

THE UNIVERSITY OF KENTUCKY

Department of Mathematics

**MA/CS 522 Matrix Theory and Numerical Linear Algebra I.**

Fall 2009

MWF 1:00-1:50 in CB 347

**Instructor:** Dr. Qiang Ye

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**Office Hours:** MWF 2:00-3:00

**Class Home Page:** <http://www.ms.uky.edu/~qye/ma522>

**Text:** James Demmel, *Applied Numerical Linear Algebra*, SIAM, 1997.

**Prerequisites:** Good knowledge of linear algebra at the level of MA322 or equivalent; experiences with a computer programming language.

**Grading:** Homework: 50%,

Mid-term: 15%,

Final: 35%.

Note: For undergraduate students enrolled in the course, the required homework and exam problems will be a subset of those given out in classes.

The following is a tentative scale for grading, subject to adjustment.

| Grade | Minimum % |
|-------|-----------|
| A     | 90        |
| B     | 75        |
| C     | 60        |

**Computer Resources:** Access to a computer on which a recent version of MATLAB runs is required for this course. MATLAB documentation is available from at least two sources. First, MATLAB has an extensive on-line help facility (just type “help” or “help command-name” in MATLAB). Second, a brief manual only slightly out of date is available free on the class homepage.

The Free Software Foundation’s Matlab clone called **Octave** may also be used by those who do not have access to MATLAB.

**Syllabus:** The course studies numerical algorithms and their theoretical background and analysis for solving dense linear algebra problems that include linear systems of equations, linear least squares problems, matrix eigenvalue problems, and matrix singular value problems. It will cover the following from the text.

- Chapter 1: Sec. 1.5, 1.7

- Chapter 2: Sec. 2.2, 2.3, 2.4, 2.5, 2.7
- Chapter 3: Sec. 3.2, 3.3, 3.4,
- Chapter 4: Sec. 4.2, 4.3, 4.4
- Chapter 5: Sec. 5.2, 5.3.1, 5.3.2, 5.3.4, 5.4

**Supplemental Texts** You may find the following books useful for supplemental reading or as a reference.

1. *Numerical Linear Algebra and Applications*, B. Datta, Brooks/Cole Publishing, 1995
2. *Matrix Computations*, G. Golub and C. Van Loan, 3rd Ed. Johns Hopkins Press 1997.
3. *Numerical Linear Algebra*, L. N. Trefethen and D. Bau, III., SIAM, 1997.