MATHEMATICS 113

APPLIED LINEAR ALGEBRA

Text: *Linear Algebra, Third Edition*, by J. Fraleigh and R. Beauregard

Topics covered include matrices and systems of linear equations, determinants, Gaussian elimination and pivoting, linear independence and linear transformations, orthogonality, eigenvalues and eigenvectors. Numerical linear algebra and computer use are integrated into these topics. Only one of Math 113 and 131 may be taken for credit.

TOPICS	SUGGESTED NO. OF 50 MIN. CLASSES

Matrices, systems of equations, and Gaussian elimination 5
(§§ 1.1–1.6)

Euclidean vectors, norm and dot product, matrices and their algebra, solving systems of linear equations, inverses of square matrices, homogeneous systems, their solution subspaces and bases for the latter.

Determinants 2
(§§ 4.1–4.4)

2×2 and 3×3 determinants and their relations to areas, volumes and cross products, the determinant of a general square matrix, computations of determinants and Cramer's rule.

Vector spaces 4
(§§ 3.1–3.4, 2.1–2.2)

The abstract notion of a vector space, generalization of linear algebraic concepts from ordinary vector algebra, coordinatization of vectors, linear transformations, linear independence and the rank of a matrix.

Linear transformations 2
(§§ 2.3–2.4)

Linear transformations of Euclidean spaces, specialization to the plane.

Orthogonaliity 6
(§§ 3.5, 6.1–6.5)

Inner product spaces, projections, the Gram-Schmidt orthonormalization process, orthogonal matrices, the projection matrix, the method of least squares.

Eigenvalues and eigenvectors 6
(§§ 5.1–5.3, 9.1–9.3, 8.1)

Basic definitions and methods for determining eigenvectors and eigenvalues, diagonalization.