

## 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 and column 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 sets 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.

**Date of Mid-term Exam 1:** 10-10-1447H (29-03-2026G)

**Date of Mid-term Exam 2:** 09-11-1447H (26-04-2026G)

**Date of Final Exam:** 21-12-1447H (07-06-2026G).