

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

**Course of Study**

*Course No.:* MSMT 201

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

*Nature of the Course:* Theory

*Full Marks:* 75

*Pass Marks:* 30

*Credit:* 3

*Course Description:*

This course develops eigenvalues and eigenvectors and their applications, Finite Element Method, Computations with Matrices, Linear Programming and Game Theory.

*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 Eigenvalues and Eigenvectors** **14 hrs**

Diagonalization of a Matrix, Difference Equations and Powers  $A^k$ , Differential Equations and  $e^{At}$ , Complex Matrices, Similarity Transformations

**Unit 2 Positive Definite Matrices** **12 hrs**

Minima, Maxima, and Saddle Points, Tests for Positive Definiteness, Singular Value Decomposition, Minimum Principles, The Finite Element Method

**Unit 3 Computations with Matrices** **8 hrs**

Matrix Norm and Condition Number, Computation of Eigenvalues, Iterative Methods for  $Ax = b$ .

**Unit 4 Linear Programming and Game Theory** **14 hrs**

Linear Inequalities, The Simplex Method, The Dual Problem, Network Models, Game Theory.

*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.