KINGDOM OF SAUDI ARABIA
AL-IMAM MOHAMMAD BIN SAUD
ISLAMIC UNIVERSITY
FACULTY OF SCIENCES
DEPARTMENT OF MATHEMATICS

المملكة العربية السعودية
جامعة الإمام محمد بن سعود الإسلامية
كلية العلوم
قسم الرياضيات والإحصاء

Linear Algebra

Course Code	Course Num.	Course Name	Credit Hours	Lec	Lab	Tut	Prerequisites
MAT	٢٢٣	Linear Algebra	4	3	0	2	MAT 251

Objectives:

- To introduce students to the subject of linear algebra, this is essential for subsequent courses in mathematics and computer science.
- To let students be familiar with basics of matrix theory.
- To let students be familiar with basics of vector spaces and linear transformations.
- To prepare students for more abstract math courses like "Modern Algebra".

Syllabus:

- **Matrices and Gauss Elimination:** Elementary row operations, Transpose of a matrix, Inverse of a square matrix, Linear equation systems and Gauss eliminations, Determinants and their properties, classical adjoint; Cramer's rule.
- **Vectors in R^2 and R^3:** Dot product, projections, cross product, mixed product.
- **Vector spaces:** Basic definitions, subspaces, linear dependence and independence, bases and dimensions, Rank of a Matrix, Inner product spaces and Gram-Schmidt normalization, orthogonal matrices.
- **Linear transformations:** Basic definitions, the matrix of a transform, Kernel and Range of a linear transformation, Matrices of linear transformations, Coordinates and change of basis, homomorphism and isomorphism .
- **Eigenvalues and Eigenvectors:** Characteristic polynomial, diagonalization of matrices, Applications involving Powers of matrices.

References:

- **Linear Algebra**, Schaum's Outline, S. Lipschutz, M. Lipson, McGraw-Hill 3rd ed. (2000).
- **Linear Algebra**, S. Leduc, Cliffs Notes (1996).
- **Linear Algebra: A Modern Introduction,** D. Poole, Brooks Cole; 1st ed. (2002).