

## 642:550 Linear Algebra and Applications

### General Information

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**Text:** Gilbert Strang, *Linear Algebra and its Applications*, 4<sup>th</sup> ed., **NOTE: NEW EDITION OF TEXT**  
ISBN #0-03-010567-6, Thomson – Brooks/Cole, 2006

**Course Web Page:** This document, other course materials, information about the course, and links to relevant web sites are posted on the Mathematics Department web site (<http://math.rutgers.edu>) Click on **course materials** and then **Math 550 Linear Algebra and Applications**. Follow the indicated links from there. **Be sure that you go to the Fall 2005 page.**

**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. The best software package for this purpose is generally agreed to be MATLAB (although other symbolic computer programs such as MAPLE or MATHEMATICA also have linear algebra capabilities). In this course you will do several MATLAB assignments and create a printed writeups of your MATLAB 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, and Digital Image Compression.

**Using MATLAB:** This software is installed on the **matrix** machine in the math department network and is accessible via **ssh** 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](http://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).

**Exams, Homework, and Grades:** There is one midterm exam (80 minutes) and a final exam (3 hours). Both exams are closed book. There are five MATLAB assignments. Writeups of selected homework problems are due each week; you should also work through the recommended additional homework problems (not graded) listed on the homework 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 500-point basis:

midterm exam: 100 points

MATLAB assignments: 150 points    Graded homework: 50 points

final exam: 200 points