COURSE CONTENT AND SCOPE	Hours
- Outline the topics included in the lecture portion of the course	

Linear transformations. Inverse linear transformations.	6	Determine whether a mapping from one vector space to another is a linear transformation. Prove linearity, injectivity, and surjectivity of functions using appropriate proof-writing techniques. Compute the image and kernel of a linear transformation. Compute 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.	9	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.	7	Calculate eigenvalues and eigenvectors and use them in applications. Prove properties of eigenvectors and eigenvalues using appropriate proof-writing 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.	2	Final examination.
Total:	54	
Total Lecture Hours In Section I Class Hours:	54	