

MATH 1101(Linear Algebra (II)) Syllabus(2/20/2012-6/15/2012)

Contents:

We will cover Chapter 5 to Chapter 8 of the textbook **Linear algebra and its applications**, 4th edition by **G. Strang**.

A proposed hour to hour contents are listed in the following table. But it may be subjected to changes according to the progress of the lectures.

| Lecture | Date | Contents | Sections |
|---------|------|--|----------------------|
| 01 | 2/22 | More Jordan canonical forms | additional materials |
| 02 | 2/24 | Nonnegative matrices | 5.3 |
| 03 | 2/29 | Markov matrices | 5.3 |
| TA | 3/02 | TA section 9 | Classroom problem 9 |
| 04 | 3/07 | Differential Equations and e^{tA} | 5.4 to 5.5 |
| 05 | 3/09 | Positive definite matrices | 6.1 to 6.2 |
| 06 | 3/14 | Indefinite symmetric matrices | 6.2 to 6.4 |
| TA | 3/16 | TA section 10 | Classroom problem 10 |
| 07 | 3/21 | Quadratic forms and Min-max principles | 6.4 |
| 08 | 3/23 | SVD decomposition | 6.3 |
| 09 | 3/28 | More pseudo-inverses | 6.3 |
| TA | 3/30 | TA section 11 | Classroom problem 11 |
| 10 | 4/11 | Norms and condition numbers | 7.1 to 7.2 |
| 11 | 4/13 | Tridiagonal and Hessenberg forms | 7.3 |
| Midterm | 4/14 | Midterm from 9am to 12am | |
| 12 | 4/18 | Power method and QR-algorithm | 7.3 |
| TA | 4/20 | TA section 12 | Classroom problem 12 |
| 13 | 4/25 | Computing the SVD | 7.3 |
| 14 | 4/27 | Iterative methods for $Ax = b$ | 7.4 |
| 15 | 5/02 | Conjugate gradient methods | 7.4 |
| TA | 5/04 | TA section 13 | Classroom problem 13 |
| 16 | 5/09 | Linear programming problems | 8.1 |
| 17 | 5/11 | The simplex methods (Part 1) | 8.2 |
| 18 | 5/16 | The simplex methods (part 2) | 8.2 |
| TA | 5/18 | TA section 14 | Classroom problem 14 |
| 19 | 5/23 | The dual problems (Part 1) | 8.3 |
| 20 | 5/25 | The dual problems (Part 2) | 8.3 |
| 21 | 5/30 | Network models | 8.4 |
| TA | 6/01 | TA section 15 | Classroom problem 15 |
| 22 | 6/06 | Game theory (Part 1) | 8.5 |
| 23 | 6/08 | Game theory (Part 2) | 8.5 |
| 24 | 6/13 | Reviews | |
| TA | 6/15 | TA section 16 | Classroom problem 16 |
| Final | 6/16 | Final from 9am to 12am | |

Course Prerequisite:

High school algebra (especially matrices and vectors)

Reference materials:

Main textbook: G. Strang, *Linear algebra and its Applications*, 4th editions.

Reference materials: Professor Strang's Linear Algebra Class Lectour Videos, MIT Video Lectures on Linear Algebra.

Grading Schemes:

The midterm and final examinations will each account for **35 percent** of the course grade.

There will be a **Homework Assignment** per 7 to 10 days. The students are required to work out some problems in the Homework, and submit the solutions to the TA. The TAs will grade these HW assignments. The HW grades will account for **18 percent** of the course grade.

There will be a **Classroom Problem** for each TA section. The students are required to work out these problems in the TA sections. This grade will account for **12 percent** of the course grade.

Course goal:

Hopefully, the students can learn from this course the basic properties and the manipulation of matrices, and find their applications to graphs, networks, codes, programmings, etc., interesting.