Linear Algebra

2018 Autumn Semester
Tuesdays 2:30pm - 5:05PM
Main Teaching Building 312

Instructor:

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Course Description: This course is designed to introduce fundamental concepts in linear algebra to undergraduate students. Topics covered include linear equations, matrix algebra, determinants, vector spaces, linear transformation, orthogonality and symmetric matrices. The mathematical tools will be motivated by geometric intuition and applications.

Textbook: *Linear Algebra and Its Applications* by David Lay, 3rd edition.

A good reference book is *Introduction to Linear Algebra* by Gilbert Strang. Its accompany website (https://ocw.mit.edu/courses/mathematics/18-06-linear-algebra-spring-2010/) offers many useful resources, such as video lectures and exercises.

Problem Sets and Exams: Problem sets will be assigned roughly every week, which are usually due in class the following week. Written solutions should be submitted and will be graded. Students are encouraged to work in groups to solve the problems, but the submitted solutions must be individual work.

The midterm and final exams are closed book, closed notes. No communication devices such as computers and mobile phones are allowed in exams. Zero grade will be recorded for missed or late assignment or exam without school-approved reasons.

Grade Distribution:

Problem Sets	20%
Midterm Exam	30%
Final Exam	50%

For problem sets, the highest 10 scores will be counted towards the course grade.

Policies: All students must follow the University's student code of conduct.

Course Outline: The lecture materials will follow the textbook. The first lecture is on September 4th. The midterm exam is tentatively on week 9 (October 30th). The last lecture is on December 18th (Week 16). We expect to cover Chapters 1-4 prior to the midterm, and Chapters 5-7 after the midterm. The final exam is in early January. Its exact date will be announced later.

Not all materials from the textbook may be covered in the exams. The details will be announced in class.

Week	**Main Topics**	**Textbook Chapters**	**Assignments**
1	solving systems of linear equations, row reduction examples of linear systems	1.1-1.3 1.6	PS1
2	solving $A\mathbf{x} = b$ linear transformation	1.4-1.5 1.8-1.9	PS2
3	linear independence matrix multiplications, inverse	1.7 2.1-2.4	PS3
4	LU factorizations Leontief input-output model	2.5 2.6	PS4
5	National Day holiday		
6	properties of determinants	3.1-3.2	PS5
7	Cramer's rule vector space, subspace	3.3 4.1	PS6
8	basis, null space, column space, coordinates	4.2-4.5, 4.7	
9	review **midterm exam**		
10	rank eigenvalues and eigenvectors	4.6 5.1-5.2	PS7
11	similar matrices, diagonaliztion	5.3	PS8
12	geometric meanings of a diagonalizable matrix Markov chains inner product, vector length, orthogonal vectors	5.4 4.9 6.1	PS9
13	least-squares problems	6.5	
14	orthogonal sets, projections, Gram-Schmidt	6.2-6.4	PS10
15	symmetric matrices quadratic forms	7.1-7.2	
16	singular value decomposition review	7.4	PS11