

UNIVERSITY OF DELHI

CNC-II/093/1(23)/2022-23/451

Dated: 03.03.2023

NOTIFICATION

Sub: Amendment to Ordinance V

[E.C Resolution No. 38-1/ (38-1-4) dated 08.12.2022]

Following addition be made to Appendix-II-A to the Ordinance V (2-A) of the Ordinances of the University;

Add the following:

Syllabi of Semester-II of the following departments under Faculty of Mathematical Sciences based on Under Graduate Curriculum Framework -2022 to be implemented from the Academic Year 2022-23.

FACULTY OF MATHEMATICAL SCIENCES

DEPARTMENT OF MATHEMATICS

Category-I

B.Sc. (Hons.) Mathematics

DISCIPLINE SPECIFIC CORE COURSE – 4: LINEAR ALGEBRA

CREDIT DISTRIBUTION, ELIGIBILITY AND PRE-REQUISITES OF THE COURSE

Course title & Code	Credits	Credit distribution of the course			Eligibility criteria	Pre-requisite of the course (if any)
		Lecture	Tutorial	Practical/ Practice		
Linear Algebra	4	3	1	0	Class XII pass with Mathematics	DSC-I: Algebra

Learning Objectives: The objective of the course is to introduce:

- The concept of vectors in R^n , and their linear independence and dependence.
- Rank and nullity of linear transformations through matrices.
- Various applications of vectors in computer graphics and movements in plane.

Learning Outcomes: This course will enable the students to:

- Visualize the space R^n in terms of vectors and their interrelation with matrices.
- Familiarize with basic concepts in vector spaces, linear independence and span of vectors over a field.
- Learn about the concept of basis and dimension of a vector space.
- Basic concepts of linear transformations, dimension theorem, matrix representation of a linear transformation with application to computer graphics.

SYLLABUS OF DSC-4

UNIT – I: Matrices and System of Linear Equations (18 hours)

Fundamental operations with vectors in Euclidean space R^n , Linear combinations of vectors, Dot product and their properties, Cauchy-Schwarz inequality, Triangle inequality, Solving linear systems using Gaussian elimination, Gauss-Jordan row reduction, Reduced row echelon form, Equivalent systems, Rank and row space, Eigenvalues, Eigenvectors, Eigenspace, Diagonalization, Characteristic polynomial of a matrix, Cayley-Hamilton theorem.

UNIT – II: Introduction to Vector Spaces (12 hours)

Vector spaces, Subspaces, Algebra of subspaces, Linear combination of vectors, Linear span, Linear independence, Bases and dimension, Dimension of subspaces.

UNIT – III: Linear Transformations (15 hours)

Linear transformations, Null space, Range, Rank and nullity of a linear transformation, Matrix representation of a linear transformation, Algebra of linear transformations, Invertibility and isomorphisms; Application: Computer Graphics-Fundamental movements in a plane, homogenous coordinates, composition of movements.

Essential Readings

1. Andrilli, S., & Hecker, D. (2016). *Elementary Linear Algebra* (5th ed.). Elsevier India.
2. Friedberg, Stephen H., Insel, Arnold J., & Spence, Lawrence E. (2003). *Linear Algebra* (4th ed.). Prentice-Hall of India Pvt. Ltd. New Delhi.

Suggestive Readings

- Lay, David C., Lay, Steven R., & McDonald, Judi J. (2016). *Linear Algebra and its Applications* (5th ed.). Pearson Education.
- Kolman, Bernard, & Hill, David R. (2001). *Introductory Linear Algebra with Applications* (7th ed.). Pearson Education, Delhi. First Indian Reprint 2003.
- Hoffman, Kenneth, & Kunze, Ray Alden (1978). *Linear Algebra* (2nd ed.). Prentice Hall of India Pvt. Limited. Delhi. Pearson Education India Reprint, 2015.