

**IMPERIAL COMMUNITY COLLEGE DISTRICT
IMPERIAL VALLEY COLLEGE**

COURSE OUTLINE

DIVISION: Science, Mathematics and Engineering

DATE: September 2006

COURSE TITLE: Introduction to Linear Algebra with Applications **COURSE NO.:** MATH 230 **UNITS:** 3

LEC HRS. 3 **LAB HRS.** _____ **HRS. TBA**

If cross-referenced, please complete the following

COURSE NO.(s) _____ **COURSE TITLE**

I. COURSE/CATALOG DESCRIPTION:

A first course in linear algebra intended for students majoring in mathematics, the physical science, engineering or business. Topics included are: systems of linear equations, matrices and determinants, vector spaces, linear transformations, eigenvalues and eigenvectors, and selected applications.

II. A. PREREQUISITES, if any:

MATH 194 with a grade of C or better.

B. COREQUISITES, if any:

C. RECOMMENDED PREPARATION, if any:

III. GRADING CRITERIA:

 X Course must be taken on a "letter-grade" basis only.

 Course may be taken on a "credit" basis or for a letter grade.

 Course must be taken on a "credit" basis only.

IV. MEASURABLE COURSE OBJECTIVES AND MINIMUM STANDARDS FOR GRADE OF "C":

1. The student will solve systems of linear equations and inequalities using elimination methods.
2. The student will apply the techniques of matrix algebra to the solution of systems of linear equations and inequalities.
3. The student will compute the determinant of a square matrix and apply determinants to matrix operations.
4. The student will perform vector operations in two or more dimensions and determine vector linear relationships, matrix dimension and rank.
5. The student will find the projection of vectors on planes in space using matrices and the Gram-Schmidt process.
6. The student will demonstrate the transformations of linear systems and find the kernel and range of such transformations.
7. The student will compute the scalar eigenvalue and eigenvector of a square matrix and diagonalize square matrices.
8. The student will choose appropriate techniques of linear algebra to solve application problems from different fields.

V. CORE CONTENT TO BE COVERED IN ALL SECTIONS:

<u>CORE CONTENT</u>	<u>APPROX. % OF COURSE</u>
1. Linear Systems A. Systems of linear equations and inequalities B. Various methods of solutions	5%
2. Matrices A. Definitions B. Properties C. Operations	10%
3. Determinants A. Definitions B. Properties C. Operations	10%
4. Vector Spaces A. Definitions B. Properties C. Operations D. Linear relationships E. Matrix dimension and rank	20%
5. Inner-product spaces A. Orthogonality B. Projections of vectors	10%
6. Linear Transformations A. Definitions and types B. Kernel and range	10%
7. Eigenvalues and eigenvectors of matrices A. Definitions B. Properties C. Diagonalization of a matrix	15%
8. Selected applications from various fields to be presented throughout the course content	20%

VI. METHOD OF EVALUATION TO DETERMINE IF OBJECTIVES HAVE BEEN MET BY STUDENTS: (check all that apply)

Essay	<u> X </u>	Class Activity	<u> X </u>	Written Assignments	<u> X </u>
Problem Solving Exercise	<u> X </u>	Final Exam	<u> X </u>	Oral Assignments	<u> X </u>
Skill Demonstration	<u> X </u>	Objective	<u> X </u>	Quizzes	<u> X </u>
Other	<u> X </u>				

VII. INSTRUCTIONAL METHODOLOGY: (Check all that apply)

Lecture	<u> X </u>	Discussion	<u> X </u>	Demonstration	<u> X </u>
Audio Visual	<u> X </u>	Group Activity	<u> X </u>	Lab Activity	<u> X </u>
Computer Assisted Instruction	<u> X </u>	Individual Simulation/ Assistance	<u> X </u>	Case Study	<u> X </u>
On-Line	<u> X </u>				

Two (2) hours of independent work done out of class per each hour of lecture or class work, or 3 hours lab, practicum, or the equivalent per unit.

Other

VIII. TEXTBOOK(S) AND SUPPLEMENT(S):

Lay, David. *Linear Algebra and Its Applications*. 3rd edition. Addison Wesley, 2006.

Larson, R. and Edward, B. *Elementary Linear Algebra*. 4th edition. Houghton Mifflin, 2000.

Kolman, B. and Hill, D. *Introductory Linear Algebra: An Applied First Course*. 8th edition. Prentice Hall, 2005.

Strang, Gilbert. *Linear Algebra and Its Applications*. 4th edition. Brooks/Cole, 2006.

Leon, Steven. *Linear Algebra with Applications*. 7th edition. Prentice Hall, 2006.