COURSE CONTENT AND SCOPE

Hours

- $\operatorname{\mathsf{Outline}}$ the topics included in the lecture portion of the course

	the matrix representation of a linear transformation. Compute similar matrix representations for linear operators with respect to different bases. Calculate the dimension of spaces associated with matrices and linear transformations.
Orthogonality. Inner products on a real vector space, angle and orthogonality in inner product spaces, and orthogonal and orthonormal bases.	Compute the scalar product of two vectors in Euclidean space. Determine whether two vectors are orthogonal. Determine the fundamental subspaces of a matrix. Compute the orthogonal complement of a subspace. Find the direct sum of two subspaces. Solve the least squares problem using the normal equations. Perform the Gram-Schmidt orthogonalization process on a set of vectors. Use bases and orthonormal bases to solve problems in linear algebra.
Characteristic value problems. Eigenvalues, eigenvectors, and eigenspace. Diagonalization including orthogonal diagonalization of symmetric matrices.	Calculate eigenvalues and eigenvectors and use them in applications. Prove properties of eigenvectors and eigenvalues using appropriate proofwriting techniques. Determine the characteristic values and characteristic vectors of a square matrix. Diagonalize a square matrix. Compute the exponential of a square matrix.
Final examination.	Final examination.

Total: 54

Total Lecture Hours In Section I Class Hours: 54