0206-130-01 Elementary Linear Algebra (4-units) Fall 2004

Synopsis:

Numerous situations of interest in science, management and commerce can be represented by a simple type of mathematical model called a "linear system."

Such systems consist of one or more algebraic equations of the first degree, involving an arbitrary number of 'unknown quantities' (i.e., variables).

This course explores the celebrated Gaussian Elimination algorithm: a general method for automatically computing all of the possible solutions to any such linear system, or for detecting that no solutions can exist (as happens in special cases where a system may happen to include equations that are 'inconsistent').

The idea of a matrix (a rectangular arrangement of numbers) is fundamental to this exploration and will be studied in detail:

- matrix manipulations (addition, subtraction, multiplication, inversion);
- elementary row and column operations, and matrix factorizations;
- the determinant for a square matrix (and what exactly it determines);
- how matrices are used to solve systems of linear equations;
- the underlying geometry of matrices, and their use as transformation operators;
- the significance of the eigenvalues and eigenvectors associated with a matrix;
- some applications to the making of optimum decisions in business management.

The course consists of lectures, readings, discussions, quizzes, and homework exercise-sets.

Learning Outcomes:

- You will know how to formulate linear systems as mathematical models
- You will know how to represent any linear system by a suitable matrix
- You will be able to compute the general solution to any linear system
- You will be able to break a complicated matrix into its simpler factors
- You will be able to recognize inherent geometric properties of a matrix
- You will know how linear algebra is used for business decision-making

Instructor:

Dr. Allan B. Cruse, Professor of Mathematics and Computer Science
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Textbook:

Howard Anton, *Elementary Linear Algebra (8th Edition),*
John Wiley & Sons, Inc. (2000), ISBN 0-471-17055-0

Exam Dates:

Midterm Exam I will be Wednesday, September 29.
Midterm Exam II will be Friday, October 22.
Midterm Exam III will be Monday, November 22.
Final Exam will be Thursday, December 16 (NOON)

Grading scheme:

Homework/Class Participation	10%
Midterm Exams (3)	45%
Final Examination	45%

Homework submissions:

Written homework normally is assigned at each class meeting, to be turned in at the beginning of the next class meeting.
[Please use standard-sized paper (i.e., 8-1/2 by 11 inches), fold your homework paper vertically, and at the top of the front page write your name, the course-number (Math 130), and the assignment's due-date. Thanks.]

Note: To expedite the process of reading, correcting, recording and returning homework papers, a policy of not receiving late submissions will be followed.