Numerical Linear Algebra

Math 6643, Fall, 2013
Tuesdays and Thursdays, 3:05-4:25 p.m. in Weber SST III 1.

Instructor: Haomin Zhou (email: hmzhou@math.gatech.edu)
Office Hours: Tue., Thur. 2:00 p.m. - 3:00 p.m. or by appointment

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Course Information

Reference Books :

- *Numerical Linear Algebra* , by Lloyd N. Trefethen and David Bau, III, published by SIAM.
- *Iterative Methods for Solving Linear Systems* , by Anne Greenbaum, published by SIAM.
- *Iterative Methods for Sparse Linear Systems*, by Yosef Saad, published by SIAM.

Tentative Course Materials:

- ***Introduction:***
  - Fundamentals including vector, matrix, norms, eigenvalues, singular values.
  - Linear systems, least square problems.
  - QR factorization. Gram-Schmidt process, Householder transformation.
  - Stability and conditioning.
- ***Direct methods for solving linear systems:***
  - Gaussian Elimination, pivoting.
  - LU, Cholesky factorizations, .
- ***Eigenvalues and Singular Value Decomposition***
  - Rayleigh Quotient, Inverse Iteration.
  - QR algorithm.
  - Divide-and-Conquer algorithm.
  - SVD.
- ***Iterative methods for solving linear systems***
  - Gauss-Jacobi, Gauss-Seidel, SOR.

- Krylov subspace methods, Conjugate Gradients, GMRES.
- Introduction to Multigrid.

Grading:

There will be three term projects involving computer programming. Your grade will be based on the performance of the projects (30% each for the first two, 40% for the third one). Late submission will NOT be accepted unless for special reasons (you must show me the evidence).

Homework will be assigned but will not be collected and graded. You are encouraged to discuss with classmates.