

EME 115, Introduction to Numerical Analysis and Methods

Prerequisites:

C- or better in Eng 006, or EME 005, or ECS 030; C- or better in MAT 021A-D, MAT 022A-B; C- or better in PHY 009A-C. *All* the prerequisites are required to take this class. You may be automatically dropped from the class during the quarter if you do not satisfy the listed requirements!

Text:

Niels Grønbech-Jensen: Introduction to Numerical Analysis (supposedly in the campus bookstore) with home- work and exam problems, and their solution. This quarter's homework and exam problems, as well as their solutions, are considered part of the taught material, once distributed. I will also post supplementary notes if the lectures deviate significantly from the required text. Those notes will also be considered required text.

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Course purpose: EME115 introduces basic computing and approximation methods/algorithms used to solve science and engineering problems. While analytical techniques are important, but most real problems cannot be solved exactly. It is therefore essential to understand the principles behind numerical methods, how they work, and why they may fail. An additional benefit of the course is that it reviews several basic mathematical concepts from Calculus, Linear Algebra, and Differential Equations that are important for scientists and engineers.

Course content: Analysis and origin of numerical errors, algorithms, maps, convergence, and stability. Methods for finding roots of nonlinear functions, solutions to systems of linear equations, numerical integration, and ordinary differential equations. Emphasis is given to the development and analysis of methods. Although there may be assigned problems involving the programming of algorithms, this is neither a programming class nor a course in solving computational problems in a specific applied discipline. Instead, the course provides a useful basic framework for understanding and developing applied numerical methods applicable to a broad class of problems relevant to science and engineering.