Course Syllabus


The following lectures from the text (and other sources) will be covered:

Part I: Fundamentals
Lecture 1  Matrix-Vector Multiplication
Lecture 2  Orthogonal Vectors and Matrices
Lecture 3  Norms
Lecture 4  The Singular Valued Decomposition
Lecture 5  More on the SVD

Part II: QR Factorization and Least Squares
Lecture 6  Projectors
Lecture 7  QR Factorization
Lecture 8  Gram-Schmidt Orthogonalization
Lecture 9  MATLAB
Lecture 10 Householder Triangularization
Lecture 11 Least Squares Problems

Part III: Conditioning and Stability
Selected topics from this part will be covered as needed for parts IV, V, and VI

Part IV: Systems of Equations
Lecture 20  Gaussian Elimination
Lecture 21  Pivoting
Lecture 22  Stability of Gaussian Elimination
Lecture 23  Cholesky Factorization
Part V: Eigenvalues

Lecture 24  Eigenvalue Problems
Lecture 25  Overview of Eigenvalue Algorithms
Lecture 26  Reduction of Hessenberg or Tridiagonal Form
Lecture 27  Rayleigh Quotient, Inverse Iteration
Lecture 28  QR Algorithm without Shifts
Lecture 29  QR Algorithm with Shifts
Lecture 30  Other Eigenvalue Algorithms
Lecture 31  Computing the SVD

Part VI: Iterative Methods

Lecture 32  Overview of Iterative Methods
Lecture 38  Conjugate Gradients
Lecture 40  Preconditioning

Remark: The following topics, while introduced in the text, are not covered in detail, additional resources will be used / provided

Lecture A1  Jacobi Iteration
Lecture A2  Gauss - Siedel Iteration
Lecture A3  SOR
Lecture A5  Other Methods for Linear Systems