

MTH 230 LINEAR ALGEBRA – Course Objectives

1. Systems of Linear Equations

- 1.1 Two linear equations in two unknowns
- 1.2 Gauss and Gauss-Jordan elimination
- 1.3 Homogeneous systems of equations

2. Vectors and Matrices

- 2.1 Vectors and scalar products
- 2.2 Matrices and matrix products
- 2.3 Matrices and linear systems of equations
- 2.4 Linear independence and Homogeneous systems
- 2.5 Matrix inverse
- 2.6 Matrix transpose

3. Determinants

- 3.1 The determinant function
- 3.2 Properties of the determinant
- 3.3 Determinants and inverses
- 3.4 Cramer's Rule

4. Vector Spaces

- 4.1 Definition and basic properties
- 4.2 Subspaces
- 4.3 Linear independence and linear combinations
- 4.4 Bases and dimension
- 4.5 Change of bases
- 4.6 Orthonormal bases and projection

5. Linear Transformations

- 5.1 Definition and examples
- 5.2 Properties of linear transformations
- 5.3 Range and kernel
- 5.4 Rank and nullity
- 5.5 Matrix of a transformation

6. Eigenvalues, Eigenvectors, and Canonical Forms

- 6.1 Eigenvalues and Eigenvectors
- 6.2 Similar matrices and diagonalization
- 6.3 Symmetric matrices and orthogonal diagonalization
- 6.4 Quadratic forms
- 6.5 Cayley-Hamilton theorem and spectral theorem

7. Numerical Methods

- 7.1 Gaussian elimination
- 7.2 Eigenvalues and Eigenvectors
- 7.3 Error in numerical computations