



Code	Subject Title	Cr. Hrs	Semester
IT-312	Linear Algebra (MA)	3	VI
Year	Discipline		
3	Information Technology		

**Objective**

The purpose of this course is to provide a solid foundation in Linear Algebra. It will enable the students to master the concepts and to know when and how to apply linear algebra. Applications are taken from such areas as Cryptography, Fractals, Chaos, Computer Graphics, Game of Strategy, Computer Tomography, Warps and Morphs. The Software MATLAB will be used for the implementation of Linear Algebra. The following topics will be covered in this course: Introduction to Linear Algebra (History, differentiation between Matrix Algebra and Linear Algebra), Concept of a matrix with real entries, Operations of matrices (Addition, multiplication, scalar multiplication, trace, transpose), Determinant of a matrix and its properties. Singular and non-singular matrices, Row/Column elementary Operations defined on a matrix Inversion of a matrix (by elementary operations), Reduction of matrix into echelon and reduced echelon form by elementary operations. Rank of a matrix, Introduction to system of linear equations, Solution of system of linear equations by Gauss elimination method, Concept of algebraic Structures (Semi group, Group, abelian group), Sub groups, Cosets, Mappings, Ring and Field, Introduction to vector spaces, Linear combination, linear span, Linear dependence and independence of vectors, Concept of basis and dimension, Linear transformations, Kernel and Range, Matrix representations of a linear transformation, Matrix transformations (dilation, contraction, reflection, compressions and expansion), Affine Transformations (Shearing, Scaling, Rotation, and Translations), Concepts of eigenvalue and eigenvector, Characteristic equation, Eigenvalues of an upper & lower triangular matrix, Diagonalization of matrices, Matrix Functions, Concepts of Norm and inner product space.

**Prerequisites**

Calculus – II

**Text Book**

Anton - Rorres “Elementary Linear Algebra, application version”. 8th Edition, John Wiley & Sons, Inc. 2000, ISBN: 978-0-471-44902-7

**Reference Material**

- David C Lay, Linear Algebra, Pearson Addison Wesley, 1999, ISBN: 0201660369