



## MATH 226: Linear Algebra

Term: 2021 Summer Session

Instructor: Staff

Language of Instruction: English

Classroom: TBA

Office Hours: TBA

Class Sessions Per Week: 5

Total Weeks: 5

Total Class Sessions: 25

Class Session Length (minutes): 145

Credit Hours: 4

### Course Description:

This course is an undergraduate course in linear algebra for students major in science, engineering, and mathematics. Students will study solutions of systems of linear equation, matrices, vector spaces, linear transformations, and similarity eigenvalues and eigenvectors. Students successful completing this course are expected to 1) solve linear system of equations; 2) understand vector spaces and subspaces; 3) understand fundamental properties of matrices including determinants, inverse matrices, matrix factorization, eigenvalues and linear transformations; 4) have a clear knowledge about the application of linear algebra.

*Prerequisite: MATH 211 or equivalent 2nd year calculus course.*

### Course Materials:

*Linear Algebra and Its Applications*, David C Lay, 5th edition.

### Course Format and Requirements:

#### **Attendance**

Students are expected to attend and participate in class. Missing class is the most common reason for poor performance in the course. If you miss a class, you are responsible for obtaining notes



for that class from a student who attended. It is also your responsibility to find out about any announcements made in class.

### Grading Scale:

**A+: 98%-100%**

**A: 93%-97%**

**A-: 90%-92%**

**B+: 88%-89%**

**B: 83%-87%**

**B-: 80%-82%**

**C+: 78%-79%**

**C: 73%-77%**

**C-: 70%-72%**

**D+: 68%-69%**

**D: 63%-67%**

**D-: 60%-62%**

**F: Below 60%**

### Course Assignments:

#### **Daily Homework Assignment**

Homework will be assigned on daily basis. It aims to help students have a review on the key points in each class. Each completed homework shall be handed in within 5 minutes since the beginning of next class. Please note, each student shall submit his or her individual answer sheet.

#### **8 Quizzes**

There will be 8 quizzes administered through the whole semester. Quizzes will always be completed in the first ten minutes of class. The quiz problems will be similar to homework problems and in-class examples. There will be no make-up quizzes.

#### **2 Midterm Exams**

Midterm exams are scheduled on week 2 and week 4. The midterm exam will be based on concepts covered in class. It will be in-class, close-book and non-cumulative.

#### **Final Exam**

The final will be cumulative and close-book. Note that the final will not be taken during the normal class times. Exact time and location for final will be announced later.

**Course Assessment:**

Daily Homework Assignment	15%
8 Quizzes	15%
Midterm Exams 1	20%
Midterm Exams 2	20%
Final Exam	30%
<b>Total</b>	<b>100%</b>

**Course Schedule:**

<b>Week</b>	<b>Topics</b>	<b>Activities</b>
1	Go through Syllabus+ Course Overview <b>Chapter 1: Linear Equations in Linear Algebra</b> Systems of Linear Equation Row Reduction and Solution Sets of Linear Systems Vector Equations The Matrix Equation $Ax = b$ Solutions Sets of Linear Systems Linear Independence Introduction to Linear Transformations The Matrix of a Linear Transformation <b>Chapter 2: Matrix Algebra</b> Matrix Operations The Inverse of a Matrix and Characterizations of Invertibility	Daily Homework Assignment Quizzes 1& 2
2	<b>Chapter 2: Matrix Algebra</b> Partitioned Matrices and Matrix Factorization Subspace of $\mathbb{R}^n$	Daily Homework Assignment <b>Midterm 1</b>



	<p>Dimension and Rank</p> <p><b>Chapter 3: Determinants</b></p> <p>Introduction to Determinants</p> <p>Properties of Determinants, the Determinant and Invertibility</p> <p>Cramer's Rule, Volume, and Linear Transformations</p>	Quiz 3
3	<p><b>Chapter 4: Vector Spaces</b></p> <p>Vector Spaces and Subspace</p> <p>Null Spaces, Column Spaces, and Linear Transformations</p> <p>Linearly Independent Sets; Bases</p> <p>Coordinate Systems</p> <p>The Dimension of Vector Space</p> <p>Rank</p> <p>Change of Basis</p> <p>Applications to Markov Chains</p>	Daily Homework Assignment Quizzes 4& 5
4	<p><b>Chapter 5: Eigenvalues and Eigenvectors</b></p> <p>Definition, the Characteristic Equation</p> <p>Diagonalization</p> <p>Eigenvectors and Linear Transformations</p> <p>Complex Eigenvalues</p> <p><b>Chapter 6: Orthogonality and Symmetric Matrices</b></p> <p>Inner Product, Length, and Orthogonality</p> <p>Orthogonality Sets and Projections</p>	Daily Homework Assignment <b>Midterm 2</b> Quizzes 6& 7
5	<p><b>Chapter 6: Orthogonality and Symmetric Matrices</b></p> <p>The Gram-Schmidt Process</p> <p>Least-Squares Problems</p> <p><b>Chapter 7: Symmetric Matrices and Quadratic Forms</b></p>	Daily Homework Assignment Quiz 8 <b>Final Exam</b>



	Diagonalization of Symmetric Matrices Quadratic Forms The Singular Value Decomposition Review for Final	
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### Academic Integrity:

Students are encouraged to study together, and to discuss lecture topics with one another, but all other work should be completed independently.

Students are expected to adhere to the standards of academic honesty and integrity that are described in the Shanghai Normal University's *Academic Conduct Code*. Any work suspected of violating the standards of the *Academic Conduct Code* will be reported to the Dean's Office. Penalties for violating the *Academic Conduct Code* may include dismissal from the program. All students have an individual responsibility to know and understand the provisions of the *Academic Conduct Code*.

### Special Needs or Assistance:

Please contact the Administrative Office immediately if you have a learning disability, a medical issue, or any other type of problem that prevents professors from seeing you have learned the course material. Our goal is to help you learn, not to penalize you for issues which mask your learning.