Syllabus: Linear Algebra II

MATH 425 Linear Algebra II, Spring 2013
LCD-undergrad 24908; LCD-grad 24909,
MWF 10:00-10:50, Thaft Hall 313

Instructor: Shmuel Friedland
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OFFICE HOURS: M 11:30-12:30, WF 8:30-9:30, or by appointment.
TEXT: I will supply lecture notes based on lecture notes on Math 310, Math 320, Math 494 and my book in preparation "Matrices". See my teaching web site.
http://www.math.uic.edu/∼friedlan/teaching.html

A supplementary text is: R.J. Horn and C.R. Johnson, *Matrix Analysis*, Cambridge University Press, 2ed, 2013.
Some of the problems will be from this text.
You can also use a free book: Linear Algebra by Peter Petersen
http://www.math.ucla.edu/∼petersen/linalg3.pdf

PREREQUISITE: Math 320 or Math 310, (first course in Linear Algebra) or its equivalent.

1 Introduction

Theory of Matrices is well recognized subject in mathematics and its applications to: applied mathematics, biology, computer science, engineering, physics and various social sciences. *Math 425* is the second course on Linear Algebra. It will give students an exposure to more advanced topics which are the most used in theory and applications. We will give applications of each topic.

2 Topics of the course

1. Definition and properties of determinants
2. Inner product spaces
   (a) Basic results on inner product spaces and linear operators.
   (b) Spectral decomposition of normal operators in finite dimensional inner product spaces, i.e. diagonalization of normal matrices by a unitary matrix.
   (c) Mini-max characterizations of eigenvalues of hermitian matrices.
   (d) Singular Value Decomposition and Moore-Penrose inverse.
3. Jordan Canonical form and spectral theory for matrices over complex numbers.
4. Perron-Frobenius theorem for nonnegative matrices (?)

3 GRADING

1. Quizzes and Homework - 25%. (Usually there would be 10 minutes quiz in the end of the class once a week, except the first week of classes, and the exam weeks.)
2. One Midterm - 25%. Tentative date: March 6, 2013.
3. Final Exam - 50%.