MAT3004	Applied Linear Algebra	L	T	P	J	C
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Pre-requisite	MAT2002 Applications of Differential and Difference Equations	Syllabus Version
		v1.0

Course Objectives

1. Understanding basic concepts of linear algebra to illustrate its power and utility through applications to computer science and Engineering.
2. apply the concepts of vector spaces, linear transformations, matrices and inner product spaces in engineering.
3. solve problems in cryptography, computer graphics and wavelet transforms

Expected Course Outcomes

At the end of this course the students are expected to learn

1. the abstract concepts of matrices and system of linear equations using decomposition methods
2. the basic notion of vector spaces and subspaces
3. apply the concept of vector spaces using linear transforms which is used in computer graphics and inner product spaces
4. applications of inner product spaces in cryptography
5. Use of wavelet in image processing.

Module:1	System of Linear Equations:	6 hours

Gaussian elimination and Gauss Jordan methods - Elementary matrices- permutation matrix - inverse matrices - System of linear equations - - LU factorizations.

Module:2	Vector Spaces	6 hours

The Euclidean space and vector space- subspace –linear combination-span-linearly dependent-independent- bases - dimensions-finite dimensional vector space.

Module:3	Subspace Properties:	6 hours

Row and column spaces- Rank and nullity – Bases for subspace – invertibility- Application in interpolation.

Module:4	Linear Transformations and applications	7 hours

Linear transformations – Basic properties-invertible linear transformation - matrices of linear transformations - vector space of linear transformations – change of bases – similarity

Module:5	Inner Product Spaces:	6 hours

Dot products and inner products – the lengths and angles of vectors – matrix representations of inner products- Gram-Schmidt orthogonalisation

Module:6	Applications of Inner Product Spaces:	6 hours

QR factorization- Projection - orthogonal projections – relations of fundamental subspaces – Least Square solutions in Computer Codes