

TRIBHUVAN UNIVERSITY
INSTITUTE OF SCIENCE AND TECHNOLOGY
SCHOOL OF MATHEMATICAL SCIENCES
Bachelor in Mathematical Sciences (B.Math.Sc.)

Course of Study

Course No.: MSMT 152

***Course Title:* Linear Algebra with Applications I**

Nature of the Course: Theory

Full Marks: 75

Pass Marks: 30

Credit: 3

Course Description:

This course develops fundamental algebraic tools involving matrices and vectors to study linear systems of equations and Gaussian elimination, linear transformations, determinants, eigenvalues and eigenvectors and their applications.

Objectives

On completion of this module, students will be able to

- Understand the concepts and methods of linear algebra
- Solve problems using linear algebra.
- Connect linear algebra to other fields both within and without mathematics
- Use the concepts and algorithms of linear algebra in an interactive computer environment
- Use computational tools for important applications of linear algebra

Mode of Delivery:

The course will be taught by lecture (48 hrs), and problem solving and class discussion (24 hrs). The use of software (MATLAB) will be encouraged.

Course Contents:

Unit 1 Matrices	12 hrs
The geometry of linear equations, Elimination with matrices, Matrix and Matrix operations, Triangular Factors and Row Exchanges, Inverses and Transposes	
Unit 2 Vector Spaces	14 hrs
Vector Spaces and Subspaces, Solving $Ax = 0$ and $Ax = b$, Linear Independence, Basis, and Dimension, The Four Fundamental Subspaces, Graphs and Networks, Linear Transformations	
Unit 3 Orthogonality	14 hrs
Orthogonal Vectors and Subspaces, Cosines and Projections onto Lines, Projections and Least Squares, Orthogonal Bases and Gram-Schmidt, The Fast Fourier Transform	
Unit 4 Determinants	8 hrs
Determinants, Properties of the Determinant, Formulas for the Determinant, Applications of Determinants	

Textbooks

1. Gilbert Strang, *Introduction to Linear Algebra*, 4th Edition, Wellesley- Cambridge Press.

Reference Books

1. David C. Lay, *Linear Algebra and its applications*, Pearson Education, 2012,
2. Howard Anton, Chris Rorres, *Elementary Linear Algebra: Applications Version*, Wiley, 2014.