

# Applied Linear Algebra, Math 4242 010

## University of Minnesota, Autumn '14

Taught by Stephen Lewis

9/3/2014-12/16/2014

### Course Info

Lecture: MWF 9:05-9:55am, Vincent 113

Website: [www.stephen-lewis.net/4242/](http://www.stephen-lewis.net/4242/)

### Instructor Info

Office: Vincent 221

Email: [iam@stephen-lewis.net](mailto:iam@stephen-lewis.net)

Website: [www.stephen-lewis.net](http://www.stephen-lewis.net)

Office Hours: Monday 2-4, Thursday 2-4, and by appointment (email me!). While I can't promise to meet whenever you are free, I will do my best to set up a time for us to meet.

### Course Description

Linear Algebra is the study of linear maps between vector spaces and the matrix algebra necessary to apply the theory to concrete problems. Its roots are quite modest: solving systems of linear equations. Linear algebra, however, has developed substantially and permeates most of modern mathematics and much of modern science and engineering. In this class, we will cover many topics of linear algebra, including Gaussian elimination, matrix algebra,  $LU$  factorization, vector spaces, subspaces, dimension, linear transformations, norms and inner products, orthogonality, Gram-Schmidt method,  $QR$  factorization, singular values, determinants, eigenvalues, diagonalization.

Because this is a course on **applied** linear algebra, we will see several applications throughout the quarter. In particular, we will study the “page rank” algorithm. This is the process by which Google (and now all search engines) figure out which pages to display in response to a search query.

### Book

Our book is *Applied Linear Algebra* by Olver and Shakiban, 1st edition. This book has a very hands-on feel, focusing many examples on applications and favoring intuitive and functional definitions over rigorous but unwieldy ones.

## Homework

Homework will be assigned weekly but not collected. However, please see the sections on quizzes and grading below. The problems will be assigned from Olver and Shakiban or written by me in pdf format. The homework sets will be available online at [www.stephen-lewis.net/4242/](http://www.stephen-lewis.net/4242/) once assigned.

## Quizzes

In place of homework evaluation, there will be weekly quizzes on Mondays. These problems will be similar or identical to homework problems.

## Exams

There will be two midterm examinations on 10/13 and 11/17. The final exam is scheduled for 12/16 from 1:30-3:30pm in the regular classroom.

## Grading

Your grade will break down as follows:

Quizzes	25%
Midterm 1	25%
Midterm 2	25%
Final	25%

Note that the homework is not formally part of your grade, but to succeed in this class, you will need to master the theory and techniques. The best way to do this is through doing the homework, studying together, and coming to office hours with questions.

The class will be graded relative to a curve, with each exam curved individually and the quizzes curved as a whole. The curve, however, has no “average” set in advance: a strong performance by many students will earn a high average for the class and vice-versa. The lowest 2 quiz grades will be dropped to accommodate an absence, bad day, etc... However, if you need to miss a class due to a religious observance, let me know in advance and we can schedule a make-up quiz.

## Disability Accommodation

If you have a disability which needs accommodation, please contact the Disability Resource Center (<https://diversity.umn.edu/disability/home/>).

## Religious Observances

If my scheduled dates for quizzes or exams are on a day of religious observance, please let me know soon so that we can make arrangements.