APPLIED LINEAR ALGEBRA

MATH 2050

Course Description:

This course presents Matrix algebra, simultaneous equations, vector spaces, with applications of linear algebra and computational considerations. Mathematical software is utilized, with required assignments. **3 credits**

Prerequisites:

MATH 1950 with a grade of C- or better

Overview of content and purpose of the course:

The purpose of the course is to present students with the basic concepts, terminology, and techniques for the solution of linear algebra problems, including the related computational considerations. Linear algebra is valuable for explaining fundamental principles and simplifying calculations in Mathematics, Statistics, Computer Science, Engineering, Physics, Biology, and Economics.

Major topics:

1) Linear Equations in Linear Algebra
- a. Systems of Linear Equations
- b. Row Reduction and Echelon Forms
- c. Vector Equations
- d. The Matrix Equation Ax=b
- e. Solutions Sets of Linear Systems
- f. Linear Independence
- g. Introduction to Linear Transformations
- h. The Matrix of a Linear Transformation

2) Matrix Algebra
- a. Matrix Operations
- b. The Inverse of a Matrix
- c. Characterizations of Invertible Matrices

3) Determinants
- a. Introduction to Determinants
- b. Properties of Determinants
- c. Cramer's Rule, Volume, and Linear Transformations

4) Vector Spaces

a. Vector Spaces and Subspaces
b. Null Spaces, Column Spaces, and Linear Transformations
c. Linearly Independent Sets; Bases
d. Coordinate System
e. The Dimension of a Vector Space
f. Rank
g. Applications of Markov Chains

5) Eigenvalues and Eigenvectors

a. Eigenvectors and Eigenvalues
b. The Characteristic Equation
c. Diagonalization

6) Orthogonality

a. Inner Product, Length, and Orthogonality
b. Orthogonal Sets

Textbook:

Lay, David C., Steven R. Lay, and Judi J. McDonald. *Linear Algebra and Its Applications, 5th ed*. London: Pearson, 2015.

June 2017