MAT 280 Linear Algebra

COURSE DESCRIPTION:

Prerequisite(s): MAT 271
Corequisite(s): None

This course provides an introduction to linear algebra topics. Emphasis is placed on the development of abstract concepts and applications for vectors, systems of equations, matrices, determinants, vector spaces, multi-dimensional linear transformations, eigenvectors, eigenvalues, diagonalization and orthogonality. Upon completion, students should be able to demonstrate understanding of the theoretical concepts and select and use appropriate models and techniques for finding solutions to linear algebra-related problems with and without technology. *This course has been approved for transfer under the CAA as a premajor and/or elective course requirement.*

Course Hours Per Week: Class, 2. Lab, 2. Semester Hours Credit, 3.

LEARNING OUTCOMES:

Upon completing requirements for this course, the student will be able to:

1. Use analytical and graphical representations to apply vector operations in multiple dimensions.
2. Solve systems of linear equations using multiple manual and technology-based methods; these methods will include but are not limited to Gaussian and Gauss-Jordan.
3. Use eigenvalues, eigenvectors and diagonalization to solve problems in appropriate situations.
4. Use matrix operations and linear transformations to solve problems in appropriate situations.
5. Demonstrate knowledge of orthogonal projections and orthogonal complements of subspaces, and apply to appropriate situations.
6. Use the fundamental concept of a basis for a subspace to give a precise definition of dimensions and rank, and to solve problems in appropriate situations.
7. Demonstrate proficiency in using CAS technology to analyze, solve and interpret the various applications.

OUTLINE OF INSTRUCTION:

I. Systems of Linear Equations
   - A. Row Reduction and Echelon Forms
   - B. Vector equations
   - C. The Matrix equation A$\mathbf{x} = \mathbf{b}$
   - D. Solution Sets of Linear Systems
   - E. Applications of Linear Systems
   - F. Linear Independence
   - G. Linear Transformations
   - H. Linear Models

II. Matrix Algebra
   - A. Matrix Operations
   - B. The Inverse of a Matrix
   - C. Characterizations of Invertible Matrices
   - D. Applications to Computer Graphics
   - E. Determinants

III. Vector Spaces
   A. Vector Spaces and Subspaces
   B. Null, Column, and Row Spaces
   C. Basis
   D. Coordinate Transformations
   E. Dimension; Rank of a Matrix

IV. Eigenvalues and Eigenvectors
   A. Eigenvalues and Eigenvectors
   B. The Characteristic Equation
   C.