

**King Fahd University of Petroleum and Minerals**  
**Department of Mathematics and Statistics**  
**Syllabus of Math 280 (171)**  
**Instructor: Pr. A. Mimouni**  
**Course: Math 280**

**Title: Introduction to Linear Algebra**

**Textbook: Linear Algebra with Applications, Steven J. Leon, 9th edition, Pearson, 2015.**

**Catalogue Description:** Matrices and systems of linear equations. Vector spaces and subspaces. Linear independence. Basis and dimension. Inner product spaces. The Gram-Schmidt process. Linear transformations. Determinants. Diagonalization. Real quadratic forms. (Co-requisite: Math 201).

**Objective:** This course introduces students to the basic concepts and techniques of elementary linear algebra.

**Learning Outcomes:** Upon completion of this course, a student should be able to:

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

**Attendance:** A DN grade will be awarded to any student who accumulates 9 unexcused absences

<b>Instructor:</b>	<b>Dr. A. Mimouni</b>
<b>Office:</b>	<b>Bldg. 5, Room 303</b>
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<b>Office Hours:</b>	<b>Sunday –Tuesday – Thursday 10:00 – 12:00 a.m. Also by Appointment</b>

**Exams and Distribution of Marks:**

Exam I (20%): Material: From Section 1.1 To Section 2.3, Sunday, February 18, 2018

Exam II (20%): Material: From Section 3.1 To Section 4.2, Sunday, March 18, 2018

Exam III (20%): Material: From Section 4.3 To Section 5.6, Sunday, April 08, 2018

**Time and location for exams will be discussed**

**Final Exam 40% (Comprehensive): TBA ?**

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(Course Instructor: Dr. A. Mimouni; Office: 5-303; Tel: 4036; email: [amimoui@kfupm.edu.sa](mailto:amimoui@kfupm.edu.sa))

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<b>Week</b>	<b>Date</b>	<b>Section</b>	<b>Material</b>
1	Jan. 21-25	1.1 1.2	Systems of linear equations Row Echelon Form
2	Jan 28-Feb. 01	1.3 1.4	Matrix Arithmetic Matrix Algebra
3	Feb. 04-08	1.5 2.1	Elementary Matrices The Determinant of a Matrix
4	Feb. 11-15	2.2 2.3	Properties of Determinants Additional topics and Applications
5	Feb. 18-22	3.1 3.2	Vector Spaces: Definition and Examples Subspaces
6	Feb 25-Mar.01	3.3 3.4	Linear Independence Basis and Dimension
7	Mar. 04-08	3.5 3.6	Change of Basis Row Space and Column Space
8	Mar. 11-15	4.1 4.2	Linear Transformations Matrix Representations of Linear Transf.
9	Mar.18-22	4.3 5.1	Similarity Orthogonality
10	Mar. 25-29	5.2 5.4	Orthogonal Subspaces Inner Product Spaces
11	Apr. 01-05	5.5 5.6	Orthonormal Sets The Gram-Schmidt Orthogonalization Process
12	Apr. 08-12	5.7	Orthogonal Polynomials
13	Apr. 15-19	6.1	Eigenvalues and Eigenvectors
14	Apr. 22-26	6.3	Diagonalization
15	Apr. 29-May 03	6.6	Quadratic Forms