



MAT 621 – Advanced Linear Algebra

Course Code & Number	Course Name	Credit Hours	Lec.	Lab.	Tut.	Prerequisites
MAT 621	Advanced Linear Algebra	4	3	0	1	

Syllabus:

Vector Spaces: Review of Bases and Dimensions, Linear transformations and their matrices, Nullity and image, The solution space homogeneous linear system, The general solution of a non-homogeneous linear system, direct sum and quotient spaces, The rank nullity theorem and complements , Dual and double dual spaces.

Eigenvalues and Linear operators: Eigenvalues and eigenvectors, Characteristic polynomial and Cayley-Hamilton) theorem, Similarity and Diagonalizations of Matrices, Invariant subspaces, Primary decompositions, Rational and Jordan canonical forms.

Inner Product Spaces: Inner products and norms, Orthonormality and (Gram-Schmidt) processes, The adjoint of a linear operator, Normal and self-adjoint Operators, Unitary and orthogonal operators and their Matrices, Orthogonal Projections and the Spectral Theorem.

Quadratic Forms: Bilinear and Quadratic Forms, Rank of a Quadratic Form, Equivalent Quadratic Forms, Diagonal Form of a Quadratic Form and Law of Inertia.

References

1. S. Friedberg, A. Insel and L. Spence; *Linear algebra*; Pearson, 4th Ed. 2002. **(Main Reference)**
2. K. Hoffman, R. Kunze; *Linear algebra*; Pearson, 2ndEd. 1971.
3. J. Kwak and S. Hong; *Linear Algebra*; Birkhäuser Boston; 2ndEd. 2004.

