

BROOME COMMUNITY COLLEGE
Binghamton, New York

COURSE TITLE LINEAR ALGEBRA MAT 264

CLASS LECTURE HOURS 4 LAB HOURS 0 CREDIT HOURS 4

DIVISION DEAN Julia Peacock

DEPT. CHAIRPERSON Paul O'Heron DATE March 15, 2001

PREREQUISITE: MAT 182 Calculus II w/Analytic Geometry

Learning Objectives of Course:

The student should be able to:

1. Solve systems of equations using Gauss-Jordan elimination.
2. Find non-trivial solutions to homogeneous systems of equations.
3. Find the inverse of a matrix by elementary row operations.
4. Compute determinants and solve equations using Cramer's rule.
5. Define a vector space.
6. Determine if a set of vectors form a vector space.
7. Determine if a set of vectors are independent.
8. Determine if a set of vectors span a given vector space.
9. Find the dimension of a vector space and determine if a set of vectors form a basis for the space.
10. Find the dimension of the row space and column space of a matrix.
11. Find the rank of a matrix.
12. Define an inner product space.
13. Use the Gram-Schmidt process to generate an orthogonal and orthonormal basis for a vector space.
14. Diagonalize a matrix using eigenvalues and eigenvectors.
15. Define a linear transformation and show a given transformation is linear.
16. Represent a linear transformation by a matrix.
17. Find the range and kernel of a linear transformation.
18. Use the techniques and concepts of linear algebra in a variety of real-life applications.

CATALOG COURSE DESCRIPTION:

Linear equations and matrices, vector spaces, inner product spaces, linear independence, linear transformations. Determinants and Cramer's rule, systems of homogeneous equations, Gram-Schmidt process and diagonalization. Eigenvalues and eigenvectors and applications.

4 Class hours; Prerequisite: MAT 182 Calculus II with Analytic Geometry

MAT 264
Linear Algebra
Course outline
Spring 2001

1. Systems of Linear Equations
 - Introduction to Systems of Linear Equations
 - Gaussian Elimination Gaus-Jordan Elimination
 - Applications of Systems of Linear Equations
2. Matrices
 - Operations with Matrices
 - Properties of Matrix Operations
 - The Inverse of a Matrix
 - Elementary Matrices
 - Applications of Matrix Operations
3. Determinants
 - The Determinant of a Matrix
 - Evaluation of a Determinant Using Elementary Operations
 - Properties of Determinants
 - Applications of Determinants
4. Vector Spaces
 - Vectors in \mathbb{R}^n
 - Vector Spaces
 - Subspaces of Vector Spaces
 - Spanning Sets and Linear Independence
 - Basis and Dimension
 - Rank of Matrix and Systems of Linear Equations
 - Coordinates and Change of Basis
 - Applications of Vector Spaces
5. Inner Product Spaces
 - Length and Dot Product in \mathbb{R}^n
 - Inner Product Spaces
 - Orthonormal Bases: Gram-Schmidt Process
 - Mathematical Models and Least Squares Analysis
 - Applications of Inner Product Spaces
6. Linear Transformations
 - Introduction to Linear Transformations
 - The Kernel and Range of Linear Transformation
 - Matrices for Linear Transformations
 - Transition Matrices and Similarity
 - Applications of Linear Transformations
7. Eigenvalues and Eigenvectors
 - Eigenvalues and Eigenvectors
 - Diagonalization
 - Symmetric Matrices and Orthogonal Diagonalization
 - Applications of Eigenvalues and Eigenvectors