



# BASIC LINEAR ALGEBRA

**PROF. I. K. RANA**

Department of Mathematics  
IIT Bombay

**TYPE OF COURSE** : Rerun | Core | UG

**COURSE DURATION** : 8 weeks (21Feb' 22 - 15 Apr' 22)

**EXAM DATE** : 24 April 2022

**INTENDED AUDIENCE** : B.Tech, B.Sc., M.Sc (maths) , BA/MA Economics/Statistics

**PREREQUISITES** : Core

**INDUSTRY SUPPORT** : Basic mathematics at school level undergraduate level

**COURSE OUTLINE :**

Linear Algebra is a basic course for students intended to go for Engineering studies and higher studies in Mathematics. We will cover the basic tools needed in these branches.

**ABOUT INSTRUCTOR :**

Prof. I. K. Rana Emeritus Fellow at Department of Mathematics, IIT Bombay. I have taught courses at B.Tech, M.Sc., and Ph.D level for the last 34 years.

**COURSE PLAN :**

**Week 1:** Matrices and Matrix operations, REF

**Week 2:** Linear systems, Gauss Elimination and Inverse of a matrix

**Week 3:**  $\mathbb{R}^n$ ; subspaces, linear independence, rank of a matrix

**Week 4:** Determinants, rank, invertibility

**Week 5:** Linear transformations, rank-nullity

**Week 6:** Inner product spaces, Gram-Schmidt process

**Week 7:** Eigenvalues and Eigenvectors

**Week 8:** Similarity, diagonalization and applications