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.
Office: 5-317 **Tel**: 860- 1763 **E-mail**: halattas@kfupm.edu.sa
Grading Policy: Major (I) 20%, Major (II) 25%; HW 20%, Final 35%.

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	Linear Transformations, Left Right Inverses, Orthogonal Vectors and Subspaces
5	Sep 29-Oct 03	Cosines and Projections onto lines, Projections and Least Squares
6	October 06-10	Orthogonal Bases and Gram-Schmidt, Determinants, Applications
7	October 13-17	Diagonalization of a Matrix, Complex Matrices, Similarity Transformations
Eid Al-Adha Break: Thursday October 18th, 2012 to Friday November 2nd,2012		
8	November 03-07	The Jordan Form
9	November 10-14	Tests for Positive Definiteness, Minimum Principles, Rayleigh Quotient
10	November 17-21	Variational principles and perturbation theory
11	November 24-28	the Courant minimax theorem, Weyl's inequalities, Gershgorin's theorem
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		