

**OFFICIAL SYLLABUS**  
**MATH 321-LINEAR ALGEBRA**  
(Adopted Spring 2012; Committee: Drs. K.H. Leem, M.-S. Song, C. Traub)

**Catalog Description:** Systems of linear equations, matrices and determinants. Vector spaces and linear transformations. Eigenvalues, eigenvectors, diagonalization of a symmetric matrix.

**Prerequisites:** Math 152 with grade of C or higher.

**Textbook:** Elementary Linear Algebra, 7<sup>th</sup> edition, by Larson.

**Course Outline and Topics**

Chapter 1: Systems of Linear Equations

- 1.1: Introduction to Systems of Linear Equations
- 1.2: Gaussian Elimination and Gauss-Jordan Elimination
- 1.3: Applications of Systems of Linear Equations [optional]

Chapter 2: Matrices

- 2.1: Operations with Matrices
- 2.2: Properties of Matrix Operations
- 2.3: The Inverse of a Matrix
- 2.4: Elementary Matrices [optional]
- 2.5: Applications of Matrix Operations [optional]

Chapter 3: Determinants

- 3.1: The Determinant of a Matrix
- 3.2: Determinants and Elementary Operations
- 3.3: Properties of Determinants
- 3.4: Applications of Determinants

Chapter 4: Vector Spaces

- 4.1: Vectors in  $\mathbb{R}^n$
- 4.2: Vector Spaces
- 4.3: Subspaces of Vector Spaces
- 4.4: Spanning Sets and Linear Independence
- 4.5: Basis and Dimension
- 4.6: Rank of a Matrix and Systems of Linear Equations
- 4.7: Coordinates and Change of Basis
- 4.8: Applications of Vector Spaces [optional]

Chapter 5: Inner Product Spaces [optional]

- 5.1: Length and Dot Product in  $\mathbb{R}^n$  [optional]
- 5.2: Inner Product Spaces [optional]
- 5.3: Orthonormal Bases: Gram-Schmidt Process [optional]

Chapter 6: Linear Transformations

- 6.1: Introduction to Linear Transformations
- 6.2: The Kernel and Range of a Linear Transformation
- 6.3: Matrices for Linear Transformations
- 6.4: Transition Matrices and Similarity
- 6.5: Applications of Linear Transformations

Chapter 7: Eigenvalues And Eigenvectors

- 7.1: Eigenvalues and Eigenvectors
- 7.2: Diagonalization
- 7.3: Symmetric Matrices and Orthogonal Diagonalization

In total, 24 sections are to be covered, with sections marked “optional” to be covered at instructor’s discretion.