Virginia Western Community College
MTH 266
Linear Algebra

Prerequisites
Completion of MTH 263 Calculus I or equivalent with a grade of B or better or MTH 264 Calculus II or equivalent with a grade of C or better.

Course Description
Covers matrices, vector spaces, determinants, solutions of systems of linear equations, basis and dimension, eigenvalues, and eigenvectors. Features instruction for mathematical, physical and engineering science programs.

Semester Credits: 3 **Lecture Hours: 3**

Required Materials
Textbook:
Elementary Linear Algebra with Applications. Hill. 3rd edition. Thomson. ISBN: 9780030103476.

Other Required Materials:
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Course Outcomes
At the completion of this course, the student should be able to:
- Solve linear systems using Gaussian Elimination.
- Manipulate matrices using the basic matrix operations.
- Compute determinants and use them in applications.
- Be familiar with vector spaces and their basic properties.
- Use matrices to perform linear transformations.
- Use the Gram-Schmidt Process.
- Find eigenvalues and their corresponding eigenspaces.
- Apply eigenvalues to applications.

Topical Description

1	Introduction to Linear Equations and Matrices
1.1	Introduction to Linear Systems and Matrices
1.2	Gaussian Elimination
1.3	The Algebra of Matrices: Four Descriptions of the Product
1.4	Inverse and Elementary Matrices
1.5	Gaussian Elimination as a Matric Factorization
1.6	Transposes, Symmetry, and Band Matrices; an Application
2	Determinants
2.1	The Determinant Function
2.2	Properties of Determinants
2.3	Finding detA Using Signed Elementary Products
2.4	Cofactor Expansion; Cramer's Rule
3	Vector Spaces
3.1	Vectors in 2 and 3 Spaces
3.2	Euclidean n-space
3.3	General Vector Spaces
3.4	Subspaces, Span, Null Spaces
4	Linear Trans., Orthogonal Projections, and Least Squares
4.1	Matrices as Linear Transformations
4.2	Relationships Involving Inner Products
4.3	Least Squares and Orthogonal Projections
4.4	Orthogonal Bases and the Gram-Schmidt Process
4.5	Orthogonal Matrices, QR Decompositions, and Least Squares
5	Eigenvectors and Eigenvalues
5.1	A Brief Introduction to Determinants
5.2	Eigenvalues and Eigenvectors
5.3	Diagonalization
5.4	Symmetric Matrices

Notes to Instructors

None.