MA 409 ADVANCED LINEAR ALGEBRA (3-0-0) 3

PREREQ : A Pass in MA204 / EC224 / EC388 / EE243

Vector spaces, subspaces, quotient spaces, basis, change of basis, linear functional, dual space, projection, eigenvalues and eigenvectors, Cayley-Hamilton theorem, elementary canonical forms, annihilating polynomials, invariant subspaces, simultaneous diagonalization, direct sum decomposition, invariant direct sum, the primary decomposition theorem, Jordan form, inner product spaces, orthonormal basis, Gram-Schmidt process; adjoint operators, normal and unitary operators, self adjoint operators, spectral theorem for self adjoint operators.

Linear systems; Gaussian elimination, iterative methods - Gauss-Jordan, Gauss-Seidel and successive over relaxation method; LU decomposition, positive definite system, Cholesky decomposition, condition numbers; orthogonal matrices, Householder transformation, Givens rotations, QR factorization, stability of QR factorization, singular value decomposition, sensitivity analysis of singular values and singular vectors, least square problems.

K. Hoffman and R. Kunze, Linear Algebra, 2nd edition, Pearson Education, New Delhi, 2006.
C.D. Meyer, Matrix Analysis and Applied Linear Algebra, SIAM, 2001.
L.N Trefethen and David Bau, Numerical Linear Algebra, SIAM , 1997.
S. Axler, Linear Algebra Done Right, Springer, 1997.