

Linear Algebra					
Credit Hours:	3	Course Code:	MATH-2103	Prerequisites	
Objectives:					
Linear algebra is the study of vector spaces and linear transformations. The main objective of this course is to help students learn in rigorous manner, the tools and methods essential for studying the solution spaces of problems in mathematics, engineering, the natural sciences, and social sciences and develop mathematical skills needed to apply these to the problems arising within their field of study; and to various real world problems.					
Course Contents:					
System of Linear Equations: Systems of Algebraic Equations, Representation in matrix form. Matrices. Operations on matrices. Echelon and reduced echelon form. Inverse of a matrix (by elementary row operations). Solution of linear system by Gauss-Jordan method, Gaussian elimination and crammer's rule. Applications of Linear systems. Vector and Matrix Equations: introduction to vectors. Linear combinations, Matrix equation. Solution of homogeneous and non-homogeneous system of equations. Linear independence. Linear transformations. Matrix of a linear transformation. Matrix factorization (LU decomposition). Determinants: Introduction to Determinates, Properties of Determinants Vector Spaces: Vector Spaces and Subspaces, Bases, Null Spaces, Colum Spaces, Coordinate Systems, The Dimension of a Vector Space, Rank Eigenvalues & Eigenvectors: Eigenvectors and Eigenvalues, The Characteristic Equation, Diagonalization, Dynamical System. Applications of Dynamical System. Canonical Form. Orthogonality: Inner Product, Length and Orthogonality, Orthogonal sets, Orthogonal Projections, The Gram-Schmidt Process, Cayley Hamilton Theorem and Applications					
Recommended Books:					
1. Curtis Ch. W., Linear Algebra, Springer, 2004. 2. Apostol T., Multi Variable Calculus and Linear Algebra, 2nd edition, John Wiley and sons, 1997. 3. Anton H., C. Rorres , Elementary Linear Algebra: Applications Version, 10th Edition, John Wiley and sons, 2010. 4. Friedberg S. and Insel A., Linear Algebra, 4th edition, Pearson Education Canada, 2003. 5. Grossman S. I., Elementary Linear Algebra, 5th edition, Cengage Learning, 2004. 6. David C. L., Steven R. L., Judi J. M., Linear Algebra and its Applications, 5th Edition, Addison- Wesley, 2016 4. Howard A., Irl B., Stephen D., Calculus Early Transcendental [10th Edition] John Wiley and Sons, Inc (International Edition), 2012.					