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.

2. Biswa Datta, Numerical Linear Algebra and Application, 2nc ed. SIAM, 2010
   Available at http://www-users.cs.umn.edu/~saad/books.html
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Prerequisites: Good knowledge of linear algebra at the level of MA322 or equivalent, pro-
gramming 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.

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<thead>
<tr>
<th>Grade</th>
<th>Minimum %</th>
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<tbody>
<tr>
<td>A</td>
<td>90</td>
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<tr>
<td>B</td>
<td>75</td>
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<tr>
<td>C</td>
<td>60</td>
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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 Second, a brief manual only slightly out of date is available free on the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