COURSE NUMBER/TITLE: MSCS-446 [354-446] NUMERICAL ANALYSIS I

CREDITS: 3

COURSE DESCRIPTION: Theory and applications of numerical methods for linear algebra, nonlinear equations and polynomial interpolation. Prerequisites: MATH-158 Calculus III, MATH-275 Linear Algebra, CS-145 Computer Science II.

Previously:
Numerical Analysis, 8th Ed., by Burden (adopted F06)
Numerical Analysis, 7th Ed., by Burden/Faires (adopted F03)
Numerical Analysis, 5th Ed., by Burden/Faires (adopted F94)
Numerical Analysis, 1st Ed., by Burden

COURSE OBJECTIVES:
To complete the course, the student will:
1. Be aware of the need for mathematical theory to support numerical problem solving techniques.
2. Understand the relationship between the theoretical solution of a problem and a computational solution.
3. Extend his/her mathematical abilities in linear algebra and analysis.
4. Construct programs and use current mathematical programming tools such as LINPACK and the International Mathematical and Statistical Library (IMSL) to solve problems involving systems of equations, interpolation and least squares approximation of functions.

COURSE OUTLINE:
1. Floating Point Arithmetic and Rounding Errors
2. Taylor's Theorem
3. Non-linear Equations
4. Solution of Systems of Linear Equations Using Direct and Iterative Methods, Error Analysis and Norms
5. Computation of Eigenvalues and Eigenvectors
6. Polynomial Interpolation and Cubic Splines
7. Orthogonal Polynomials and Least Squares Approximation of Functions