



Indraprastha College for Women

University of Delhi

Course Name:	GE Sem II
Paper Title:	Introduction to Linear Algebra
Unique Paper Code:	
Semester:	II
Faculty(s):	Dr Manju Sharma
Year:	2024

Work Plan			
Unit No.	Learning Objective	Lecture No.	Topics to be Covered
1	The objective of the course is to introduce the concept of vectors in $\mathbb{R}^n$ and Understanding the nature of solution of system of linear equations.	1	Fundamental operations with vectors in Euclidean space $\mathbb{R}^n$, Linear combinations of vectors, Dot product and their properties,
		2	Fundamental operations with vectors in Euclidean space $\mathbb{R}^n$, Linear combinations of vectors, Dot product and their properties,
		3	Fundamental operations with vectors in Euclidean space $\mathbb{R}^n$, Linear combinations of vectors, Dot product and their properties,
		4	Fundamental operations with vectors in Euclidean space $\mathbb{R}^n$, Linear combinations of vectors, Dot product and their properties,
		5	Cauchy-Schwarz inequality, Triangle inequality, Solving system of linear equations using Gaussian elimination,
		6	Cauchy-Schwarz inequality, Triangle inequality, Solving system of linear equations using Gaussian elimination,

		7	Cauchy-Schwarz inequality, Triangle inequality, Solving system of linear equations using Gaussian elimination
		8	Cauchy-Schwarz inequality, Triangle inequality, Solving system of linear equations using Gaussian elimination,
		9	Application: Curve Fitting, Gauss Jordan row reduction, Reduced row echelon form, A
		10	Application: Curve Fitting, Gauss Jordan row reduction, Reduced row echelon form, A
		11	Solving several systems simultaneously, Equivalent systems, Rank and row space of a matrix,
		12	Solving several systems simultaneously, Equivalent systems, Rank and row space of a matrix,
		13	Solving several systems simultaneously, Equivalent systems, Rank and row space of a matrix,
		14	Eigenvalues, Eigenvectors, Eigenspace, Diagonalization, Characteristic polynomial of a matrix.
		15	Eigenvalues, Eigenvectors, Eigenspace, Diagonalization, Characteristic polynomial of a matrix.
		16	Eigenvalues, Eigenvectors, Eigenspace, Diagonalization, Characteristic polynomial of a matrix.
		17	Eigenvalues, Eigenvectors, Eigenspace, Diagonalization, Characteristic polynomial of a matrix.
		18	Eigenvalues, Eigenvectors, Eigenspace, Diagonalization, Characteristic polynomial of a matrix.
2	introduce the concepts of vector spaces, linear independence and dependence.	1	Introduction to Vector Spaces Definition
		2	Examples of vector spaces
		3	Examples of vector spaces
		4	some elementary properties of vector spaces

		5	Subspaces, Span
		6	Subspaces, Span
		7	Linear independence and linear dependence of vectors
		8	Basis and dimension of a vector space
		9	Basis and dimension of a vector space
		10	Basis and dimension of a vector space
		11	Maximal linearly independent sets
		12	Minimal spanning sets.
3	To view the $m \times n$ matrices as a linear function from RR^{nn} to RR^{mm} and vice versa.	1	Linear transformations: Definition, Examples and elementary properties, The matrix of a linear transformation,
		2	Linear transformations: Definition, Examples and elementary properties, The matrix of a linear transformation,
		3	Linear transformations: Definition, Examples and elementary properties, The matrix of a linear transformation,
		4	Linear transformations: Definition, Examples and elementary properties, The matrix of a linear transformation,
		5	Kernel and range of a linear transformation, The dimension theorem, one-to-one and onto linear transformations
		6	Kernel and range of a linear transformation, The dimension theorem, one-to-one and onto linear transformations
		7	Kernel and range of a linear transformation, The dimension theorem, one-to-one and onto linear transformations
		8	Kernel and range of a linear transformation, The dimension theorem, one-to-one and onto linear transformations

		9	Invertible linear transformations, Isomorphic vector spaces.
		10	Invertible linear transformations, Isomorphic vector spaces.
		11	Invertible linear transformations, Isomorphic vector spaces.
		12	Invertible linear transformations, Isomorphic vector spaces.
		13	Invertible linear transformations, Isomorphic vector spaces.
		14	Invertible linear transformations, Isomorphic vector spaces.
		15	Invertible linear transformations, Isomorphic vector spaces.

Syllabus		
Unit	Contents	Contact Hours
I	Fundamental operations with vectors in Euclidean space $\mathbb{R}^n$, Linear combinations of vectors, Dot product and their properties, Cauchy-Schwarz inequality, Triangle inequality, Solving system of linear equations using Gaussian elimination, Application: Curve Fitting, Gauss Jordan row reduction, Reduced row echelon form, Application: Solving several systems simultaneously, Equivalent systems, Rank and row space of a matrix, Eigenvalues, Eigenvectors, Eigenspace, Diagonalization, Characteristic polynomial of a matrix.	18
II	Introduction to Vector Spaces Definition, Examples and some elementary properties of vector spaces, Subspaces, Span, Linear independence and linear dependence of vectors, Basis and dimension of a vector space, Maximal linearly independent sets, Minimal spanning sets.	12
III	Linear transformations: Definition, Examples and elementary properties, The matrix of a linear transformation, Kernel and range of a linear transformation, The dimension theorem, one-to-one and onto linear transformations, Invertible linear transformations, Isomorphic vector spaces.	15
	Total	45
Text Books/Suggested Readings:		

S. No.	Name of Authors/Books/Publishers	Year of Publication/ Repr int
1.	Andrilli, S., & Hecker, D. (2016). Elementary Linear Algebra (5th ed.). Elsevier India.	2016
2.		
3.		
4.		

Paper Components			
Credits	Lecture (L)	Tutorial (T)	Practical (P)
4	3	1	0
Assessment Scheme			
S.No.	Component	Marking Scheme	Total Marks
1	Internal Assessment - Assignment/Quiz/Project/Presentation - Class Test - Attendance	12	30
		12	
		6	
2.	Continuous Assessment (Tutorial) - Activity 1 - Activity 2 - Attendance	20	40
		15	
		05	
3.	Practical - Continuous Assessment - End Term Written/Practical Exam - Viva		NA
		NA	
4.	End Semester Examination	90	90