Prerequisites: Math 12 (or 17) or consent


Description:

This course is the “honors” version of Math 46. We will stress the development of abstract concepts and the proofs of theorems. There will be less emphasis on matrix computations. If you want to know the “why” as well as the “how” behind linear algebra, this is the course for you. There will be a strong emphasis on proofs rather than calculations. If you want to learn more about proofs and real mathematics, this is the course for you. The course is intended for majors or minors in mathematics, science, and engineering. While the choice of topics and the emphasis will be different, this course will share the same number and course title as the other sections of Math 46.

Linear algebra is used in essentially all fields of mathematics, and in applications as diverse as medical imaging, operations research, and signal processing. You will use it again and again in your later math courses, too.

We will quickly go over Gaussian elimination, an efficient way to solve linear equations. This will lead to more abstract concepts such as vector spaces, subspaces, linear independence, basis, and dimension. The course then proceeds to linear transformations and their associated matrices, and properties such as rank, nullspace, trace, and determinant. Additional important topics to be treated in the course include eigenvalues and eigenvectors, diagonalizability and invariant subspaces. We hope to cover the Cayley-Hamilton theorem, inner product spaces, orthogonality, the adjoint, orthogonal and the Spectral Theorem. If time permits, the course will also consider canonical forms or applications such as systems of ordinary differential equations.

The course will include two or three in-class exams and a final, as well as daily assignments.