

Linear Algebra and Its Applications

線性代數與應用

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Office hour: 9:10am-11:10am, Wednesday (管院二館 413).

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Office hour: 3pm-5pm and 7pm-9pm, Monday (工綜 455).

Text Book: Gilbert Strang, *Linear Algebra and Its Applications*, Thomson

(歐亞 Tel: 02-8912-1188)

Professor Strang's Class Lecture Videos:

<http://web.mit.edu/18.06/www/>

Time: Tuesday 9:10-12:10 PM Classroom: 普通 404

Evaluation

Homework 30% (the two lowest grades will be dropped).

Please put a hard copy of your work into the homework box in front of Room 455 (the TAs' lab) of the Engineering Building by the due time (typically 8:30am on Tuesday).

Project 20%

Participation 5%

Midterm 20% (or 15%)

Final 25% (or 30%; comprehensive)

Course Outline

Theory:

Chapter 1: Matrices and Gaussian Elimination.

Chapter 2: Vector spaces and Linear Equations.

Chapter 3: Orthogonality.

Chapter 4: Determinants.

Chapter 5: Eigenvalues and Eigenvectors.

Chapter 6: Positive Definite Matrices.

Applications:

Principal Component Analysis.

Singular Value Decomposition (Appendix A).

Linear Programming (Chapter 8).

Nonlinear Programming.

Game Theory (Chapter 8).

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Motivation behind this course:

I am trying to tell you a *STORY* of Linear Algebra

- The story is *clean* and *beautiful*
 - A mathematician's statement?
 - Linear algebra is one of very few mathematical subjects that can really make you feel that way
 - This is exactly one of this class's goals: tell you something exciting and beautiful.
- Things learned from the story are *needed* and *used*
 - The subject has been taught too abstractly.
 - Crucial importance of the story was often missed
 - An essential sophomore course but not really appreciated
 - We are here trying to pick up this subject again and hopefully this time we can have different perspectives not only on this subject but also on any subject that uses linear algebra.
- Less on rigor and much more on *understanding*.
 - *Explain* rather than *deduce*
 - Ideas come with examples
 - Ability to *reason mathematically* will naturally develop
 - The story moves simply and naturally from a line or a plane to the n -dimensional space. That step is mathematics at its best and every one of you should be able to take it.

*Read the Novel and Watch the
Movies!!!*