Math 545 - Linear Algebra for Applied Mathematics - Spring 2007
MWF 11:15 → 12:05 LGRT 319

Professor: Eyal Markman
Office: LGRT 1242
Office Phone: 545-2788
E-mail: markman@math.umass.edu
Course Web page: http://www.math.umass.edu/∼markman/ **Please check it often!**
Office hours: (tentative) Wednesday 12:05 → 1:30 pm, Thursday 12:30 → 2:00 pm, and by appointment.

Prerequisites: Introductory course, such as Math. 235 or 236.
Text: The main text will be:
Linear Algebra. An introductory approach, by C. W. Curtis, Corrected reprint of the 1984 fourth edition. Undergraduate Texts in Mathematics. Springer-Verlag, New York, 1993.

Some topics will be taken from *Linear Algebra and Its Applications*, 4th Edition. by Gilbert Strang, Publisher: Thomson Learning. It will be available on reserve in the library.

Homework: Will be assigned weekly and will be due each Friday, unless mentioned otherwise. The homework will be graded by a special grader. Due to lack of funds, it will not be possible to grade all the homework problems assigned. A few of the homework problems will be corrected and graded every week. Nevertheless, for your own benefit, you will be asked to hand in *all* the homework problems assigned. Your grade on each homework assignment will be calculated as follows:

70% The grade on the corrected problems.

30% Credit for handing in *most* of the homework problems assigned. Partial credit will be given.

Late homework will not be collected. Instead, your three lowest grades will be dropped.
Grades:

Homework–20%
Two Midterms–50% (each 25%)
Final Exam –30%

First Midterm: Thursday, March 15, 5 to 6:30 PM.

Second Midterm: Thursday, April 26, 5 to 6:30 PM.

Final: During the week beginning Thursday, May 17 and ending on Thursday, May 24. The precise date is yet to be determined.

See back . . .

Syllabus:

1. A brief review of basic linear algebra. (Corresponding to the first six Chapters of Curtis, most of which will be assumed as prerequisite).
2. The theory of a single linear transformation.
   (a) Eigenvalues, eigenvectors, characteristic polynomial
   (b) Minimal polynomial
   (c) Invariant subspaces, direct sums
   (d) Primary decomposition
   (e) Diagonalizable operators
   (f) Triangular form, Cayley-Hamilton Theorem
   (g) Rational and Jordan canonical form
3. Orthogonal and Unitary transformations
   (a) The Gram-Schmidt process
   (b) The structure of orthogonal transformations
   (c) The Principal Axis Theorem
   (d) Unitary transformations and the Spectral Theorem
4. Further topics and applications (selection among the following):
   (a) Systems of first order linear differential equations
   (b) The QR-algorithm for eigenvalues
   (c) Least square solution of a linear system
   (d) Perron-Frobenius Theorem
   (e) Singular value decomposition
   (f) Other applications, depending of time constraints and class preference.