

MATH 220

(GO) **Matrices** (3) Systems of linear equations; matrix algebra; eigenvalues and eigenvectors; orthogonality and least squares; symmetric matrices and quadratic forms.

Effective: Fall, 2008

Prerequisite: [MATH 110](#), [MATH 140](#) or [MATH 140H](#)

Topics

LINEAR EQUATIONS IN LINEAR ALGEBRA

Systems of Linear Equations

Row Reduction and Echelon Forms

Vector Equations

The Matrix Equation $AX = B$

Solution Sets of Linear Systems

Linear independence

Introduction to Linear Transformations

The Matrix of a Linear Transformation

II. MATRIX ALGEBRA

Matrix Operations

The Inverse of a Matrix

Characterizations of Invertible Matrices

Linear Subspaces

Dimension and Rank

III. DETERMINANTS

Introduction to Determinants

Properties of Determinants

IV. EIGENPROBLEMS

Eigenvalues and Eigenvectors

The Characteristic Equation

Diagonalization

Eigenvectors and Linear Transformations

V. ORTHOGONALITY AND LEAST-SQUARES

Inner Product, Length, and Orthogonality

Orthogonal Sets

Orthogonal Projections

The Gram-Schmidt Process (no Factorization)

Least-Squares Problems

VI. SYMMETRIC MATRICES

Diagonalization of Symmetric matrices (Spectral Theorem)

Quadratic Forms