Syllabus for Math 416 (M13)

Instructor: S. P. Dutta, TR 11:00-12:20pm

Course summary: Math 416 is a rigorous, abstract treatment of linear algebra. Topics to be covered include vector spaces, linear transformations, eigenvalues and eigenvectors, diagonalizability, and inner product spaces. The course concludes with a brief introduction to the theory of canonical forms for matrices and linear transformations.

Book: The textbook for the course is Linear Algebra, fourth edition, by S. H. Friedberg, A. J. Insel and L. E. Spence

Syllabus: The essential ideas in the course are

(1) systems of linear equations, row reduction and echelon form

(2) vectors and matrices, matrix multiplication, invertibility and inverses

(3) vector spaces and linear transformations

(4) subspaces, linear combinations, spanning sets and bases

(5) representing linear transformations as matrices, change of basis

(6) kernel and image, row and column rank, Rank-Nullity theorem

(7) determinants

(8) eigenvalues and eigenvectors

(9) finding the eigenvalues of a transformation using the characteristic polynomial

(10) finding the eigenspace associated to an eigenvalue

(11) inner product spaces and their algebra and geometry, the Cauchy–Schwarz inequality

(12) orthogonal projections, Gram–Schmidt, least squares

(13) orthogonal and unitary matrices, spectral theory

(14) bilinear forms

(15) Jordan form