

OHLONE COLLEGE
Ohlone Community College District
OFFICIAL COURSE OUTLINE

I. Description of Course:

1. **Department/Course:** MATH - 103
2. **Title:** Introduction to Linear Algebra
3. **Cross Reference:**
4. **Units:** 3
Lec Hrs: 3
Lab Hrs:
Tot Hrs: 54.00
5. **Repeatability:** No
6. **Grade Options:** Grade Only (GR)
7. **Degree/Applicability:**
Credit, Degree Applicable, Transferable -
CSU & UC (T)
8. **General Education:** CSU General
Education (Plan B)
B2 - Mathematics/Quantitative Reasoning
District General Education (Plan A)
IV-B. Analytical Thinking and Oral
Communication IGETC (Plan C)
2. Mathematical Concepts/Quantitative
Reasoning
9. **Field Trips:** Not Required
10. **Requisites:**
Prerequisite
MATH 101B Calculus With Analytic
Geometry

12. Catalog Description:

This course includes an introduction to linear algebra including vector spaces, matrices, determinants, linear transformations, eigenvectors, techniques of solving systems of equations, and applications.

13. Class Schedule Description:

Vector spaces, matrices, determinants, linear transformations, eigenvectors, and applications.

14. Counselor Information:

Linear Algebra is required for math, physical science and engineering majors. The topics are also relevant for business and economics majors with a math orientation.

II. Student Learning Outcomes

The student will:

1. Use elementary row operations to reduce a matrix to reduced row echelon form and apply this technique to solving systems of linear equations.
2. Perform the arithmetic of vectors and matrices.
3. Identify definitions and properties of the determinant of a matrix.
4. Identify definitions and properties of vector spaces, including subspaces, basis and dimension.
5. Perform linear transformations and find the range, kernel, nullity and rank of a transformation.
6. Expand their levels of thinking to more abstract mathematics and apply this abstract

thinking to proofs.

7. Apply the above material to current applications.

III. **Course Outline:**

1. Linear Equations.
 - a. Systems of linear equations
 - b. Matrices and Matrix Operations including echelon forms
 - c. Matrices and Linear Systems of Equations along with Homogeneous Systems
 - d. Linear independence
2. Matrix Algebra
 - a. Matrix operations
 - b. Matrix Inverses
 - c. Characterizations of Invertible Matrices
3. Determinants, definition, properties and Cramer's Rule
4. Definitions and Basic Properties of Vector Spaces
 - a. Subspaces, Linear Independence, Linear Combinations and Span
 - b. Basis and Dimension and Change of Basis
 - c. Row Space, Column Space, Nullspace
 - d. Rank and Nullity
 - e. Properties of Linear Transformations: Range and Kernel
 - f. Matrix Representation of a Linear Transformation
5. Eigenvalues and Eigenvectors
 - a. The characteristic polynomial
 - b. Similar Matrices and diagonalization
6. Current Applications

IV. **Course Assignments:**

- A. Reading Assignments
- B. Projects, Activities, and other Assignments
 1. Homework
- C. Writing Assignments

V. **Methods of Evaluation:**

- A. Exams
- B. Quizzes

VI. **Methods of Instruction:**

- A. Lecture
- B. Demonstration
- C. Audiovisual
- D. Computer Assisted Instruction
- E. Collaborative Learning

VII. **Textbooks:**

Recommended

1. David Lay *Linear Algebra and its Applications* 3rd Edition, Addison-Wesley, 2003

Supplemental

VIII. **Supplies:**

