Math 6800 Computational Linear Algebra Fall 2011

Instructor: D.W. Schwendeman (schwed@rpi.edu, 276-2647)

Office Hours: Wednesdays 1:30–3:00pm, Fridays 9:30–11:00am, or by appointment.

Web site: `http://eaton.math.rpi.edu/Faculty/Schwendeman/home.html`

Learning Outcomes:

The two basic problems in linear algebra involve the solution of a linear system of equations and the matrix eigenvalue problem. While exact solution can be obtained readily for problems with a small number of unknowns, computational methods for these two basic problems are used for larger problems. The focus of the work in this course is on various algorithms for these two problems, their behavior and computational cost. Attention will be given to theoretical issues of problem conditioning and the stability of algorithms, and the convergence behavior of iterative methods. Successful completion of the course should enable you to

1. demonstrate an understanding of
   (a) numerical algorithms for the solution of linear systems and eigenvalue problems,
   (b) fundamental concepts of conditioning and stability,
   (c) the behavior of numerical algorithms in computational linear algebra, and their strengths and limitations.
2. implement numerical methods for linear algebra using clear and correct computer code.
3. present written solutions to problems in a clear, concise and coherent fashion.

This knowledge is essential for the evaluation of existing software for computational linear algebra, and for the design of new algorithms and software.