

## 640:250 Introduction to Linear Algebra (MATLAB Sections)

**Text:** Spence, Insel & Friedberg *Elementary Linear Algebra: A Matrix Approach*  
 ISBN # 0-13-716722-9, Prentice-Hall, Upper Saddle River, NJ 07458

### Syllabus

Lecture	Reading	Topics
1	1.1, 1.2	Matrices and Vectors
2	1.3	Systems of Linear Equations
3	1.4	Gaussian Elimination
4	1.6	Span of a Set of Vectors
<b>MATLAB Lab #1 – Matrix and Vector Computations in MATLAB</b>		
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
<b>MATLAB Lab #2 – Linear Equations and Matrix Algebra</b>		
9	2.4	Inverse of a Matrix
10	2.5	LU Decomposition of a Matrix
11	<b>Midterm Exam #1</b>	
12	3.1	Determinants; Cofactor Expansions
13	3.2	Properties of Determinants
<b>MATLAB Lab #3 – LU Decomposition and Determinants</b>		
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
<b>MATLAB Lab #4 – Vector Spaces and General Solution to <math>Ax = b</math></b>		
18	5.2	Characteristic Polynomial
19	5.3	Diagonalization of a Matrix
20	5.5	Examples of Diagonalization
21	<b>Midterm Exam # 2</b>	
22	6.1	Geometry of Vectors; Projection onto a Line
<b>MATLAB Lab #5 – Eigenvalues and Eigenvectors</b>		
23	6.2	Orthogonal Sets of Vectors; Gram-Schmidt Process
24	6.2	Orthogonal Projection; Orthogonal Complements
25	6.3	Least Squares; Normal Equations
26	6.4, 6.5	Orthogonal Matrices; Diagonalization of Symmetric Matrices
<b>MATLAB Lab #6 – Orthonormal Bases and Least Squares Approximations</b>		
27	6.5	Spectral Decomposition for Symmetric Matrices Diagonalization of Quadratic Forms
28	Catch up and review	
<b>Final Exam</b> (Class Hour Schedule)		