



East China Normal University

MATH21 Linear Algebra

Instructor: Wanzhong Lu

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Home University: Shanghai University of Finance Economics

Semester: June 27 to July 15, 2022

Course Hour: Monday through Friday, 160 mins per teaching day;

Total Contact Hours: 64 contact hours

Credits: 4

Designated Textbook with ISBN:

Linear Algebra and Its Applications (with Pearson MyLab), 5th Edition, David C. Jay

Course Prerequisite:

This course provides an introduction to the fundamental concepts and theory of linear algebra and practice in reading and writing mathematical proofs. Topics include systems of linear equations and techniques for solving them, linear independence and dependence, linear transformations and their matrix representations, matrix algebra, characterizations of invertible matrices, determinants, vector spaces and subspaces, null and column spaces, Basis Theorem, Rank Theorem, as well as eigenvalues and eigenvectors. Additional topics and applications of linear algebra may be covered.

**Notes: The course might be moved to online delivery due to COVID-19 pandemic. Students will be notified once such decision is made.*

Grading Scale and Notes

The following definitions will be used as a guide for the assignment of grades:

Number Grade	Letter Grade	Definitions
94-100	A	Extraordinary distinction, indicating a full mastery of course content and excellent work.
90-93	A-	
87-89	B+	Strong performance demonstrating a high level of attainment, indicating a good comprehension of the course material and the student's full engagement with the course requirements and activities.
84-86	B	
80-83	B-	
77-79	C+	Acceptable performance, demonstrating an adequate and satisfactory comprehension of the course material and the student has met the basic requirements for completing assignments and participating in class activities.
70-76	C	
60-69	D	A marginal performance in the required exercises demonstrating a minimal passing level of attainment.
0-59	F	An unacceptable performance. The F grade indicates that the student's performance has revealed almost no understanding of the course content.

Midterm Exams

You will take 1 mid-term exams during the semester. time will be limited to class time. It will involve a mix of mechanical skills and conceptual reasoning. The best possible preparation for them is regular attendance and completion of assigned homework. Make-up exams are only given in case of documented emergencies.

Grading

Your final course grade will be determined by

Homework: 30%

Attendance: 30%

Midterm: 20%

Final Exam: 20%

Course Schedule

Day	Sections Covered (Tentative)
1	1.1 Systems of Linear Equations 1.2 Row Reduction and Echelon Forms 1.3 Vector Equations 1.4 The Matrix Equations $Ax = b$
2	1.5 Solution Sets of Linear Systems 1.6 Applications of Linear Systems 1.7 Linear Independence 1.8 Introduction to Linear Transformations
3	1.9 The Matrix of a Linear Transformation 2.1 Matrix Operations 2.2 The Inverse of a Matrix 2.3 Characterizations of Invertible Matrices
4	2.4 Partitioned Matrices 2.5 Matrix Factorizations 2.8 Subspaces of \mathbb{R}^n 2.9 Dimension and Rank
5	3.1 Introduction to Determinants 3.2 Properties of Determinants 3.3 Cramer's Rule, Volume, and Linear Transformations
6	4.1 Vector Spaces and Subspaces 4.2 Null Spaces, Column Spaces, and Linear Transformations 4.3 Linearly Independent Sets; Bases
7	4.4 Coordinate Systems 4.5 The Dimension of a Vector Space 4.6 Rank Midterm Exam Review
8	Midterm Exam
9	4.7 Change of Basis 4.8 Applications of Difference Equations 4.9 Applications to Markov Chains
10	5.1 Eigenvectors and Eigenvalues 5.2 The Characteristic Equation 5.3 Diagonalization
11	5.4 Eigenvectors and Linear Transformations 5.5 Complex Eigenvalues 6.1 Inner Product, Length, and Orthogonality 6.2 Orthogonal Sets
12	6.3 Orthogonal Projections 6.4 The Gram-Schmidt Process 6.5 Least-Squares Problems
13	7.1 Diagonalization of Symmetric Matrices 7.2 Quadratic Forms 7.3 Constrained Optimization
14	7.4 The Single Value Decomposition Final Exam Review
15	Final Exam



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