Elementary Linear Algebra

Math 213

Fall 2004

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Office Hours: M 3 - 5 p.m., F 11:00 - noon, and by appointment
Class Meeting: 254 Olin Science Building
Class Times: MWF 2:00 - 2:52 p.m., T 9:30-10:52 a.m.
Course Webpage: www.unix.bucknell.edu/~lsmolka/Math213
Text: Elementary Linear Algebra by Kolman & Hill, 8th edition, ISBN: 0-13-045787-6

Course Description: After calculus, linear algebra is one of the most widely used areas in mathematics in such diverse fields as economics, management, signal processing, computer graphics, structural design, among many others. In this course, we'll focus on the underlying theory as well as the applications of linear algebra. Course topics will include: linear equations, matrices, vector spaces, linear transformations, determinants and eigenvalues.

Tests: There will be two midterm exams (on 9/28 and 11/2) and a cumulative final exam (scheduled between 12/9 and 12/16, make your travel plans accordingly). You must secure my approval to postpone an exam ahead of time. Make-up exams are given with no penalty if you have a valid excuse, otherwise seven points will be deducted from your exam grade.

Quizzes: Given each Tuesday except for exam dates. Your lowest quiz grade will be dropped. There are no make-ups, unless you miss class due to participation in a University sanctioned event.

Homework: Assignments will be posted on the course webpage and are due on Wednesdays; they can be turned in at class or in my mailbox at 380 Olin by **noon**. Late homework will be accepted with penalty (minus 3 pts.); no homework grades will be dropped. The assignments will be graded according to completeness, correctness and clarity. Though only a selected portion of the problems will be graded, you are responsible for all assigned problems. *Assignments should be stapled and written in pencil.* I will also assign one project that will be weighted as two homework assignments; more details will be provided in the near future.

Grading Policy:

40% Two Midterm Exams (20%/exam) 35% Final Exam 15% Quizzes 10% Homework

Academic Honesty: From the Bucknell catalog, "Bucknell students are responsible to the academic community for the preparation and presentation of work representing their own individual efforts. Acceptance of this responsibility is essential to the educational process and must be considered as an expression of mutual trust, the foundation upon which creative scholarship rests. Students are directed to use great care when preparing all written work and to acknowledge fully the source of all ideas and language other than their own." If you have questions about this, ask first.

Advice and Comments:

1. Engage yourself in the lectures and ask questions. The more you understand in class, the less backtracking you'll need to do outside of class.

2. Attendance is expected and will be used to determine final grades.

3. You are responsible for reading the material not covered in class unless otherwise specified.

4. I will ask questions to get you to think, so be ready.

5. You may work with others on homework, however the work you turn in must represent your own understanding of the material and may not be copied from others.

6. Calculators (graphing or scientific) may not be used on exams or quizzes.

- 7. You will be evaluated on the supporting work you provide to a problem. Answer only \rightarrow no credit.
- 8. Please be on time to class.

Syllabus Chapter 1: Linear Equations and Matrices

1.1 Systems of Linear Equations
1.2 Matrices
1.3 Matrix Multiplication
1.4 Algebraic Properties of Matrix Operations
1.5 Special Types of Matrices and Partitioned Matrices
1.6 Matrix Transformations
1.7 Computer Graphics
1.8 Correlation Coefficient
Chapter 2: Solving Linear Systems
2.1 Echelon Form of a Matrix
2.2 Elementary Matrices: Finding Λ^{-1}
2.2 Enclineatery Matrices.
2.5 Equivalent Matrices
2.4 LU-Factorization
2.1 Western in the Director spaces
3.1 vectors in the Plane and in 3-space
3.2 Vector Spaces
3.3 Subspaces
3.4 Span and Linear Dependence
3.5 Basis and Dimension
3.6 Homogeneous Systems
3.7 Coordinates and Isomorphisms
3.8 Rank of a Matrix
Chapter 4: Inner Product Spaces
4.1 Length and Direction in \mathbb{R}^2 and \mathbb{R}^3
4.3 Inner Product Spaces
4.4 Gram-Schmidt Process
4.5 Orthogonal Complements
4.6 Least Squares
Chapter 5: Linear Transformations and Matrices
5.1 Definition and Examples
5.2 Kernel and Range of a Linear Transformation
5.3 Matrix of a Linear Transformation
5.5 Similarity
Chapter 6: Determinants
6.1 Definition
6.2 Properties of Determinants
6.3 Cofactor Expansion
6.4 Inverse of a Matrix
Chapter 7: Eigenvalues and Eigenvectors
7.1 Eigenvalues and Eigenvectors
7.2 Diagonalization and Similar Matrices
7.3 Markov Processes
7.4 Diagonalization of Symmetric Matrices
7.5 Spectral Decomposition and Singular Value Decomposition
1.5 Spectral Decomposition and Singular Value Decomposition
(These topics may be subject to change)