



蘇州大學
Soochow University

MAT 237 Applied Linear Algebra

Summer 2023

Course Credits: 4

Contact Hours: 55 hours

Instructor: TBA

Email: TBA

COURSE OBJECTIVES

This course is designed to explore the practical applications of linear algebra concepts. The course builds upon the foundational knowledge of linear algebra and focuses on its real-world applications. Students will develop an understanding of how linear algebra is used in various fields such as engineering, computer science, and economics. The course emphasizes problem-solving, critical thinking, and the ability to apply linear algebra techniques to solve complex problems.

Upon Completion of this Course, students will be able to:

1. Understand the applications of linear algebra in diverse fields
2. Apply linear algebra concepts and techniques to solve real-world problems
3. Develop problem-solving and critical-thinking skills through the application of linear algebra
4. Enhance mathematical modeling abilities by using linear algebra tools
5. Improve proficiency in working with matrices, vectors, and systems of linear equations
6. Develop the ability to interpret and analyze data using linear algebra techniques

PREREQUISITES

MAT 120 Calculus II

GRADING

Grades will be determined by accumulating points, with 100 points being the maximum, as follows:



| ITEM | POINTS |
|------------|------------|
| Quizzes | 20 Points |
| Midterm 1 | 20 Points |
| Midterm 2 | 20 Points |
| Final Exam | 40 Points |
| Total | 100 Points |

Late submissions will be graded at the end of the course. Grades will be assigned according to the following rule:

$$A \geq 90 > B \geq 80 > C \geq 70 > D \geq 60 > F.$$

We reserve the right to make adjustments to the overall grading policy.

COURSE MATERIALS

Required Texts:

Linear Algebra and Its Applications, 5th Edition, Lay, Pearson.

Recommended (Optional) Texts or Other Materials:

None

COURSE TOPICS

| MODULE | TASKS |
|----------|--|
| Module 1 | Topics: Topic 1: Optimization Problems Topic 2: Optimization (Cont.) Topic 3: Eigenvalues and Eigenvectors Topic 4: The Characteristic Polynomial Assessments: Quiz#1 |
| Module 2 | Topics: Topic 5: Diagonalisation of Matrices Topic 6: Applications: Calculating Powers of Matrices, Solving Systems of Linear Differential Equations Topic 7: Orthogonality Topic 8: Scalar Product, Definition and Properties Assessments: |



| | |
|----------|--|
| | Quiz#2 |
| Module 3 | Topics: Topic 9: Orthogonal and Orthonormal Sets Topic 10: Gram-Schmidt Process, Orthogonal Complement of a Subspace Topic 11: Orthogonal Projections and Orthogonal Matrices Topic 12: LU and QR decomposition Assessments: Midterm#1 |
| Module 4 | Topics: Topic 13: Orthogonal Diagonalization and the Spectral Theorem Topic 14: Spectral Theorem and its Application Topic 15: Spectral Theorem and its Application(Cont.) Topic 16: Singular Value Decomposition Assessments: Midterm#2 |
| Module 5 | Topics: Topic 17: concept of Singular Value Decomposition Topic 18: Singular Value Decomposition Application Topic 19: Low-rank Approximation and Data Compression Techniques Topic 20: Final Exam Review Assessments: Final Exam |

ATTENDANCE

1) Class attendance is required. Missing classes without permission will lead to decrease in overall grade.

Missing less than two classes: no penalty.

Missing more than two classes: 7% will be taken off from the overall grade.

If the instructor reports a student's frequent missing of class to the Soochow University Academic Administration Office, the student might get a written warning and might be prohibited from attending final exam.

2) Participants in this course are expected to arrive in class promptly and adequately prepared. The primary objective of this course is to critically engage with the readings



and the subject matter. Therefore, course participants are expected to have completed the reading prior to class and prepare thoughtful reflections/commentaries to share with fellow colleagues.

LEARNING REQUIREMENTS

- 1) Late assignments are not acceptable and are subjected to grade deductions.
- 2) Assignments submitted in the wrong format will be counted as not submitted.
- 3) Failure to submit or fulfill any required course component results in failure of the class.
- 4) Make-up for midterm and final exams only with valid excuses, as defined by the University.
- 5) In order to earn a Certificate of Completion, participants must thoughtfully complete all assignments by stated deadlines and earn an average quiz score of 50% or greater.

TECHNOLOGY POLICY

The use of electronic devices in class is distracting, both for the user and for the rest of the class. Only non-programmable calculators can be used in the tests and exam. Any attempts to use cell phones and other electronic communication devices will be seemed as cheating. Laptops are discouraged, unless you use them for activities DIRECTLY related to the course (eg., note taking, reading course documents).

ACADEMIC INTEGRITY POLICY

Soochow University highly values the academic integrity and aims to promote the academic fairness, honesty and responsibility. Any academic dishonesty behaviors and any attempts to cheats and plagiarism will be reported to the university administration office. A written warning and the relevant penalties will be imposed. The record might be shown on the official university transcript.

DISABILITY ACCOMMODATION

Soochow University is committed to maintaining a barrier-free environment so that students with disabilities can fully access programs, courses, services, and activities at



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Soochow University. Students with disabilities who require accommodations for access to and/or participation in this course are welcome.

Note:

Please contact the University 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.