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

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