MTS-211: LINEAR ALGEBRA

General Information

Course Number	MTS-250
Credit Hours	3+0 (Theory Credit Hour=3, Lab Credit Hours = 0)
Prerequisite	-
Course Coordinator	Not Specified

Course Objectives

This course aims to make the students become familiar with the basic concepts of linear algebra with a thorough understanding the system of linear equation, Matrices and its types, Rank, vector spaces, linear transformations and matrix operations enhancing the students' ability to reason mathematically and able to apply this knowledge to many fields in engineering, statistics and computer science.

Catalog Description

MTS-250

Course Content

Session No.	Week No.	Topics	Suggested Readings
01-04	1	Matrices and its types Matrix Operations Introduction to Systems of Linear Equations	Elementry Linear Algebra by H.Anton 9th Edition
04-12	2-3	Row Reduction and Echelon Forms Elementary Row operation method The Matrix Equation $\boldsymbol{Ax = b}$ Determinant of square matrix, cofactors and minors Cramer's rule Properties of Determinants Gaussian Elimination	
12-24	4-5	Vector equation Euclidean Vector Spaces Norm, Dot product, Cross Product Vectors in 2-Space, 3-Space, and n-Space Orthogonality Linear combinations Linear Independence and independence	
24-32	5-6	Subspaces, Basis and dimension Partitioned Matrices Matrix Factorizations Rank, Nullity, Row space Null Spaces, Column Spaces	
32-40	6-7	Introduction to Linear Transformations The Matrix of a Linear Transformation Matrix Operations Characterizations of Invertible Matrices Matrix Transformation	
40-44	7-8	The Characteristics Equation Eigenvalues and eigenvectors Diagonalization MATLab	

MID TERM			
44-48	9-10	Orthogonal Diagonalization Orthogonal Matrices Orthogonal Sets Orthogonal Projection application to dynamical system	
48-52	10-11	Inner Products Angle and Orthogonality in Inner Product Spaces Gram-Schmidt Process Best Approximation; Least Squares General Linear Transformations	
52-58	11-12	LU decomposition Iterative method Power Method Application to Computer Graphics MatLab practice	
	12-13	Practice	
Final Term			

Text Book

1. Linear Algebra and Its Applications by Howard Anton & Chris Rorres, 11th Edition

Reference Material

1. Linear Algebra with Applications by Gareth Williams, 6th Edition
2. Linear Algebra with Applications by David C. Lay, 4th Edition

Course Learning Outcomes

	Course Learning Outcomes (CLO)
1	Students will be able to understand the basic knowledge of system of linear equations. (Important characteristics of matrices, such as its four fundamental subspaces, rank, determinant, eigenvalues and eigenvectors, different factorizations, etc;)
2	Students will be able to identify, formulate, and analyze complex computing problems using linear algebra.
3	To make the students aware of the crucial importance of linear algebra to many fields in engineering, statistics and computer science.

CLO-SO Map

	SO, IDs											
CLO ID	**GA1**	**GA2**	**GA3**	**GA4**	**GA5**	**GA6**	**GA7**	**GA8**	**GA9**	**GA10**	**GA11**	**GA12**
CLO 1	1	0	0	0	0	0	0	0	0	0	0	0
CLO 2	0	1	0	0	0	0	0	0	0	0	0	0
CLO 3	0	0	1	0	0	0	0	0	0	0	0	0

Approvals

Prepared By	Iftikhar Ahmed Bhutto
Approved By	Not Specified
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