



MAT 138 Introduction to Applied Linear Algebra

Summer 2023

Course Credits: 4

Contact Hours: 55 hours

Instructor: TBA

Email:TBA

COURSE OBJECTIVES

This course will introduce students to the fundamental concepts of linear algebra and their applications in various fields such as engineering, physics, and computer science. Students will learn about vectors, matrices, systems of linear equations, determinants, eigenvalues and eigenvectors, and their applications in solving real-world problems. The course will also cover topics such as linear transformations, orthogonality, and least squares regression.

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

1. Understand the fundamental concepts of linear algebra
2. Learn about vectors, matrices, and systems of linear equations
3. Understand the applications of linear algebra in various fields
4. Learn about determinants, eigenvalues and eigenvectors
5. Understand the concept of linear transformations and orthogonality
6. Learn about least squares regression and its applications

PREREQUISITES

N/A

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 by Gilbert Strang (Wellesley-Cambridge Press).

Recommended (Optional) Texts or Other Materials:

None

COURSE TOPICS

MODULE	TASKS
Module 1	Topics: Topic 1: What is linear algebra? Topic 2: Linear systems and matrices Topic 3: Vector spaces and linear independence Topic 4: Matrices and Linear Systems Assessments: Quiz#1
Module 2	Topics: Topic 5: Matrix operations and inverses Topic 6: Gaussian elimination and LU decomposition Topic 7: Applications in physics and engineering Topic 8: Determinants and Eigenvalues Assessments: Quiz#2



Module 3	Topics: Topic 9: Definition and properties of determinants Topic 10: Eigenvalues and eigenvectors Topic 11: Orthogonality and Linear Transformations Topic 12: Inner product spaces and orthogonality Assessments: Midterm#1
Module 4	Topics: Topic 13: Orthogonal projections and Gram-Schmidt process Topic 14: Least Squares Regression Topic 15: Linear regression and the method of least squares Topic 16: Multiple regression and model selection Assessments: Midterm#2
Module 5	Topics: Topic 17: Applications of Linear Algebra Topic 18: Applications in computer graphics and image processing Topic 19: Applications in optimization and control Topic 20: Applications in quantum mechanics and cryptography 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 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



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professors from seeing you have learned the course material.