NORMANDALE COMMUNITY COLLEGE **9/28/2011**
COMMON COURSE OUTLINE
CSCI 2033, ELEMENTARY COMPUTATIONAL LINEAR ALGEBRA

I. EFFECTIVE DATE OF OUTLINE

Spring Semester, 2012. To be reviewed by the department annually.

II. CATALOG DESCRIPTION

A. CSCI 2033
B. Elementary Computational Linear Algebra
C. 4 Credits
D. Offered Spring Semester
E. Prerequisites: MATH 1510
F. Matrices and linear transformations, basic theory. Linear vector spaces. Inner product spaces. Systems of linear equations, Eigenvalues, and singular values. Algorithms and computational matrix methods using MATLAB. Use of matrix methods to solve a variety of computer science problems.

III. RECOMMENDED ENTRY SKILLS/KNOWLEDGE

Students are expected to have mastered and retained the material covered in a standard first-year Calculus sequence: functions of one variable and their properties and graphs, two-dimensional analytic geometry, the definition and development and applications of differentiation and integration. In addition, high-level problem solving ability will be assumed as well as mastery of algebraic manipulations, graphical visualization, and numerical computations. To do well in this course, students should have excellent work habits and be dedicated to a complete understanding of concepts and their application

IV. OUTLINE OF MAJOR CONTENT AREAS

Emphasis will be on computational issues and applications, particularly related to Computer Science, but will include a formal introduction to the basic theory

A. Elementary Linear Mappings
B. Graphs and Matrices
C. Elementary Matlab Programming
D. Systems of Linear Equations
E. Theory of Linear Equations Determinants
F. Vector Spaces
G. Abstract Linear Spaces
H. Inner Products
I. Orthogonality
J. Least Squares
K. Norms, Condition Numbers, and Numerical Stability
L. Abstract linear transformations
M. Eigenvalues
N. Singular Value Decomposition

V. LEARNING OUTCOMES

Upon successful completion of CSCI 2033, students will be able to:

A. Apply matrix reduction methods to solve and describe solutions sets of linear systems.
B. Perform matrix operations.
C. Do row reductions on matrices and obtain echelon.
D. Determine linear Independence of vectors.
E. Give characterizations of invertible matrices.
F. Compute algebraically with matrices; products and inverses.
G. State and use properties of determinants and employ Cramer's Rule.
H. Describe the structure and characteristics of vector spaces, subspaces, and linear transformations between vector spaces.
I. Compute eigenvalues and eigenvectors.
J. Determine orthogonality and use least squares approximations for a straight line.
K. Apply Linear Transformations.

VI. METHODS USED FOR EVALUATION OF STUDENT LEARNING

The instructor will choose from among various evaluation techniques including – but not limited to – in-class testing, take-home testing, assignments, quizzes, attendance, group or individual projects, and research. The instructor will also choose a method for end-of-the-semester evaluation.

VII. SPECIAL INFORMATION

A. Students will need access to the computers and Matlab software in the Normandale Community College Computer Center or on another system of their choice.