

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

**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

Date	(Q = quiz) Lecture	Reading	Topics
9/02	1	1.1, 1.2	Matrices, Vectors, and Linear Combinations
9/08	2	1.3	Systems of Linear Equations
9/09	3Q	1.4	Gaussian Elimination
9/14	4	1.6	Span of a Set of Vectors
<b>MATLAB Lab #1 – Matrix and Vector Computations in MATLAB (due 9/14)</b>			
9/16	5Q	1.7	Linear Dependence and Linear Independence
9/21	6	1.7, 2.1	Homogeneous Systems, Matrix Multiplication
9/23	7Q	2.1	Matrix Algebra
9/28	8	2.3	Invertibility and Elementary Matrices
		App. E	Uniqueness of Reduced Row Echelon Form
<b>MATLAB Lab #2 – Linear Equations and Matrix Algebra (due 9/28)</b>			
9/30	9Q	2.4	Inverse of a Matrix
		2.5	Partitioned Matrices and Block Multiplication
10/05	10	2.6	<i>LU</i> Decomposition of a Matrix
10/07	11	<b>Midterm Exam #1</b>	
10/12	12	3.1	Determinants; Cofactor Expansions
10/14	13Q	3.2	Properties of Determinants
10/19	14	4.1	Subspaces
<b>MATLAB Lab #3 – LU Decomposition and Determinants (due 10/19)</b>			
10/21	15Q	4.2	Basis and Dimension
10/26	16	4.3	Column Space and Null Space of a Matrix
10/28	17Q	5.1	Eigenvalues and Eigenvectors
11/02	18	5.2	Characteristic Polynomial
<b>MATLAB Lab #4 – Vector Spaces and General Solution to <math>Ax = b</math> (due 11/02)</b>			
11/04	19Q	5.3	Diagonalization of a Matrix
11/09	20	5.5	Examples of Diagonalization
11/11	21	<b>Midterm Exam # 2</b>	
11/16	22	6.1	Geometry of Vectors; Projection onto a Line
<b>MATLAB Lab #5 – Eigenvalues and Eigenvectors (due 11/16)</b>			
11/18	23Q	6.2	Orthogonal Sets of Vectors; Gram-Schmidt Process; <i>QR</i> factorization
11/23	24	6.3	Orthogonal Projection; Orthogonal Complements
11/30	25Q	6.4	Least Squares; Normal Equations
12/02	26	6.5, 6.6	Orthogonal Matrices; Diagonalization of Symmetric Matrices
12/07	27Q	6.6	Diagonalization of Quadratic Forms Spectral Decomposition for Symmetric Matrices
<b>MATLAB Lab #6 – Orthonormal Bases and Least Squares Approximations (due 12/09)</b>			
12/09	28	Catch up and review	