

Numerical Linear Algebra

MA 660-1F, Spring 2020

Instructor: Dr. Y. Zeng, UH 4012

Time & Location: MWF 13:25 - 14:15, UH 4002

Office Hours: Monday, Wednesday 14:30 –15:30 (or by appointment)

Text: A set of class notes (evolved from courses taught by several faculty members in the department) will be provided. These notes contain all definitions, theorems, and examples, but no proofs (which will be presented in detail in class).

References:

- G. H. Golub and C. F. Van Loan, *Matrix Computations*, Johns Hopkins University Press, 3rd Ed., 1996
- D. S. Watkins, *Fundamentals of Matrix Computations*, Wiley, John & Sons., 2nd Ed., 2002
- L. N. Trefethen and D. Bau, III, *Numerical Linear Algebra*, SIAM, 1997
- R. A. Horn and C. R. Johnson, *Matrix Analysis*, Cambridge Univ Press, 2nd Ed., 2013

Course Contents: Norms and inner products; orthogonal vectors; orthogonal/unitary matrices; adjoint and self-adjoint matrices; bilinear forms and positive definite matrices; machine arithmetic; Cholesky factorization; sensitivity and stability; over-determined linear systems; Schur decomposition and Singular value decomposition; eigenvalues and eigenvectors – sensitivity and computation.

Grading Policy:

Homework assignments	40 %
Midterm exam (Friday, Feb. 28, tentative)	20 %
Final exam (Friday, May 1, 10:45 AM – 1:15 PM)	40 %

Homework Assignments: Homework will be assigned weekly on Monday and due the following Monday, unless announced otherwise. Software package MATLAB may be used in some assignments. Homework will NOT be accepted late. However, the two lowest homework grades will be dropped to account for any missed assignments due to illness or any other circumstance. I am not planning on accepting any excuses except in extraordinary circumstances.

Exams: Midterm and Final exams will be comprehensive.

Preparation for Joint Program Exam: This course covers the material for the numerical part of the Joint Program Exam in Applied Linear Algebra. Past exams can be downloaded at

<http://www.uab.edu/cas/mathematics/graduate/phd/qualifying-exams-testbank>

Problems from past exams will also be used in homework assignments.