Course Syllabus Spring Semester 2014

MAT 5293  Numerical Linear Algebra  MW 7:30-8:45 pm MS 2.02.12

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SPRING 2014 TEACHING SCHEDULE:
MAT 6973.001 MW 6:00-7:15 pm MS 2.01.06 Data Mining and Pattern Classification
MAT 5293.001 MW 7:30-8:45 pm MS 2.02.12 Numerical Linear Algebra

Textbook: Numerical Linear Algebra, Lloyd Trefethen and David Bau, SIAM, ISBN 978-0-898713-61-9. Lectures and problem assignments will follow the textbook closely, so it is necessary to have access to a copy.

GRADING: Beginning graduate students should review the pages in the Graduate Catalog relating to grades. Problem sets assigned will determine 15% of your grade, an in-class midterm exam 40%, and a final exam 45%. Note that class will meet during the final exam period. This is a graduate course and I am free to make minor modifications to the grading scheme to reflect how the class as a whole progresses with the material.

COURSE DESCRIPTION: 5293 Numerical Linear Algebra (3-0) 3 hours credit. Prerequisite: MAT 2233 or an equivalent. Direct and iterative methods for solving general linear systems, the algebraic eigenvalue problem, least squares problems, and solutions of sparse systems arising from partial differential equations. (Same as CS 5293. Credit cannot be earned for both MAT 5293 and CS 5293.)

COURSE OBJECTIVE: The course is designed to enable a student to attain mastery of the elements of modern numerical linear algebra, particularly as they relate to the large scale computational challenge problems in the sciences and engineering. Note that MAT 2233 is a prerequisite and I will assume that all students have familiarity with Gaussian elimination (LU-factorization) and the basic concepts concerning linear spaces, linear transformations, and scalar products. As we discuss the various matrix factorizations, LU, SVD, QR, etc, it is important that you start with a solid understanding of elimination and more generally row echelon form. There are several good reference books for the undergraduate material including those by Gilbert Strang. Note also that while Calculus III (MAT 2213) is not a formal prerequisite for MAT 5293, we will need to minimize/maximize functions of several variables in our development of least-squares. Our interest will be in understanding the mathematics behind the various algorithms, but it is important that you understand implementation issues and are able to define an algorithm using pseudo-code. Actually programming assignments will be minimal and can be implemented using Matlab or Sage, for example.

DATES TO REMEMBER:
January 13 - First Day of Classes
January 29 - CENSUS DATE
February 12 – In-class Midterm Exam (Tentative)
March 10-14 – Spring Break
May 3-10 Final Exam Days