



Shanghai Jiao Tong University

MA077 Linear Algebra

Instructor:	Gexin Yu	Email:	gyu@wm.edu
Home Institution:	College of William and Mary	Office:	505 Main Bldg
Office Hours:	TBD		
Term:	2 July – 2 August 2018	Credits:	4
Classroom:	TBD	Teaching Assistant(s):	TBD
Class Hours:	Monday through Thursday, 8:30 am-10:30am		
Discussion Session:	2 hours each week, leaded by teaching assistant(s)		
Total Contact Hours:	66 contact hours (1 contact hour = 45 mins, 3000 mins in total)		
Required Texts (w/ ISBN):	Linear Algebra and Its Applications, Fourth Edition (kindle ebook), by David C. Lay. ISBN-13: 978-0-321-38517-8		
Prerequisite:	N/A		



Course Goals

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 Policy

Homework: Homework problems will be assigned for each section we cover, but will not be collected or graded.

Quizzes: We will have two quizzes every week (only one in the weeks with exams). Quiz problems are taken from homework problems. No make-up quiz will be given. Your lowest quiz grade will be dropped.

Exam: There will be one midterm exam, tentatively scheduled for June 14. There will also be a comprehensive final exam at the end of our session. Please tell me as soon as possible if you have a conflict.

Calculator: You may use calculator for homework problems, but no calculator is allowed in quizzes or exams.

Grading Policy

- ✧ Homework and quizzes: 30%
- ✧ Midterm exam: 30%
- ✧ Final exam: 40%

Your letter grade will be assigned according the following 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



Course Schedules

WEEK 1 (2-5 July):		
Section	Topic	Homework
1.1	Systems of Linear Equations	3, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23, 25, 27.
1.2	Row Reduction and Echelon Forms	1, 3, 5, 7, 9, 11, 13, 17, 21, 23.
1.3	Vector Equations	5, 9, 11, 13, 21.
1.4	The Matrix Equation $Ax=b$	1, 3, 5, 7, 9, 11, 13, 15, 21, 25, 23, 29.
1.5	Solution Sets of Linear Systems	7, 9, 11, 13, 17, 21, 23, 27, 35.
1.7	Linear Independence	1, 3, 5, 7, 9, 11, 13, 15, 17, 19, 21.
1.8	Introduction to Linear Transformations	1, 3, 5, 7, 9, 11, 17, 19, 21, 29, 31, 33.
WEEK 2 (9-12 July):		
1.9	The Matrix of a Linear Transformation	1, 3, 5, 7, 9, 11, 15, 17, 19, 21, 23.
2.1	Matrix Operations	5, 7, 9, 11, 13, 15, 17, 23, 25, 31.
2.2	The Inverse of a Matrix	1, 3, 5, 9, 11, 13, 15, 17, 19, 29, 31, 33, 35.
2.3	Characterizations of Invertible Matrices	1, 3, 5, 11, 13, 15, 17.
2.4	Partitioned Matrices	1, 3, 5, 7, 9, 11, 13, 25
2.5	Matrix Factorizations	7, 9, 11, 13, 15.
3.1	Introduction to Determinants	1, 5, 7, 9, 11, 13.
3.2	Properties of Determinants	1, 3, 9, 5, 7, 11, 15, 17, 19, 21, 25, 29, 31, 33, 35, 39.
WEEK 3 (16-19 July):		
Exam at the beginning of the week.		
3.3	Cramer's Rule, Volume, and Linear Transformations	1, 7, 9.



4.1	Vector Spaces and Subspaces	1, 3, 5, 7, 9, 11, 15, 17, 21, 23.
4.2	Null Spaces, Column Spaces, and Linear Transformat	1, 3, 5, 7, 9, 11, 13, 15, 17, 19, 23, 25, 31.
4.3	Linearly Independent Sets; Bases	1, 3, 5, 7, 9, 13, 15, 23, 33.
4.4	Coordinate Systems	1, 3, 5, 7, 9, 11, 13, 19, 25, 27, 29.
4.5	The Dimension of a Vector Space	1, 3, 7, 9, 11, 13, 15, 17, 19, 27.
4.6	Rank	1, 3, 5, 7, 9, 11, 13, 15, 17.
WEEK 4 (23-26 July):		
4.7	Change of Basis	1, 5, 7, 9.
5.1	Eigenvectors and Eigenvalues	1, 3, 5, 7, 11, 13, 15, 17, 21, 23, 25, 27.
5.2	The Characteristic Equation	1, 3, 5, 9, 11, 15, 17, 21.
5.3	Diagonalization	1, 5, 7, 9, 11, 13, 17, 21, 23, 27.
5.4	Eigenvectors and Linear Transformations	1, 3, 5, 9, 19, 21, 23, 25.
6.1	Inner Product, Length, and Orthogonality	1, 3, 5, 7, 9, 15, 17, 19, 27, 31.
6.2	Orthogonal Sets	1, 3, 7, 11, 17, 23, 29.
6.3	Orthogonal Projections	1, 3, 5, 7, 13, 15, 21.
WEEK 5 (30 July-2 August):		
6.4	The Gram-Schmidt Process	1, 3, 5, 9, 17.
6.5	Least-Squares Problems	1-13(odd)
6.6	Applications to Linear Models	
7.1	Diagonalization of Symmetric Matrices	1,3,5, 8, 10, 13, 17, 19, 25, 29
7.2	Quadratic Forms	1,5,8,11,13, 19, 21, 27
7.3	Constrained Optimization	1,3,5,7,11
Final exam at the end of the week		



Academic Honesty

The highest standards of academic integrity are enforced for this course. You may (actually are encouraged to) work together on your homework problems, but you are allowed to get help on your quizzes or exams from your classmates or any other resources. Failure to abide the rule will result in a failing grade for your coursework.