

Syllabus

Math 01.502 - Linear Algebra and Matrix Theory

CATALOG DESCRIPTION:

Math 01.502 Linear Algebra and Matrix Theory 3 s.h.

Linear Algebra is about linear objects such as vectors and linear transformations. It consists of the part of mathematics that is most widely used in mathematics and as well as in other fields. Topics includes linear systems, matrices, determinants, vector spaces, linear independence, inner product spaces, orthogonality, linear transformations, eigenvalues and eigenvectors, and canonical forms. This course may not be offered annually.

OBJECTIVE:

This course is intended to provide a sufficient background in linear algebra and matrix theory for students in the program of M.A. in mathematics and those in the program of M.A. in Subject Matter Teaching Mathematics.

CONTENTS:

1. Linear Systems and Matrices

- System of Linear Equations
- Gaussian Elimination
- Matrices and Operations on Matrices
- Reduced Row Echelon Matrices
- General Solution to a Linear System
- Elementary Matrices and Non-singular Matrices

2. Determinants

3. 3-dimensional Space

- Vectors in 3-dimensional Space
- Inner product
- Cross Product
- Lines and Planes in 3-dimensional Spaces

4. Vector Spaces

- Definition of a vector space
- Linear Combination, Linear Span and Subspaces
- Linear Dependence and Independence
- Bases and Dimensions
- Transition Matrices

5. Inner Product Spaces

- Inner Product
- Orthogonality and Gram-Schmidt Process

6. Linear Transformations

- Linear Transformations and Isomorphisms
- Kernels and Ranges
- Matrix representation

7. Diagonalization

- Eigenvalues and Eigenvectors
- Diagonalization and Similar Matrices
- Characteristic Polynomials and Minimal Polynomials
- Canonical Forms

TEXTS:

Lay, Davis, LINEAR ALGEBRA, AND ITS APPLICATIONS, Addison Wesley, NY

Fridberg, Stephen; Insel, Arnold and Spence, Lawrence, LINEAR ALGEBRA, (3rd edition), Prentice Hall, NJ

Lipschutz, LINEAR ALGEBRA, McGraw-Hill, New York, 1989.

Leon, LINEAR ALGEBRA WITH APPLICATIONS, (5th edition), Prentice Hall, NJ