1. **Name of the Course:** Linear Algebra
2. **Course Code:** LAL
3. **LTP structure of the Course:** 3-1-0
4. **Objective of the Course:** Solving systems of linear equations, understanding vector spaces, linear transformations, eigenvalue, eigenvector, generalized notion of angle, distance, and length, diagonalization and orthogonalization.
5. **Outcome of the Course:** To able to solve systems of linear equations, work within vector spaces, to manipulate matrices and to do matrix algebra.
6. **Prerequisite:** None
7. **Course Plan:**

Component	Unit	Topics for Coverage
Component 1	Unit 1	System of linear equation, Gauss elimination method, Elementary matrices, Invertible matrices, Gauss-Jordon method for finding inverse of a matrix, Determinant, Cramer's rule, Vector spaces, Linearly independence and independence, Basis, Dimension.
	Unit 2	Linear transformation, Representation of linear maps by matrices, Rank-Nullity theorem, Rank of a matrix, Row and column spaces, Solution space of a system of homogeneous and non-homogeneous equations, Inner product space, Cauchy-Schwartz inequality, Orthogonal basis.
Component 2	Unit 3	Gram-Schmidt orthogonalization process, Orthogonal projection, Eigen value, eigenvector, Cayley-Hamilton theorem, Diagonalizability and minimal polynomial, Spectral theorem.
	Unit 4	Positive, negative and semi definite matrices. Decomposition of the matrix in terms of projections, Strategy for choosing the basis for the four fundamental subspaces, Least square solutions and fittings, Singular values, Primary decomposition theorem, Jordan canonical form.

8. **Text Books/References:**

1. Gilbert Strang, Introduction to Linear Algebra, 4th Edition, Cambridge Press (2009).
2. K. Hoffman and R. Kunze, Linear Algebra,2nd Edition, Pearson (2015).
3. S. Kumaresan, Linear algebra - A Geometric approach, Prentice Hall of India (2000).
4. S. Lang, Introduction to Linear Algebra, 2ndEdition, Springer (2012).