



MA077 Linear Algebra

Instructor Information	Chao Liu Home Institution: Shanghai Jiao Tong University Email: Liu.chao@shufe.edu.cn Office Hours: Determined by Instructor		
Term	December 13, 2021 - January 7, 2022	Credits	4 units
Class Hours	Monday through Friday, 120 mins per teaching day		
Discussion Sessions	2.5 hours each week, conducted by teaching assistant(s)		
Total Contact Hours	66 contact hours (1 contact hour = 45 mins, 3000 mins in total)		
Required Texts (with ISBN)	Linear Algebra with Applications, Ninth Edition, by Steven J. Leon. ISBN-13: 978-0-321-96221-8		
Prerequisite	Calculus 1		



Course Overview

The general topics we will cover in this class are systems of linear equations, matrix algebra, and vector spaces. There are many models of biological, economical, or physical systems which are quite complicated mathematically. No matter what the model, though, it is frequently approximated by a linear system in practice. The unifying theme of this class is to study such linear systems from various points of view (algebraically, computationally, and geometrically).

Course Goals

Students should be able to express a linear system in the form of matrix equations and vector equations and solve them. Know the basic properties and operations of matrices. Understand the definitions of determinants and know their computation and applications of determinants. Understand basis and dimension of vector spaces. Understand subspaces related to a matrix and rank of a matrix. Understand the meaning of eigenvalues and eigenvectors of a matrix and use them to diagonalize a matrix. Know the orthogonal sets and projections and solve least-square problems. Understand how to diagonalize a symmetric matrix and deal with quadratic forms.

Grading Policy

Quizzes and Homework	30%
Midterm Examination	30%
Final Examination	40%

Grading Scale

Number grade	Letter grade	GPA
90-100	A	4.0
85-89	A-	3.7
80-84	B+	3.3
75-79	B	3.0
70-74	B-	2.7
67-69	C+	2.3
65-66	C	2.0
62-64	C-	1.7
60-61	D	1.0
≤59	F (Failure)	0



Class Schedule

Date	Lecture	Readings
Day 1	Linear systems, row reduction	Chapter 1.1-1.2
Day 2	Matrix arithmetic	Chapter 1.3
Day 3	Matrix inversion, the transposes of a Matrix	Chapter 1.4
Day 4	Elementary matrices, partitioned matrices	Chapter 1.5-1.6
Day 5	Determinants,	Chapter 2.1
Day 6	Properties of determinants, Cramer's rule	Chapter 2.2-2.3
Day 7	Definition of vector spaces, subspaces	Chapter 3.1-3.2
Day 8	Midterm review	
Day 9	Midterm Exam	
Day 10	Linear independence	Chapter 3.3
Day 11	Basis and dimension	Chapters 3.4
Day 12	Change of basis, row space and column space	Chapter 3.5-3.6
Day 13	Linear transformations	Chapter 4.1
Day 14	Matrix representations of linear transformations, similarity	Chapter 4.2-4.3
Day 15	The scalar product in R^n , orthogonality in R^n	Chapter 5.1-5.2
Day 16	Least-square problems, inner product spaces,	Chapter 5.3-5.4
Day 17	Orthonormal sets, the Gram-Schmidt orthogonalization process	Chapter 5.5-5.6
Day 18	Eigenvalue and eigenvectors	Chapter 6.1
Day 19	Final review	
Day 20	Final Exam	