Syllabus MA101

Linear Algebra Spring 1998

MWF 11:00-11:50 Room E 106

Instructor M. Smith

Office Information HH 018

Office Hour (after the class prefered) or by appointment

Call Ext 681 (739-4681) or (H) 528-1978

Textbook : Elementary Linear Algebra (6th Edition) 1996
by Bernard Kolman ISBN 0-13-374729-8
Publisher Prentice- Hall, Inc.

Course Description: Matrices, elementary row operations, vector spaces, linear transformations, determinants, applications to system of linear equations, bases and orthogonal bases, eigen values, and eigen vectors. Prerequistie: M211 or consent of instructor.

Course Objectives: Students will be introduced to axiomatic approach to study mathematics, and begin to learn proving theorems. This course is prerequisite to MA402 Abstract Algebra.

Methods of evaluation: Homework (30%)
One midterm examination and quizzes (30%)
Final comprehensive examination (40%)

Preview: Previewing is a key to a successful learning. The following items are few of pointers that are helpful for an effective previewing.

(a) meet new terminlogies or symbols (read definitions);
(b) think about connection or relationship with previously; learned concepts or techniques;
(c) make sure to note unclear points or any questions arising while previewing;
(d) ask yourself " why? " , when you read the textbook;
(e) if so desired,try exercise problems for better understanding

Homework: Unless otherwise advised, all exercise problems indicated to each section in the course outline are automatically assigned. Students should prepare a separate notebook for the exercise.

Course outline: We plan to proceed according the order in which sections appear in the next page and we will try to cover abour two to three sections per week.

This course outline is a tentative one and we may need to adjust the outline

Major Topics[Key Ideas]	Homework [* points earner]
§1.1 System of Linear Equations [Name of Equations. Elimination Method]	pp.6-7 (2, 3, 7, 9, 11, 12, 13, 14, 16* 17* 22*, 23*)
§1.2 Matrices, and their Operations [Get used to the operations]	pp.16-18(1, 4, 5, 6, 8 12, 15, 16, 21 25, 27, 31, 32*, 33*]
§1.3 Algebraic Properties of Matrix Operations	pp.25-26 (1-5,7-36)
§1.4 Special Types of Matrices (and Partitioned Matrices)	pp.35-38 (3, 4, 9, 10, 11, 12,13, 15, 20 21, 22, 23, 25, 26, 27)
§1.5 Echelon Form of a Matrix (May learn to use a software)	pp.54-56 (1, 5, 7,9, 11, 13, 15, 17, 19, 23, 25,27)
§1.6 Elementaryu Matrices; Find the Inverse Matrix (Theoretically Important)	pp.62-64(1, 3, 5, 7, 9, 11, 13, 15, 17, 19, 21, 27,)
§1.7 Equivalent Matrices	pp67-68 (1, 3, 7)
§2.1 Vectors in the Plane and in 3-space (Familiarlize the operations)	pp.91-93 (1, 3, 5, 7, 9, 11, 13, 15, 17, 19, 21*, 22*, 23*)
§2.2 Vector spaces (Idea of proof)	pp.98 (1, 3, 4, 5, 6, 7, 9, 13, 19*,20*, 21*)
§2.3 Subspaces Linear Combinations, solution spaces	pp.107(1, 3, 5, 7, 9, 11, 14, 15, 17, 23, 25, 29, 31)
§2.4 Linear Independence (Important preparation for Theoretical Development)	pp.199-200 (1, 2, 3, 4, 5, 6, 7, 9, 11, 13, 15, 17, 21*, 27, 28*)
§2.5 Basis and Dimension (Learn to prove)	pp.134-137 (1, 3, 5, 6, 7, 9, 11, 13, 15, 19, 21, 23, 25, 27, 29, 31, 33, 36*, 37*, 41*, 42*, 47*)
§2.6 Coordinates and Isomorphisms	pp.150-152(1, 3, 5, 7, 9, 11, 13, 15, 17, 19, 21, 22, 23, 25, 27, 28*, 29*, 30*, 31*, 39*, 40*)
§2.7 Homogeneous Systems (Important application)	pp. 159-160(1, 3, 5, 8, 9, 11, 13, 15, 17, 19*, 20*)
§2.8 Rank of a Matrix Singularity, appl. to non-homog system)	pp. 169-172(1, 3, 5, 7, 9, 11, 13, 15, 17 19, 21, 23, 25, 28, 29, 30, 35*)
Supplemenatry Exercises	pp.173-175(2, 13, 14, 17, 25)
§4.1 Linear Transformations and Matrices	pp.251-252(1, 3, 4, 7, 9, 11, 13, 15, 17, 18, 25, 26*, 27*, 28*)
§4.2 Kernel and Range of a Linear Transformation (Lear to prove more)	pp.264-266(1, 3, 5, 6, 7, 9, 11, 13, 16, 17, 19, 21, 23, 25*, 26*, 27*, 28*, 29*, 30*)
§4.3 Matrix of a linear Transformation	pp.274-275(1, 3, 5, 7, 9, 11, 13, 15, 17, 18*, 19*, 20*, 21*, 23, 25*)
§4.6 Similarity	pp.297-298(1, 3, 5, 9)
Supplementary Exercises	pp.298-300 (4, 5, 6, 7, 8, 9, 11, 13, 15, 21)
§5.1 Determinants	pp.305 (1, 3, 5, 7, 9, 11, 13)
§5.2 Properties of Determinants (Get used to Determinants)	pp. 312-314(1, 3, 5, 7, 9, 11, 13, 15, 21, 22, 23, 25, 27, 29, 35*)
§5.3 Cofactor Expansion (another way to evaluate determinants)	pp.320-321(1, 3,5,7, 9, 11,13, 15,17, 19)
§5.4 Inverse of a matrix	pp.325-326 (1, 3, 7, 9, 11)
§5.5 Other application Cramer's rule)	pp.331(1, 3, 5, 7,11, 13, 15)
Supplementary Exercises	pp.333 (1, 4, 5, 9, 11, 13)
§6.1 Diagonalizatio	pp.352-355(1, 3, 5, 7, 9, 11, 13, 17, 21, 23, 24, 26, 28, 29, 30)
§6.2 Diagonalization of Symmetric Matrices	pp366-367 (1, 3, 7, 9, 11, 15, 17, 19, 25, 27, 31)
§6.3 Real Quadratic Forms	pp.376-37(1, 3, 5, 7, 9, 11, 15, 21, 23)
§6.4 Conic Sections (Read)	pp 386 (1, 3, 5, 7, 11, 15, 17)
§6.5 Quadratic Surfaces	pp 1,3,5,7,9,11,13,15, 19,21 23 25,27)