Indian Institute of Technology
Course Details Report

Course No: MA5890

Course Name: Numerical Linear Algebra

Course Type:

Theory

Description:

The course will focus on designing algorithms for matrix computations, analysing these algorithms (in terms of complexity, communication costs, stability, performance in finite precision and exact arithmetic), implementation on different computer architectures.

Course Content:

Floating point arithmetic (1 lecture), stability of algorithms (2 lectures), conditioning of a problem (2 lectures), perturbation analysis (2 lectures), algorithmic complexity (1 lecture), Matrix decomposition including LU, Cholesky, QR, SVD, etc. (12 lectures), Iterative techniques mainly focussing on Krylov subspace methods including Lanczos, Arnoldi, Conjugate Gradient, GMRES, etc. (12 lectures), Preconditioning (2 lectures), structured matrix computations (4 lectures), designing matrix algorithms on modern computer architectures (3 lectures).

Text Books:

1. James W. Demmel, Applied Numerical Linear Algebra, Publisher : Society for Industrial and Applied Mathematics, Year : 1997

2. N. Trefethen & David Bau III, Numerical Linear Algebra, Publisher : Society for Industrial and Applied Mathematics, Year : 1997

Reference Books:

1. Biswa Nath Datta, Numerical Linear Algebra and applications, 2nd Edition, Publisher : Society for Industrial and Applied Mathematics, Year : 2010