MA 534: Numerical Linear Algebra (3-0-2:4)

Vector spaces, bases, linear transformations, matrices, vector and matrix norms, condition number and stability. IEEE floating point arithmetic, analysis of roundoff errors, stability and ill-conditioning.

Direct methods for solving linear equations: Gaussian elimination, LU decomposition, Cholesky method, stability and sensitivity analysis.

Iterative methods for solving linear equations: Jacobi, Gauss-Seidel, successive over-relaxation.

Linear least-squares: Gram-Schmidt orthonormal process, rotators and reflectors, QR factorization, stability of QR factorization, QR method linear least-squares problems, rank deficient least-squares problems, sensitivity analysis.

Eigenvalues and singular values-symmetric eigenvalue problem, non-symmetric eigenvalue problem, SVD,Krylov subspace method,Lanczosalgorithm, sensitivity analysis of eigenvalues.

Software Support: MATLAB.

Text Books and References:

1. D. S. Watkins, “Fundamentals of Matrix Computation”, Wiley
2. G. H. Golub and C. F. Van Loan, “Matrix Computation”, Hindustan Book Agency
3. L. N. Trefethen and D. Bau, “Numerical Linear Algebra”, SIAM
4. J. W. Demmel, “Applied Numerical Linear Algebra”, SIAM
5. B. N. Datta, “Numerical Linear Algebra and Applications”, SIAM