

THE UNIVERSITY OF KENTUCKY
Department of Mathematics

MA/CS 622 Matrix Theory and Numerical Linear Algebra II.
Spring 2012
MWF 2:00-2:50 pm at CB 337

Instructor: Dr. Qiang Ye
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Office Hours: MWF 3:00-4:00 pm

Class Home Page: <http://www.ms.uky.edu/~qye/ma622>

Text: There is no required text. The following books will be good sources of reference.

1. James Demmel, *Applied Numerical Linear Algebra*, SIAM, 1997
2. Biswa Datta, *Numerical Linear Algebra and Application*, 2nc ed. SIAM, 2010
3. *Numerical Methods for Large Eigenvalue Problems*, Y. Saad., Halstead Press, NY, 1992.
Available at <http://www-users.cs.umn.edu/~saad/books.html>
4. *Iterative Methods for Sparse Linear Systems*, Y. Saad., PWS Publishing, Boston, MA, 1996.
Available at <http://www-users.cs.umn.edu/~saad/books.html>

Prerequisites: Good knowledge of linear algebra at the level of MA322 or equivalent, programming experience, numerical sophistication at the level of MA/CS 321 or equivalent.

Grading: Homework: 75%,
Final Exam (take-home): 25%.

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 essential 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 Second, a brief manual only slightly out of date is available free on the class homepage.

Syllabus: The following topics will be included.

- Iterative methods for large sparse systems of linear equations:
 - Jacobi, Gauss-Seidel, SOR,
 - conjugate gradient, BiCG, BiCGSTAB, GMRES, etc.
 - preconditioning
 - Iterative methods for large sparse eigenvalue problems
 - Symmetric Lanczos
 - Nonsymmetric Lanczos
 - Arnoldi
- Matrix exponentials