

King Fahd University of Petroleum and Minerals
Department of Mathematics and Statistics
SYLLABUS 121

Course: Math 460
Title: Applied matrix theory
Objectives: This course is designed to expose math students to some basic ideas in matrix analysis and linear algebra.
Catalogue Description: Review of the theory of linear systems. Eigenvalues and eigenvectors. The Jordan canonical form. Bilinear and quadratic forms. Matrix analysis of differential equations. Variational principles and perturbation theory: the Courant minimax theorem, Weyl's inequalities, Gershgorin's theorem, perturbations of the spectrum, vector norms and related matrix norms, the condition number of a matrix.

Textbook: Linear Algebra and its Applications by Gilbert Strang, Saunders College Publishing, 3rd Edition, 1988.

Grading Policy

KFUPM attendance policy will be enforced. Final Exam shall be comprehensive.
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Grading Policy: Major (I) 20%, Major (II) 25%; HW 20%, Final 35%.
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Week	Dates (/2012)	Topics
1	September 01-05	Introduction, Geometry of Linear Equations
2	September 08-12	Triangular Factors and Row Exchanges, Inverses and Transposes
3	September 15-19	Vector Spaces and Subspaces, Linear Independence, Basis, and Dimension
4	September 22-26	Graphs and Networks, Linear Transformations
5	Sep 29-Oct 03	Orthogonal Vectors and Subspaces, Cosines and Projections onto lines
6	October 06-10	Projections and Least Squares, Orthogonal Bases and Gram-Schmidt
7	October 13-17	Determinants, Applications
Eid Al-Adha Break: Thursday October 18th, 2012 to Friday November 2nd, 2012		
8	November 03-07	Diagonalization of a Matrix, Complex Matrices, Similarity Transformations
9	November 10-14	Maxima, Minima, Saddle Points, Tests for Positive Definiteness
10	November 17-21	Semidefinite and Indefinite Matrices
11	November 24-28	Minimum Principles, Rayleigh Quotient
12	December 01-05	Matrix Norm and Condition Number of a Matrix
13	December 08-12	Computation of Eigenvalues
14	December 15-19	Iterative Methods for $Ax = b$
15	December 22-26	Singular Value Decomposition, Pseudoinverse
Saturday Dec 29: Considered as Sunday classes (Last day of classes)		
Sunday and Monday Dec 30-31: Final Exams Preparation Break		