



## Shanghai Jiao Tong University

### MA077 Linear Algebra (Online)

<b>Instructor Information:</b>	Guofu Yu Home Institution: Shanghai Jiao Tong University Email: gfyu@sjtu.edu.cn Office Hours: Determined by Instructor		
<b>Term:</b>	June 29, 2020 - July 24, 2020	Credits:	4 units
<b>Class Hours:</b>	Monday through Friday, 120 mins per teaching day		
<b>Discussion Sessions:</b>	2 hours each week, conducted by teaching assistant(s)		
<b>Total Contact Hours:</b>	66 contact hours (1 contact hour = 45 mins, 3000 mins in total)		
<b>Required Texts (with ISBN):</b>	Linear Algebra and Its Applications, Fourth Edition (kindle ebook), by David C. Lay. ISBN-13: 978-0-321-38517-8		
<b>Prerequisite:</b>	Students are expected to pass Accelerated Mathematics 1		



## Course Overview

This subject introduces the linear systems, including linear algebraic equations, Matrix operations, linear transformation, vector space, etc. Linear algebraic systems appear in many fields such as physics, biology, economics, engineering, computer sciences. In this class we focus on linear systems from points of view of both algebraic and geometric.

## Course contents

On completion of this subject students should

1. Know the definition of determinant and how to compute determinant for a given matrix;
2. Have a good knowledge of vector space, basis, dimension;
3. Ability to solve linear algebraic equations and give solutions space.
4. Know properties of matrices and operations.
5. Have a good knowledge of linear transformation;
6. Know the eigenvalues and eigenvectors of matrices;
7. Understand the orthogonal systems and Schmidt orthogonalization.
8. Know the properties of real symmetric matrices and their diagonalization.
9. Apply properties of real symmetric matrices in studies of quadratic form;
10. Problem-solving skills: the ability to solve least-square problems;
11. The Laplace transform and the inversion formula.



### Grading Policy

Assignments	20%
Midterm Test	40%
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
$\leq 59$	F (Failure)	0



### Class Schedule

Date	Lecture	Readings
Day1	Linear systems and row reduction	Chapter 1.1-1.2
Day2	Vector equation, matrix equation and solutions	Chapter 1.3-1.5
Day3	Applications of Linear equations and Linear independence	Chapter 1.6-1.7
Day4	Matrix of Linear transformation	Chapter 1.8-1.9
Day5	Matrix operations and inverse of a matrix	Chapter 2.1-2.2
Day6	Invertible matrices, matrix partition and factorization	Chapter 2.3-2.5
Day7	Introduction to Determinants	Chapter 3.1-3.2
Day8	Cramer's rule, vector spaces	Chapter 3.3-4.1
Day9	Midterm review	
Day10	<b>Midterm Exam</b>	
Day11	Null spaces and column spaces	Chapter 4.2-4.3
Day12	Coordinate system and dimension of space	Chapter 4.4-4.5
Day13	rank of space and change of basis	Chapter 4.6-4.7
Day14	Eigenvalue and eigenvectors	Chapter 5.1-5.2
Day15	Diagonalization, Inner product, orthogonality	Chapter 5.3-6.1
Day16	Orthogonal sets, Gram-Schmidt process, least-square problems and application to linear models	Chapter 6.2-6.6
Day17	Symmetric matrices and quadratic forms	Chapter 7.1-7.2
Day18	Laplace transform and inversion formula	
Day19	Final review	
Day20	<b>Final Exam</b>	