Introduction to Linear Algebra (Math 280) Syllabus

Term 151, Year 2015/16

INSTRUCTOR INFORMATION

Instructor	Email & Website	Office Location & Hours
Dr. Mohammed Alshahrani	mshahrani@kfupm.edu.sa http://faculty.kfupm.edu.sa/MATH/mshahrani/	Building 5, Room 201-1, Tel: 013-860-7748 **Office hours:** Sundays, Tuesdays & Thursdays 09:00-09:50 AM

GENERAL INFORMATION

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.

LEARNING OUTCOMES

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:

Attendance is a University Requirement. A DN grade will be awarded to any student who misses 9 classes without excuse.

ACADEMIC INTEGRITY:

All KFUPM policies regarding ethics apply to this course.

GRADING POLICY

EVALUATION

Activity	Points
Homework	100
Computer Assignment	100
Exam 1	100
Exam 2	100
Final	200
Total	600

COURSE MATERIALS

Required Text

Linear Algebra with Applications, 8th Edition (Pearson New International Edition), by Steve Leon, 2014.

RESOURCES:

This course will be supplemented by the following websites

- My personal website:
  http://faculty.kfupm.edu.sa/MATH/mshahrani/
- BlackBoard: (Version 9.1 on
  https://blackboard.kfupm.edu.sa/)
  Syllabus, Lecture Notes, Homework Problem Sets, Grades, Attendance, etc

Course Schedule

Week	Topic	Section
1	Systems of linear equations	1.1
	Row echelon form	1.2
2	Matrix arithmetic	1.3
	Matrix algebra	1.4
3	Elementary matrices	1.5
4	The determinant of a matrix	2.1
	Properties of determinants	2.2
	Additional topics and applications	2.3
5	Vector space: Definition and examples	3.1
	Subspaces	3.2
6	Linear independence	3.3
	Basis and dimension	3.4
7	Change of basis	3.5
	Row space and column space	3.6
8	Linear transformations	4.1
	Matrix representations of linear transformations	4.2
9	Similarity	4.3
	The scalar product in $\mathbb{R}^n$	5.1
10	Orthogonal subspaces	5.2
	Inner product spaces	5.4
11	Orthonormal sets	5.5
12	The Gram-Schmidt orthogonalization process	5.6
	Orhogonal polynomials	5.7
13	Eigenvalues and eigenvectors	6.1
14	Diagonalization	6.3
15	Quadratic forms	6.6

Events

Event	Date & Time		Notes
Id Adha Holiday	Sunday September 20, 2015 – Monday September 28, 2015.		
Exam 1	Thursday, October 8, 2015	**(07:00-09:00PM)**	**Material:** Sections 1.1 – 3.2
Exam 2	Thursday, November 5, 2015	**(07:00-09:00PM)**	**Material:** Sections 3.2 – 5.1
Final	Monday, December 28, 2015	**(08:00-11:00AM)**	**Material:** Comprehensive