

COURSE OUTLINE

MATH 250 Linear Algebra 4 Semester Hours

HOWARD COMMUNITY COLLEGE

Description

In this course, students will develop skills in the basic concepts of linear algebra. These skills will cover areas such as vector spaces, applications to line and plane geometry, linear equations and matrices, similar matrices, linear transformations, eigenvalues, function spaces, determinants, quadratic forms and complex vector spaces. The use of a computer algebra system will be an integral part of the course. Prerequisite: MATH 150 or equivalent. (4 hours weekly)

Overall Course Objectives

Upon successful completion of this course, the student will be able to:

1. Solve systems of linear equations using Gaussian Elimination and matrices.
2. Basic vector arithmetic; calculate vector sums, differences, scalar products, dot products, and cross products; calculate projections.
3. Use the basic rules of matrix arithmetic and algebra to calculate a matrix product, a matrix sum, a matrix inverse, etc.
4. Use the basic concepts of vectors and vector spaces to solve the matrix equation $A \bullet X = B$.
5. Find bases and coordinate vectors in general vector spaces.
6. Use concept of a linear transformation by applying it to geometry and to differentiation; develop matrix representations of linear transformations, calculate associated eigenvalues and eigenvectors.
7. Calculate the determinant of a matrix and use it when solving a system of linear equations.
8. Calculate orthogonal and orthonormal bases in inner product spaces.
9. Solve applications dealing with quadratic forms and diagonalizing quadratic forms as applied to conic sections.
10. Use complex numbers in both complex matrix spaces and complex vector spaces.

Major Topics

- I. Systems of Linear Equations and Matrices
- II. Vectors in Two and Three Spaces
- III. Vector Spaces
- IV. Linear Transformations
- V. Determinants
- VI. Eigenvalues and Eigenvectors

- VII. Applications
 - a. Quadratic Forms and Conic Sections
 - b. Selected uses in physical and social sciences, e.g. Markov Processes
- VIII. Inner Product Spaces
- IX. Complex Vector and Matrix Spaces

Course Requirements

Grading/exams: Although grading procedures will be determined by individual faculty, it will include unit exams and a comprehensive final exam.

A graphing calculator such as the TI83+ is required.

Other Course Information

Meets College definition for: Arts and Sciences Elective, General Electives (undesignated),
Math Elective