King Saud University / Department of Mathematics

Math-244 (Linear Algebra) Semester 2 of Academic Year 1447H

Course Contents:

Matrices: Matrices and matrix operations; elementary row operations; inverse of a matrix; special matrices.

Determinants: Definition of determinant of a matrix; evaluation of a determinant; properties of determinants; adjoint of a matrix and its properties.

Systems of Linear Equations: Systems of linear equations; Gauss and Gauss – Jordan elimination methods; homogeneous systems of linear equations; Cramer's Rule.

Vector Spaces: Definition of a vector space and examples; subspaces; linear combinations and linear span of a set of vectors; linear dependence and linear independence of a set of vectors; basis and dimension of a vector space; coordinates of a vector with respect to a basis; change of basis; rank and nullity of a matrix.

Inner Product Spaces: Definition of inner product and inner product space with examples;

orthogonal and orthonormal sets of vectors; orthonormal basis; Gram-Schmidt orthonormalization process.

Linear Transformations: Definition of a linear transformation and examples; basic properties of linear transformations; injective, surjective and bijective Linear transformations; kernel and image spaces of a linear transformation; matrix of linear transformation.

Eigenvalues, Eigenvectors and Diagonalization: Eigenvalues and eigenvectors of a square

matrix; algebraic and geometric multiplicities of an eigenvalue; diagonalization of matrices.