

revised 8/19/09

640:250 Introduction to Linear Algebra

Text: Spence, Insel & Friedberg *Elementary Linear Algebra: A Matrix Approach, 2nd Edition*
ISBN # 978-0-13-187141-0, Prentice-Hall, Upper Saddle River, NJ 07458

Syllabus

| Lecture | Reading | Topics |
|---------|-------------------------|---|
| 1 | 1.1, 1.2 | Matrices, Vectors, and Linear Combinations |
| 2 | 1.3 | Systems of Linear Equations |
| 3 | 1.4 | Gaussian Elimination |
| 4 | 1.6 | Span of a Set of Vectors |
| 5 | 1.7 | Linear Dependence and Linear Independence |
| 6 | 1.7, 2.1 | Homogeneous Systems, Matrix Multiplication |
| 7 | 2.1 | Matrix Algebra |
| 8 | 2.3 | Invertibility and Elementary Matrices |
| | App. E | Uniqueness of Reduced Row Echelon Form |
| 9 | 2.4 | Inverse of a Matrix |
| | 2.5 | Partitioned Matrices and Block Multiplication |
| 10 | 2.6 | LU Decomposition of a Matrix |
| 11 | Midterm Exam #1 | |
| 12 | 3.1 | Determinants; Cofactor Expansions |
| 13 | 3.2 | Properties of Determinants |
| 14 | 4.1 | Subspaces |
| 15 | 4.2 | Basis and Dimension |
| 16 | 4.3 | Column Space and Null Space of a Matrix |
| 17 | 5.1 | Eigenvalues and Eigenvectors |
| 18 | 5.2 | Characteristic Polynomial |
| 19 | 5.3 | Diagonalization of a Matrix |
| 20 | 5.5 | Examples of Diagonalization |
| 21 | Midterm Exam # 2 | |
| 22 | 6.1 | Geometry of Vectors; Projection onto a Line |
| 23 | 6.2 | Orthogonal Sets of Vectors; Gram-Schmidt Process; QR factorization |
| 24 | 6.3 | Orthogonal Projection; Orthogonal Complements |
| 25 | 6.4 | Least Squares; Normal Equations |
| 26 | 6.5, 6.6 | Orthogonal Matrices; Diagonalization of Symmetric Matrices |
| 27 | 6.6 | Diagonalization of Quadratic Forms Spectral Decomposition for Symmetric Matrices |
| 28 | | Catch up and review |
| | Final Exam | (Class Hour Schedule) |