



IIT Mandi **Proposal for a New Course**

Course number	: IC-114
Course Name	: Linear Algebra
Credit Distribution	: 2-0-0-2
Intended for	: B.Tech 1 st year
Prerequisite	: None
Mutual Exclusion	: None

1 Preamble: Linear algebra is a branch of mathematics concerning linear equations and linear maps. Linear algebra is used in most sciences and fields of engineering because it allows modeling many natural phenomenon, and computing efficiently with such models. This course will cover the analysis and implementation of algorithms used to solve linear algebra problems in practice. This course will enable students to acquire further skills in the techniques of linear algebra, as well as understanding of the principles underlying the subject.

2 Course Modules with quantitative lecture hours:

Unit 1: Matrix Theory: Rank of Matrix, inverse of a matrix by elementary operations, Solution of linear simultaneous equations and their numerical solutions by gauss Elimination and Gauss Seidel Methods. Eigen values and eigen vectors, Cayley Hamilton Theorem, Diagonalization of Matrices. Orthogonal, Hermitian, Skew Hermitian, Normal and Unitary matrices and their elementary properties, Quadratic Forms. [7 Lectures]

Unit 2: Vector Spaces: Vector spaces, Sub Spaces, Linear Dependences and Independences of Vectors, Span, Bases and Dimensions, Direct Sum. [7 Lectures]

Unit 3: Linear Transformations: Linear Transformations, Linear Variety, Range Space and Rank, Null Space and Nullity, Homomorphism, Matrix of Linear Transformations, Matrix Representation of a linear transformation, Structure of the solutions of the matrix equation $Ax = b$, Change of bases. [7 Lectures]

3 Text books:

1. G. Strang: Linear Algebra, Introduction to linear algebra, 41 Edition, Wellesley Cambridge Press.

2. Kenneth Hoffman and Ray Kunze: Linear Algebra, PHI publication.

4 References:

5 Similarity with the existing courses: None

(Similarity content is declared as per the number of lecture hours on similar topics)

S. No.		Course Code	Similarity Content	Approx. % of Content
1.				

6. Justification of new course proposal if cumulative similarity content is >30%: