Linear Algebra

Course Type	Course Code	Name of Course	L	T	P	Credit
DC	AMC 16103	**Linear Algebra**	3	0	0	9

Prerequisite: None

Course Objective
To introduce the basic ideas and techniques of linear algebra and to provide a basis for further studies in other pure and applied courses.
Learning Outcomes
The student will be able (i) to understand the concepts of vectors spaces, inner product spaces, bases and dimensions and their geometric properties (ii) to understand computational techniques and algebraic skills essential for the study of linear transformations, eigenvalues, eigenvectors, diagonalization and different canonical forms and apply them to solve related problems (iii) to understand bilinear forms and quadratic forms and their geometric properties.

Unit No.	Topics to be Covered	Lecture Hours	Learning Outcome
1	Fields and linear equations, Matrices and Elementary row operations, Row Reduced Echelon Matrices, Invertible Matrices	04	Students will learn to solve the system of linear equations and will understand the concepts of vectors spaces and their properties.
	Vector spaces, Supspaces, Linear independence, Basis and dimension, Change of basis matrix, Quotient Spaces	08	
2	Linear transformations, projections, Isomorphism, Rank and Nulity, Representation of Linear Transformations by Matrices, Similarity Transformations	06	Students will understand computational techniques and algebraic skills essential for the study of linear transformations,

	Linear Functionals, Dual space, Determinants, Eigenvalues and Eigenvectors, Diagonalisation and its applications	06	eigenvalues, eigenvectors and diagonalization and apply them to solve related problems
3	Annihilating Polynomials, Invariant Subspaces, Direct sum decomposition, Invariant Direct sums, Primary Decomposition Theorem	04	Students will learn concepts of annihilating Polynomials and invariant subspaces and different decomposition.
4	Inner product spaces, Self adjoint, Unitary and normal operators, Orthogonal projections	07	Students will learn the algebraic and geometric properties of inner product spaces and also learn about the different operators and their properties.
4	Bilinear forms, Symmetric, Skew-symmetric, Positive and semi-positive forms	04	Students will understand bilinear forms and quadratic forms and their geometric properties.

Text Books

1. K. Hoffman and R. Kunze, Linear Algebra, 2nd Edition, Pearson (India), 2015.

Reference Books

1. S. Kumaresan, Linear Algebra: A Geometric Approach, PHI Learning, 2000.
2. P. Lax, Linear Algebra and its Applications, 2nd Edition, Wiley, 2007.
3. G. Strang, Introduction to Linear Algebra, 5th Edition, Wellesley-Cambridge Press, 2016.

(P. K. Kewat)