Course Title:	Linear Algebra
Course Code:	SMTH-102
Semester:	II
Credit Hours:	3 Credit Hours
Pre-requisites:	N / A

Learning Outcomes

By the end of this course, students will be able to:

1. Students will be able to **apply** linear equations to solve them using appropriate methods; and derive matrices representing linear transformation.
2. Students will be able to **review** the concepts of a vector space and subspace, and grasp the concepts of rank and nullity for any vector space.
3. Students will be able to **grasp** the concepts and methods of calculating Eigenvalues and Eigenvectors.

Course Outline

Unit 1

Introduction to Linear Algebra

Concepts and use with respect to daily life. Linear equation, System of linear equations, Consistent and inconsistent systems, Types of solutions: Algebraic solution and Geometric solution, Homogenous and non-homogenous linear system, Solving the system of linear equations by Gauss Elimination and Gauss Jorden method, Gauss Jorden method Continued, Applications to the system of linear equations, More on Applications to the system of linear equations

Unit 2

Matrices and Matrix Operation

Inverse of a Matrix, Vector Spaces, Vector Spaces Continued, Subspaces, Matrix Transformation, Euclidean and Affine Transformation

Unit 3

Affine Transformation

Cryptography (Encryption, Decryption), Linear combination of vectors. Linear independence/dependence, Spanning, Basis and Dimension, Relationship between homogeneous and non- homogeneous linear systems, Basis for the solution Space of homogeneous linear systems.

Unit 4

Introduction to Eigenvalues and Eigenvectors

Eigenvalues and Eigenvectors of 3 by 3 matrices, Eigen space, basis of Eigen Space, Digonalization

- **Teaching-learning Strategies:**
  Class Lecture method, which includes seminars, discussions, assignments and projects. (Audio-visual tools are used where necessary)

- **Assignments-Types and Number with calendar:**
  According to the choice of respective teacher.

- **Assessment and Examinations:**
  According to the University's Semester Rules.

Sr. No.	Elements	Weightage	Details
1	Midterm Assessment	35%	It takes place at the mid-point of the semester.
2	Formative Assessment	25%	It is continuous assessment. It includes: Classroom participation, attendance, assignments, and presentations, homework, attitude and behavior, hands-on-activities, short tests, quizzes etc.
3	Final Assessment	40%	It takes place at the end of the semester. It is mostly in the form of a test, but owing to the nature of the course the teacher may assess their students based on term paper, research proposal development, field work and report writing etc.

Text Books:

Linear Algebra with supplemented Applications by Howard Anton/ Chris Rorres, 10th Edition..

Reference Books

1. Introductory Linear Algebra with Applications by Bernard Kolman, David R. Hill.
2. Linear Algebra with applications by Otto Bretscher, 4th edition.
3. Linear Algebra with Applications by Steven J. Leon.