



**0701M340**

# **Linear Algebra**

**Instructor:** TBA

**E-mail:** TBA

**Office Hours:** by appointment on Zoom

**Contact Hours:** 60 (50 minutes each)

**Credits:** 4

## **Course Description**

Systems of linear equations, vector spaces and subspaces, bases, linear transformations, determinants, eigenvalues and eigenvectors, diagonalization of symmetric matrices, orthogonality.

## **Required Textbook(s)**

Linear Algebra and Its Applications, 6th Edition, David C. Lay. ISBN: 9780135851159

## **Prerequisites**

Calculus I

## **Course Goals**

By the end of the course, students will be able to:

- Analyze and solve linear systems through row reduction, echelon forms, and matrix methods; describe solution sets in parametric terms and determine

consistency criteria.

- Utilize concepts of linear independence, subspaces, dimension, and rank to identify spanning sets, establish bases, and express coordinate representations in  $\mathbb{R}^n$  and abstract vector spaces.
- Execute matrix operations and examine transformations—calculate matrix products, inverses, and factorizations; represent linear transformations using matrices; and assess whether a mapping is one-to-one or onto.
- Evaluate and interpret determinants and eigenvalues—compute determinants via their properties, apply Cramer’s Rule, find eigenvalues and eigenvectors, and use diagonalization (including for complex eigenvalues) to streamline computations.
- Implement orthogonality in vector spaces—compute inner products, recognize orthogonal sets, determine orthogonal projections, and generate orthogonal bases via the Gram–Schmidt process.

## Course Outline

Please note that the outline is meant to give an overview of the major concepts in this course. Changes may occur as needed to aid in the student’s development.

### Module 1

- 1.1 Systems of Linear Equations
- 1.2 Row Reduction and Echelon Forms
- 1.3 Vector Equations
- 1.4 The Matrix Equation  $Ax = b$
- 1.5 Solution Sets of Linear Systems
- **Homework 1**
- **Quiz 1**

### Module 2

- 1.7 Linear Independence
- 1.8 Introduction to Linear Transformations
- 1.9 The Matrix of a Linear Transformation
- **Homework 2**
- **Quiz 2**

### **Module 3**

- 2.1 Matrix Operations
- 2.2 The Inverse of a Matrix
- 2.3 Characterizations of Invertible Matrices
- **Homework 3**
- **Quiz 3**

### **Module 4**

- 2.5 Matrix Factorizations
- 2.8 Subspaces of  $\mathbb{R}^n$
- 2.9 Dimension and Rank
- **Homework 4**
- **Quiz 4**
- **Exam 1**

### **Module 5**

- 3.1 Introduction to Determinants
- 3.2 Properties of Determinants
- 3.3 Cramer's Rule, Volume, and Linear Transformations
- **Homework 5**
- **Quiz 5**

### **Module 6**

- 4.1 Vector Spaces and Subspaces
- 4.2 Null Spaces, Column Spaces, and Linear Transformations
- 4.3 Linearly Independent Sets; Bases
- 4.4 Coordinates
- **Homework 6**
- **Quiz 6**

### **Module 7**

- 4.5 The Dimension of a Vector Space
- 4.6 Change of Basis

- 5.1 Eigenvectors and Eigenvalues
- **Homework 7**
- **Quiz 7**

### Module 8

- 5.2 The Characteristic Equation
- 5.3 Diagonalization
- 5.4 Eigenvectors and Linear Transformations
- 5.5 Complex Eigenvalues
- **Homework 8**
- **Quiz 8**
- **Exam 2**

### Module 9

- 6.1 Inner Product, Length, and Orthogonality
- 6.2 Orthogonal Sets
- 6.3 Orthogonal Projections
- 6.4 The Gram – Schmidt Process
- **Homework 9**
- **Quiz 9**
- **Final Exam**

## **Grading Policy**

Your grade in this course will be determined by your performance in the following categories:

Homework	15 %
Quizzes (Top 8 out of 9)	20 %
Exams	40 %
Final Exam	25 %
<b>Total</b>	<b>100%</b>

Since a quiz is being dropped, there will be absolutely no rounding of your final grade. For each assignment, you have two days from the day the grade is posted to the course

site to challenge its grading. Failure to challenge the grading in this time frame will result in the grade being final. You may track your running point total throughout the term via our course site. Please be aware, however, that the course grade you see on the site will reflect only assignments and activities you have already completed and that your professor has graded.

## Grading Scale

The instructor will use the grading system as applied by JNU:

Definition	Letter Grade	Score
Excellent	A	90~100
Good	B	80~89
Satisfactory	C	70~79
Poor	D	60~69
Failed	E	Below 60

## Academic Integrity

As members of the Jinan University academic community, students are expected to be honest in all of their academic coursework and activities. Academic dishonesty, includes (but is not limited to) cheating on assignments or examinations; plagiarizing, i.e., misrepresenting as one's own work any work done by another; submitting the same paper, or a substantially similar paper, to meet the requirements of more than one course without the approval and consent of the instructors concerned; or sabotaging other students' work within these general definitions. Instructors, however, determine what constitutes academic misconduct in the courses they teach. Students found guilty of academic misconduct in any portion of the academic work face penalties that range from the lowering of their course grade to awarding a grade of E for the entire course.