Math / CS 243B, Advanced Topics in Numerical Analysis (Advanced Numerical Linear Algebra), Fall 2013

Days and times: MW 6-7:15pm, MH 323

Prerequisite: Math 143C or Math 143M; and instructor consent

Instructor: Plamen Koev

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Office hours: MW 4:30-6pm or by appointment

Text: Numerical Linear Algebra by Lloyd Trefethen and David Bau, SIAM Press, 1997

Suggested References:

General Text / Reference Books

1. Matrix Computations by Gene Golub and Charles Van Loan, Johns Hopkins Press, 1996
2. Applied Numerical Linear Algebra by James Demmel , SIAM, 1997
3. Numerical Linear Algebra by Gregoire Allaire, Sidi Kaber and Karim Trabelsi, Springer, 2008.
4. Fundamentals of Matrix Computations, 2nd edition, by David Watkins, John Wiley and Sons, 2002
5. Numerical Linear Algebra and Applications, by Biswa Datta, Brooks / Cole, 1995

Books on Specialized Topics related to the course

6. Numerical Methods for Least Squares Problems by Ake Bjorck, SIAM, 1996. (Chapter 2 of T+B)
7. Matlab Guide, 2nd edition, by Desmond Higham and Nicholas Higham, SIAM, 2005. (Lecture 9 of T+B)
8. Accuracy and Stability of Numerical Algorithms, 2nd edition, by Nicholas Higham, SIAM, 2002. (Chapter 3 of T+B)
9. The Matrix Eigenvalue Problem: GR and Krylov Subspace Methods, by David Watkins, SIAM, 2007 (Chapter 5 & 6 of T+B)
10. Iterative Methods for Sparse Linear Systems, 2nd edition, by Yousef Saad, SIAM, 2003 (Chapter 6 of T+B)

Also note that Trefethen and Bau is a popular text book for graduate numerical analysis courses and you will find material on the web relating to the text. For example, http://persson.berkeley.edu/18.335/ has a complete set of slides for lectures from the T+B text as well as other material

Computing in the course: We will use MATLAB – you can access it in the labs (see me or the main math office for access codes) or make your own arrangements.

Learning Objectives: To understand the commonly used algorithms for the topics listed above. To be able to compare these algorithms in terms of efficiency, accuracy and reliability. To understand the derivations of the algorithms and the major theoretical results related to the algorithms, including their proofs. To develop the skills required to investigate a specific topic in depth and present the results of the investigation orally and in writing.

Requirements: Two midterms (25% each), homework (25%) , final project (25%)

Curve: 93/90/87/83/80/77/73/70/67/63/60 A/A-/B+/B/B-/C+/C/C-/D+/D/D-.

Make-up exams and quizzes: None except under very unusual circumstances and then only if you contact me before the exam. Make-up exams will be more difficult.

Cheating: Don't. On homework assignments you may discuss the assignments with other students but don't copy their work. Also you can find solutions to some of the homework problems from Trefethen and Bau's text on the web. Doing homework problems by yourself or as part of a study group is the educational (and fun!) part of the homework. I much prefer that you work in this manner. If you or your study group gets help with a solution from the web cite the source!!

Additional information / requirements please see http://www.math.sjsu.edu/math/courses/mathgs.htm