: 02-02(T) F2: F3: F4: 15-06(T) F5: 21-09(T)