

Course Title	Linear Algebra	Course No.	MA511
Department	Mathematics	Structure (LTPC)	3-1-0 [4]
Offered for	M.Sc. Students	Type	Compulsory
Pre-requisite	None	To take effect from	

Objectives

To give sufficient knowledge of the subject, which can be used by student for further applications in their respective domains of interest.

Learning Outcomes

1. Concept of linear spaces, mapping between spaces, norm and their action on spaces.
2. Triangularization, diagonalization and Primary decomposition theorem.
3. Semi-simple operators, unitary and normal operators, spectral theory of normal operators.
4. Bilinear forms and Tensor products

Contents

1. Vector Spaces over fields, subspaces, bases and dimension. Direct sum of the sub spaces, System of linear equations, Matrices and rank
2. Linear Transformations, Rank and Nullity theorem, Representation of linear transformations by matrices, duality and transpose.
3. Inner product spaces, Gram-Schmidt orthonormalization, orthogonal projections, linear functionals and adjoints, Hermitian, self-adjoint, Unitary and normal operators, Spectral theorem for normal operators, Rayleigh quotient, Min-Max principle
4. Eigenvalues, Eigenvectors, Characteristic polynomials, minimal polynomials, Cayley Hamilton Theorem, triangulation, diagonalization, Jordan canonical forms, Bilinear forms, symmetric and skew-symmetric bilinear forms, positive definiteness
5. Applications of linear algebra

Reference Books

1. Herstein, I. N. (1975) *Topics in Algebra*, 2nd Edition, John Wiley & Sons
2. Hoffman, K., and Kunze R. (1991) *Linear Algebra*, Prentice Hall of India
3. Lang, S. (2004) *Linear Algebra*, 3rd Edition, Springer Verlag
4. Lax, P. (1997) *Linear Algebra and its applications*, John Wiley & Sons, Indian Edition
5. Sharma, R. K., Shah, S. K. and Shankar, A. G. (2011) *Algebra I: A Basic Course in Algebra*, Pearson Education