



# LINEAR ALGEBRA

## PROF. PRANAV HARIDAS

Department of Mathematics  
Kerala School of Mathematics

**INTENDED AUDIENCE :** Undergraduate students in various universities.

**INDUSTRIES APPLICABLE TO :** Almost all engineering based companies

### COURSE OUTLINE :

Linear Algebra is a foundational subject in Mathematics which is of fundamental importance in the development of almost every branch of Mathematics, Theoretical Physics and Computer Science. A good understanding of the subject is also crucial to the study of most Engineering disciplines and many problems in Social Sciences. Linear Algebra can be succinctly described as the study of Linear Transformations and its algebraic properties. This course is an introduction to Linear Algebra

### ABOUT INSTRUCTOR :

Prof. Pranav Haridas is a Assistant Professor at the Kerala School of Mathematics. His research interests broadly lie in Complex Analysis and more specifically quadrature domains in several complex variables. He is also interested in the study of quasiconformal mappings and Teichmüller spaces. He completed his doctoral studies from the Indian Institute of Sciences, Bangalore

### COURSE PLAN :

**Week 1:** Vectors, vector spaces, span, linear independence, bases

**Week 2:** Dimension, linear transformations

**Week 3:** Null spaces, range, coordinate bases

**Week 4:** Matrix multiplication, Invertibility, Isomorphisms

**Week 5:** Coordinate change, products and quotients of vector spaces, duality

**Week 6:** Review of elementary row operations, rank, determinants

**Week 7:** Eigenvalues, Eigenvectors

**Week 8:** Diagonalization

**Week 9:** Characteristic polynomials, inner products and norms

**Week 10:** Orthogonal bases, orthogonalization, orthogonal complements

**Week 11:** Adjoints, normal and self-adjoint operators

**Week 12:** Spectral theorem for normal and self-adjoint operators