



Math 2005	LINEAR ALGEBRA	(CR3)
Preq.	Math 1001, 1002	

Objectives

The aims of this course are to introduce the basic ideas of linear algebra.

Syllabus

Matrix algebra, addition and transposition, linearity, matrix multiplication, properties of matrix multiplication, matrix inversion, inverses of sums and sensitivity, elementary matrices and equivalence, the LU factorization, vector spaces, subspaces, four fundamental subspaces, linear independence, basis and dimension, more about rank, classical least squares, linear transformations, change of basis and similarity, invariant subspaces, norms, inner products and orthogonality, vector norms, matrix norms, inner-product spaces, orthogonal vectors, Gram–Schmidt procedure, unitary and orthogonal matrices, orthogonal reduction, discrete Fourier transform, complementary subspaces, range-null space decomposition, orthogonal decomposition, singular value decomposition, orthogonal projection, least squares, angles between subspaces, determinants, additional properties of determinants, eigenvalues and eigenvectors, properties of Eigen systems, diagonalization by similarity transformations, functions of diagonalizable matrices, systems of differential equations, normal matrices, positive definite matrices, nilpotent matrices and Jordan structure, Jordan form, functions of non-diagonalizable matrices.

Recommended Books

1. *Elementary linear algebra: applications version (11th Edition)* by H. Anton and C. Rorres, Wiley (2010)
2. *Mathematical Methods for Physicists (7th Edition)* by G. B. Arfken, H. J. Weber and F. E. Harris, Academic Press (2012)
3. *Mathematics for Physicists* by P. Dennery and A. Krzywicki, Dover Publications (2012)
4. *Mathematical methods for physics and engineering* by K. F. Riley, M. P. Hobson, and S. J. Bence (3rd Edition), Cambridge (1999)