King Fahd University of Petroleum & Minerals

Department of Mathematics and Statistics

Syllabus of **MATH 280 (142)**

Instructor: **Dr. Hattan Tawfiq**; Office 5-419; Tel. 1931; email: hattan@kfupm.edu.sa

Course: MATH 280

Title: Introduction to Linear Algebra

Textbook: Linear algebra with applications, Steven J. Leon, Pearson (2014).

Objective: Understand the theory of Linear Algebra.

Students Learning Outcome: Upon successful completion of this course, a student should be able to:

- Use elementary row operation to solve systems of linear equations and decide whether a square matrix is singular or nonsingular.
- Express a nonsingular matrix as a product of elementary operations.
- Evaluate the determinant of a matrix using cofactor expansion or elementary row (column) operations.
- Find the inverse of a nonsingular matrix using its adjoint and solve some systems by Cramer's method.
- Construct a basis for a given vector space and evaluate its dimension.
- Represent a linear transformation by a matrix.
- Construct an orthonormal set using the Gram-Schmidt orthogonalization process
- Determine the eigenvalues and eigenspaces of a square matrix.
- Decide whether a given square matrix is diagonalizable or not.
- Diagonalize orthogonally a real symmetric matrix.

Attendance: KFUPM attendance policy will be enforced. A **DN grade** will be awarded to any student who accumulates **9** unexcused absences.

Grading Policy:

1. Two Major Exams (2 X 20%)
2. Final Exam (35%) (Comprehensive)
3. Homework (10%)
4. MATLAB projects (10%)
5. Participation (in Class/ Online) (5%)

Academic Integrity: All KFUPM policies regarding ethics apply to this course.

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Week	Date	Section	Material
1	Jan. 25- 29	1.1-1.2	Systems of linear equations - Row echelon form
2	Feb. 1-5	1.3-1.4	Matrix arithmetic - Matrix algebra
3	Feb. 8-12	1.5	Elementary matrices
4	Feb. 15-19	2.1-2.2-2.3	The determinant of a matrix - Properties of determinants - Additional topics and applications
5	Feb. 22-26	3.1-3.2	Vector space: Definition and examples - Subspaces
6	Mar. 1-5	3.3-3.4	Linear independence - Basis and dimension
7	Mar.8 -12	3.5-3.6	Change of basis - Row space and column space
8	Mar. 15 -19	4.1-4.2	Linear transformations - Matrix representations of linear transformations
Mid Term Vacation Mar. 22- 26			
9	Mar. 29 – Apr. 2	4.3-5.1	Similarity - Orthogonality
10	Apr. 5 -9	5.2-5.4	Orthogonal subspaces - Inner product spaces
11	Apr. 12 – 16	5.5	Orthonormal sets
12	Apr. 19 – 23	5.6-5.7	The Gram-Schmidt orthogonalization process - Orhogonal polynomials
13	Apr. 26 -30	6.1	Eigenvalues and eigenvectors
14	May 3 -7	6.3	Diagonalization
15	May 10 -14	6.6	Quadratic forms