Minnesota State University Moorhead

MATH 450: Numerical Analysis I

A. COURSE DESCRIPTION

Credits: 4

Lecture Hours/Week: 4

Lab Hours/Week: 0

OJT Hours/Week: *.*

Prerequisites:
This course requires all three of these prerequisites
CSIS 152 - Introduction to Computers and Programming I-a
MATH 323 - Multi-Variable and Vector Calculus
MATH 311 - Introduction to Proof and Abstract Mathematics

Corequisites: None

MnTC Goals: None

Numerical solutions to systems of equations and differential equations, finite differences, interpolation formulas, numerical calculus, and approximating functions.

B. COURSE EFFECTIVE DATES: 06/08/1999 - Present

C. OUTLINE OF MAJOR CONTENT AREAS

1. Rounding methods, absolute and relative error, the definition of an algorithm.
2. Methods for approximating roots of functions, error analysis and rates of convergence for these methods.
3. Interpolation and approximation of functions (including finite difference methods), error analysis for these methods.
4. Numerical differentiation and numerical integration techniques, error analysis for these methods.
5. Approximating solutions to initial value problems, the definition of a well-posed problem, error analysis for these methods.

D. LEARNING OUTCOMES (General)

1. Use numerical methods to find approximate solutions to a variety of real world problems.
2. Understand the importance of verifying necessary hypotheses when using numerical methods to solve problems.
3. Understand the importance of error analysis and be able to use error analysis to find a reasonable upper bound on the error when using numerical methods to solve problems.
4. Develop multiple methods to solve the same type of problem and understand how to choose an appropriate method to use in a specific application.

E. Minnesota Transfer Curriculum Goal Area(s) and Competencies

None

F. LEARNER OUTCOMES ASSESSMENT

As noted on course syllabus

G. SPECIAL INFORMATION

None noted