

GRANDE PRAIRIE REGIONAL COLLEGE  
DEPARTMENT OF SCIENCE  
COURSE OUTLINE

1995

**MATHEMATICS 1020 A3**  
WINTER SEMESTER 1994 - 95

**TITLE:** APPLIED LINEAR ALGEBRA

**Prerequisite :** MA 1000

**SCHEDULE:** Tuesday, Thursday 11:00 - 12:20 J 204  
Seminars: AS1 Friday 15:00 - 15:50 J 204  
AS2 Thursday 15:00 - 15:50 J 131

**INSTRUCTORS:** LakshmaREDDY GANTA / Frank NANI  
**OFFICE:** J 220 / J 210  
**TELEPHONE:** 9 - 2850 / 9 - 2793  
**CONSULTATIONS:** ANY TIME THAT IS CONVENIENT TO BOTH YOU AND ONE OF US

**TEXT:** Elementary Linear Algebra by C.H. Edwards, Jr.  
and David E. Penney

**COMPOSITION OF THE COURSE GRADE:**

Final exam	45%
Term Test-1	15%
Term Test-2	15%
Quizzes	15%
Assignments	10%

## COURSE TOPICS:

Solving systems of linear equations, Gauss-Jordan reduction. The algebra of matrices, symmetric Matrices, triangular matrices, diagonal matrices, identity matrix, elementary matrices and their connection to row reduction, inverse of a matrix. Computation of  $A^{-1}$  by row reduction.

Definition of  $\det A$ ,  $\det A^T = \det A$ ,  $\det A = 0$  if and only if  $A^{-1}$  does not exist,  $\det AB$ , Cramer's rule.  $R^2$  and  $R^3$  as vector spaces.

Lines and planes in  $R^2$  and  $R^3$ ; dot and cross product, orthogonal projection (much of this material overlaps with your physics and engineering courses).

$R^n$ , subspace, linear independence, basis, dimension, relation of column space to solution of equations, equality of, dimensions of row and column space (rank of a matrix).

### Solutions of Linear Differential Equations

We will be selecting a core of useful information about the notion of perpendicularity in the vector spaces  $R^n$  and  $C[a,b]$ . The key ideas are: the inner (dot) product in  $R^n$  and  $C(a,b)$ , orthogonality of vectors, orthonormal basis, orthogonality matrix, Gram-Schmidt process.

Eigenvalues, Eigenvectors, Diagonalization of matrices, Applications to Systems of differential equations.

Complex numbers, complex eigenvalues,  $e^{ix}$  (Appendix F of Stewart's Calculus, plus special notes), solutions of systems of differential equations.

Transition matrix, orthogonal matrix, symmetric matrix.

## SCHEDULE OF EXAMINATIONS:

Term test-1 : Tuesday 7, February, 1995 (Tentative)

Term test-2 : Thursday <sup>5</sup>23, March, 1995 (Tentative)

Final Examination : Will be scheduled by Registrar's Office in April 1995.

Quizzes, term test and the final examination must be written at scheduled times.

**Seminars:** In the seminars you will be asked to complete a worksheet (perhaps in groups) with open book and notes, and the instructor circulating to help, and/or to write a quiz after a tutorial session. Generally, quizzes will be administered on Thursdays and Fridays. The instructor will let the class know of any change at the appropriate time. The quizzes will be based on the material currently under study--they are twenty to thirty minutes long and consist of one or two questions on a topic announced in a previous class. There will be about 10 of them.

**Assignments:** There will be 8 to 10 assignments. Assignment Problem Sets will be made available to students at appropriate times. Assignments should be legible and neatly done. Assignments must be submitted on time. **Late assignments will not be accepted.**

**Homework:** From time to time some home-work will be suggested from the text-book as different topics are covered. This home-work is for practice only and need not be handed in.

**Attendance:** If a student misses a particular class it is their responsibility to know the material covered and announcements made.

**Lateness:** In order to avoid disruption, students are requested not to be late for classes.

**Calculators:** Calculators are not allowed in quizzes, term tests and examinations.

**Food and drink:** LARGE meals are not allowed during the class time. A sandwich for survival will not be frowned at.

**Notes:** Take appropriate notes in the class placing a special mark or a symbol by the side of a concept or a problem that is important or difficult to understand or remember. It helps students immensely to go over the day's notes at home, preferably the same day when the matter is fresh in their mind. Going over the notes passively like a novel does not do much good for the learning process. Actually work out some or all of the problems completed during the class and then attempt other home-work questions.

If you miss a class, it is important that you keep track of material covered in the class. One way to do this is to get class-notes from a peer who takes notes with care. Write the notes rather than xerox them. Kinesthetics of writing helps comprehension and retention. Xeroxing of notes should be resorted to only when one has run into time-management problems