Math 33A: Linear Algebra & Applications

- [Math 33A: General Course Outline & Catalog Description](#)

The purpose of Math 33A is to provide mathematicians, engineers, physical scientists, and economists with an introduction to the basic ideas of linear algebra in n-dimensional Euclidean space. Abstract vector spaces are not covered; they are treated in Math 115A. Students in the course should have covered the following topics in previous high school and college mathematics courses:

- solving linear systems of equations,
- matrices, matrix multiplication,
- two-by-two and three-by-three determinants,
- complex numbers,
- complex polynomials, the fundamental theorem of algebra.
  This background material is reviewed in the course, though briefly.
  The topics in linear algebra that are covered in Math 33A include:
- systems of linear equations, associated matrix equations,
- row reduction of a matrix,
- linear transformations,
- invertible matrices,
- subspaces, linear independence, bases, dimension,
- row space, column space, rank-nullity theorem,
- determinants,
- orthogonality, orthonormal bases,
- orthogonal matrices,
- Gram-Schmidt process, QR factorization,
- least-squares approximation, normal equations,
- eigenvalues, eigenvectors, similarity, diagonalization,
- applications to discrete dynamical systems,
- diagonalization of symmetric matrices,
- applications to quadratic forms, singular value decomposition.