

MATH 401 — SECTION 0301 — SPRING 2010  
**APPLICATIONS OF LINEAR ALGEBRA**

MTH 0304      TuTh 12:30-1:45PM

**Instructor**

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**WEB page with information of the course**

[www.math.umd.edu/~rhn/teaching](http://www.math.umd.edu/~rhn/teaching)

**Grader:** not confirmed yet

**Textbooks**

[1] Peter J. Olver and Chehrzad Shakiban, *Applied Linear Algebra*, Prentice Hall, 2006; ISBN 0-13-147382-4.

[2] Gilbert Strang, *Linear Algebra and Its Applications*, fourth edition, Thomson Learning Inc, 2006; ISBN 0-03-010567-6.

**Syllabus**

1. Gaussian Elimination, Matrix Factorizations and Determinants (Chapter 1 of [1])  $\approx$  3 weeks
2. Vector Spaces and Bases (Chapter 2 of [1])  $\approx$  2 weeks
3. Orthogonality and Least Squares (Chapters 3, 4, 5 of [1])  $\approx$  3 weeks
4. Eigenvalues and Eigenvectors (Chapter 8 of [1])  $\approx$  2 weeks
5. Computations with Matrices (Chapter 7 of [2] and Chapter 10 of [1])  $\approx$  1 week
6. Linear Programming and Game Theory (Chapter 8 of [2])  $\approx$  1 week

**Grading Policy**

EXAM 1 (20%):  $\approx$  March 2.

EXAM 2 (20%):  $\approx$  April 20.

FINAL (30%): Tuesday, May 18, 1:30-3:30PM. Covers all the material of the course.

QUIZZES (10%): There will be a 10-minute quiz about every 2-3 weeks which will cover the material developed since the previous quiz. Quizzes will be announced the class before and on the web.

HOMEWORK (10%): Homework problems will be assigned each class and some of them, marked with a star (\*), graded. Quizzes will be slight modifications of homework problems. A list of the homework assignments will be given in class and posted in the webpage of the course and updated frequently. Homework sheets should be **stapled** together.

MATLAB (10%): There will be three MATLAB assignments. Students are encouraged to work in groups of up to three students but must hand in an individual project report, which should be **stapled** together.

**Make-up Policy**

Make-up examinations will be given *only* in the case of an absence caused by illness, religious observance, participation in a University activity at the request of the University authorities, or compelling circumstances beyond the students' control. Convincing documentation such as a doctor's note will be required. If possible, an absence should be arranged before the exam.

## USE of MATLAB

We will be using the software package MATLAB, a computer system for doing linear algebra calculations. We will use MATLAB in two ways: 1) to illustrate the basic linear algebra theory we will be developing; 2) to carry out certain important linear algebra calculations that cannot be done by hand (usual pencil-and-paper calculations). These two uses will be carefully explained in the course, but it may be useful to explain them briefly here. The solution of linear equations and the calculation of eigenvalues and eigenvectors, are two linear algebra problems of special importance in applications, but because of the sizes of the matrices involved, they must be done on a computer; hence the importance of the second use. It is only for very small matrices or matrices of special type that these two problems, as well as many other problems, can be solved by hand. It is thus difficult to illustrate the theory of linear algebra on any but the simplest matrices by hand calculation; hence the importance of the first use. You will need a GLUE computer account, or equivalent, with access to MATLAB.