🕖 | UNIVERSITY OF NEBRASKA AT OMAHA

MATH 8500: Numerical Linear Algebra

MW 5:30 PM – 6:45 PM | On-Campus | Dr. Mahboub Baccouch

Overview: Numerical analysis is the study of numerical methods (mathematical techniques for generating approximate solutions to mathematical problems of various types). The purpose is

- 1. to introduce/analyze numerical methods,
- 2. to explain how, why, and when they can be expected to work, and
- 3. to provide a foundation for further study of numerical analysis and scientific computing.

Description: This course covers methods for numerically solving problems such as nonlinear algebraic equations, systems of linear and nonlinear equations by various schemes (direct and iterative methods), computing eigenvalues and eigenvectors. Matrix norms, conditioning of a problem, the propagation of errors, analysis of round-off error, numerical stability for algorithms are also included. Additional topics such as least square problems, etc.

For Whom Intended: Graduate (majors in mathematics, engineering, or computer science) needing advanced numerical methods for solving large problems in linear algebra.

Prerequisites: MATH 1960 and MATH 2050; or permission of instructor. Familiarity with computer programming is assumed. Other topics will be introduced as needed.

Objectives: The main objective and expectation of this course is that students learn methods for computing accurate numerical solutions to mathematical and scientific problems, and acquire an understanding of when and why a particular methods work, and how reliable, accurate and efficient they are. The student should:

- become familiar with techniques for solving numerically large problems in linear algebra,
- be able to apply numerical methods to the problems that do not have analytic solutions, and
- be able to use the numerical analysis approach to solve real world problems.

Textbook: Numerical Analysis, 10th Ed., by Burden & Faires, Brooks/Cole, 2016. ISBN 9781305253667.

Remark: This course is part of a two-course sequence (Math 8500, Math 8510), but can be taken independently. The main topics covered in Math 8510 (offered Spring 2022) are: Interpolation and polynomial approximation, numerical differentiation and integration, numerical solutions of ordinary and partial differential equations including parabolic, hyperbolic and elliptic types. Emphasis is placed on the convergence and stability of the methods studied.



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