

642:550 Linear Algebra and Applications

General Information

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Text: Gilbert Strang, *Linear Algebra and its Applications*, 3rd ed., ISBN #0-15-551005-3, Saunders Publishing/Harcourt Brace Jovanovich

Course Web Page: This document, other course materials, information about the course, and links to relevant web sites are posted on the course web site:
(<http://www.math.rutgers.edu/courses/550A/550-f03/>).

Computer Component of Course: Linear algebra is the most widely-used mathematics tool in engineering, applied science, and statistics. Unlike the one-variable calculus problems that you can solve by hand calculation (or with the aid of a graphing calculator), linear algebra algorithms generally require substantial computer resources. Symbolic computer programs such as MAPLE or MATHEMATICA and MATLAB have linear algebra capabilities. We will use MAPLE and MATLAB in this course. The use of MATLAB is required in this course. The use of MAPLE 9 is recommended in this course.

In this course you will do several MATLAB and MAPLE assignments and create printed writeups of your sessions to hand in for grading. These assignments have a double purpose:

- (1) to help you learn the concepts and algorithms of linear algebra by using them in an interactive computer environment.
- (2) to introduce you to state-of-the-art computational tools for important applications of linear algebra, such as the Fast Fourier Transform, Least Squares Data Fitting, Digital Image Compression, and Data search engines.

Using MATLAB: This software is installed on the `gauss` and `compute` machines in the math department network. These are accessible from the math department terminal rooms in Hill Center. Any student in the course wanting to run MATLAB on the math department system can obtain a class account (math graduate students already have such accounts). For students in the School of Engineering there are several computer networks on which MATLAB is installed. It is also available in the Student PC Labs in the ARC Building on Busch Campus (and at the Student PC labs on the Livingston, College Avenue, and Douglass campuses). You can purchase the Student edition of MATLAB for PC's, Linux or Macintosh from the web site of Mathworks, Inc: www.mathworks.com. It includes documentation and tutorials. Links to MATLAB-related web sites can be found on the course web page and on the web page for the undergraduate course Math 250 (MATLAB sections).

Using MAPLE: The university has a site license for MAPLE, so this software is installed on many machines in university departments and computer labs. Any student in the course wanting to run MAPLE on the math department system can obtain a class account (math graduate students already have such accounts). For students in the School of Engineering there are several computer networks on which MAPLE is installed. It is also available in the Student PC Labs in the ARC Building on Busch Campus (and at the Student PC labs on the Livingston, College Avenue, and Douglass campuses). You can purchase student edition MAPLE 9 at a discount through a special program provided by Maplesoft. Links to MAPLE related sites can be found at www.maplesoft.com.

Exams, Homework, and Grades: There will be one midterm exam and a final exam (both exams will be closed book). There will be five MATLAB assignments. Although homework will not be graded, you are

strongly urged to work through most of the suggested problems, especially those marked *. A notebook with the solutions manual to the text is available in the Reading Room on the first floor of the SERC building and also available on-line from the Rutgers Library web page. Please ask about homework problems (before or after the lectures, at office hours, or by e-mail). **Important:** The exams will contain problems that test your understanding of the concepts of linear algebra, in addition to straightforward computational problems. Your final course grade will be determined on the following 400-point basis:

midterm exam: 100 points

MATLAB assignments: 100 points

final exam: 200 points