

MATH 401 — SECTION 0101 — FALL 2006  
**APPLICATIONS OF LINEAR ALGEBRA**

MTH 0409      TuTh 9:30-10:45

**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:** Sean Burke, Office Hours: Tu 11-12, MTH 0107, [cjslick1@msn.com](mailto:cjslick1@msn.com)

**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 10 of [1] and Chapter 7 of [2])  $\approx$  2 week
6. Linear Programming and Game Theory (Chapter 8 of [2])  $\approx$  1-2 weeks

**Grading Policy**

EXAM 1 (20%):  $\approx$  October 12.

EXAM 2 (20%):  $\approx$  November 16.

FINAL (30%): Friday Dec 15, 8-10AM. Covers all the material of the course.

QUIZZES (10%): There will be a 10-minute quiz about every two weeks, unless stated otherwise, which will cover the material developed since the previous quiz. Quizzes will be announced the class before.

HOMEWORK and MATLAB (20%): Homework problems will be assigned each class and some of them graded. Quizzes will be slight modifications of homework problems. A list of the homework assignments will be posted in the webpage of the course and updated frequently. There will be several MATLAB assignments. Students are encouraged to work in groups of up to three students but must hand in an individual project report.

**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.

## 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 WAM or GLUE computer account.