

Department of Mathematics  
College of Sciences  
King Saud University  
Riyadh

**Course outline for Math 240: Introduction to Linear Algebra**

**Prerequisite: Math 111**

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**Text Book:** Elementary Linear Algebra with Supplemental Applications, Eleventh Edition, by H. Anton and Chris Rorres, John Wiley & Sons, 2015

**1. Matrices**

- Matrices and their operations
- Types of matrices
- Inverse of a matrix
- Algebraic properties of matrices
- Method for finding inverse
- Linear systems of equations

**2. Determinants**

- Determinants by cofactor expansion
- Evaluating determinants by row reduction
- Properties of determinants: Cramer's Rule

**3. Vector Spaces**

- Real vector spaces
- Subspaces
- Linear dependence
- Basis and dimension (finite)
- Row space, column space, and null space
- Rank and nullity

**4. Inner Product Spaces**

- Inner products
- Angle of orthogonality in inner product spaces
- Best approximation: Least Squares

**5. Linear Transformations**

- General linear transformations
- Kernel and range of a linear transformation
- Isomorphism
- Compositions and inverse transformations
- Matrices for general linear transformations

**6. Eigenvalues and Eigenvectors**

- Eigenvalues and eigenvectors of a matrix
- Diagonalization
- Eigenvalues for linear operators

**Mark Distribution: Mid Term 1 and 2: 25+25=50**

**Tutorial: 10**

**Final: 40**

**Total: 100**

**Note: The date of Exams will be announced in due time**