

AC –11-03-25  
Item No. – 05

Approved by the BoS in Information Technology on 03-03-2025 Item No. 05

**Tolani College of Commerce (Autonomous)**



**Title of the Course: Linear Algebra**

**Syllabus for Four credit Course**

**From the academic year- 2025-2026**

**Name of the Course: Linear Algebra II**

**Vertical: Minor , Semester VI**

**Programmes: Bachelor of Science (Information Technology)**

<b>Sr. No.</b>	<b>Headin g</b>	<b>Particula rs</b>
<b>1</b>	<b>Description the course:</b>	Linear algebra is a branch of mathematics that focuses on the study of vector spaces and linear transformations. It deals with systems of linear equations, matrices, determinants, eigenvalues, and eigenvectors. Linear algebra is widely applied in various areas, including computer graphics, machine learning, cryptography, signal processing, control theory, and operations research.
<b>2</b>	<b>Vertical :</b>	Minor
<b>3</b>	<b>Type :</b>	Theory / Practical

4	<b>Credit:</b>	4 credits
5	<b>Hours Allotted :</b>	60 Hours
6	<b>Marks Allotted:</b>	100 Marks (60 (SE) + 40 (CE))
7	<b>Course Objectives:</b> <ol style="list-style-type: none"> <li>1. To define matrices and understand their properties, including addition, scalar multiplication</li> <li>2. To understand matrix multiplication, and transpose.</li> <li>3. To understand the relationship between the solutions of linear systems</li> <li>4. To learn the geometry of vector spaces.</li> </ol>	
8	<b>Course Outcomes:</b> <ol style="list-style-type: none"> <li>1. Students will demonstrate a clear understanding of fundamental concepts in linear algebra</li> <li>2. Also they will understand vectors, matrices, vector spaces, and linear transformations.</li> <li>3. Students will be able to perform matrix operations efficiently, including addition, scalar multiplication, matrix multiplication</li> <li>4. Student will be able to find the inverse of matrix</li> </ol>	
9	<b>Modules:-</b>	
	<b>Module 1: Elementary Transformations (15 Hours)</b>	
	<ul style="list-style-type: none"> <li>● Elementary transformations on a matrix</li> <li>● Equivalent matrices</li> <li>● Normal form of a matrix</li> </ul>	
	<b>Module 2: Rank (15 Hours)</b>	
	<ul style="list-style-type: none"> <li>● Rank of a matrix, Rank by using Normal Form</li> <li>● Echelon form to find the rank of a matrix</li> <li>● Consistency of a system of equations</li> </ul>	
	<b>Module 3. Eigen Values ,Eigen vectors (15 Hours)</b>	
	<ul style="list-style-type: none"> <li>● System of non-homogeneous linear equations</li> <li>● Eigen values, Properties of Eigenvalues</li> <li>● Eigen Vectors, Properties of Eigen Vectors</li> </ul>	
	<b>Module 4: Cayley Hamilton Theorem(15 Hours)</b>	
	<ul style="list-style-type: none"> <li>● Cayley Hamilton Theorem</li> <li>● Hermitian matrix, Skew Hermitian matrix</li> <li>● Orthogonal and Unitary matrices and its properties</li> <li>● Diagonalisable matrix, Minimal Polynomial</li> </ul>	
10	<b>Reference Books</b> <ul style="list-style-type: none"> <li>● S. Kumaresan, Linear Algebra PHL Learning Pvt Ltd</li> <li>● Narayan, Shanti, and P.K. Mittal. A Textbook of Matrices. S. Chand &amp; Co.</li> <li>● Lay, David. Linear Algebra and Its Applications. Pearson Publications.</li> <li>● Sharma, R.D. Theory and Problems of Linear Algebra. Dreamtech.</li> </ul>	
11	<b>Internal Continuous Assessment: 40%</b>	<b>Semester End Examination : 60%</b>
12	<b>Continuous Evaluation through:</b>	Assignments /Periodical Test

**13** **Format of Question Paper:** for the final examination

Q. 1 Attempt any Three (15 marks)

- a.
- b.
- c.
- d.

Q. 2 Attempt any Three (15 marks)

- a.
- b.
- c.
- d.

Q. 3 Attempt any Three (15 marks)

- a.
- b.
- c.
- d.

Q. 4 Attempt any Three (15 marks)

- a.
- b.
- c.
- d.