

Department of Mathematics College of
Sciences King Saud University, Riyadh

Semester II: 1440-1441

Course outline for Math 240: Introduction to Linear Algebra

Prerequisite: Math 111

Name of Instructor: Prof. Dr. T M G Ahsanullah

Office: 2B 80 Tel.: 11- 4675177 Website: <http://fac.ksu.edu.sa/tmga1>

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

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
- Orthogonal complements and basis for an orthogonal complement
- Gram-Schmidt Process
- 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

