

Course Details and Evaluation Plan

Course Code	: MA703
Course Title	: Computational Linear Algebra
L-T-P	: 3-0-0
Credits	: 3
Teaching Department	: Mathematical and Computational Sciences (MACS)
Evaluation Plan	: 10 % weightage for Quiz-I 25 % weightage for Mid-Semester Exam 15 % weightage for Quiz-II 50 % weightage for End-Semester Exam
Attendance	: Must have at least 75 %
Course Co-ordinator	: Dr. P. Sam Johnson

Topics

Matrix multiplication problems : Basic algorithms and notations, exploiting structure, block matrices and algorithms, vectorization and re-use issues.

Matrix analysis : Basic ideas from linear algebra, vector norms, matrix norms, finite precision matrix computations, orthogonality and SVD, projections and the CS decomposition, the sensitivity of square linear systems.

General linear systems : Triangular systems, the LU factorization, roundoff analysis of Gaussian elimination, pivoting, improving and estimating accuracy.

Special linear systems : The LDMT and LDUT factorizations, positive definite systems, banded systems, symmetric indefinite systems, block systems, vandermonde systems and FFT, Toeplitz and related systems.

References

1. **Gene H. Golub and Charles F. Van Loan**, *Matrix Computations*, Third Edition, Hindustan Book Agency, 2007.
2. **A. Ramachandra Rao and P. Bhimasankaram**, *Linear Algebra*, Second Edition, Hindustan Book Agency, 2000.
3. **D.S. Watkins**, *Fundamentals of Matrix Computations*, John Wiley & Sons, New York, 1991.
4. **G. Strang**, *Linear Algebra and its Applications*, Thomson Learning, 2003.
