



Middlesex Community College
COURSE OUTLINE

MAT	272	Linear Algebra	3
Dept. Abbr.	Course No.	Course Title	Credits

Course Description

A beginning course in Linear Algebra, intended for students in mathematics, science and engineering. Topics include: Systems of linear equations, matrices, determinants, vectors and vector spaces, linear transformations, eigenvalues and eigenvectors. Applications will be considered, with emphasis on numerical methods. Computers and/or graphing calculators will be integrated into the course, as deemed appropriate.

PREREQUISITES: C OR BETTER IN MAT 256, AND ELIGIBILITY FOR ENG 101

General Objectives of the Course

After completing this course, the student will be able to:

Solve systems of Linear Equations by the Gauss-Jordan Elimination method

- Perform operations on vector spaces
- Compute the dot product and other operations on vectors
- Calculate various computations with matrices.
- Analyze and use matrix operations and linear transformations to solve systems of equations.
- Perform operations on determinants
- Compute determinants in order to solve systems of equations
- Solve eigenvalue and eigenvector problems and applications.
- Analyze vector spaces, and linear dependence and independence.
- Other applications as time allows.

This course will satisfy the Quantitative Reasoning requirement of the TAP, as Students will: interpret mathematical and quantitative information, and draw logical inferences from representations such as formulas, equations, graphs, tables and schematics. Students will also engage in Critical Analysis and Logical Thinking, as they will solve problems, and make decisions, based upon analytical processes.

TAP Learning Outcomes (Competencies) of the Course

Written Communication in English ((E)

3. Craft Logical Arguments

- Generate a controlling idea or thesis.
- Provide clear and logical evidence, support, or illustration for their assertions.
- Choose appropriate and effective organizing methods, employing effective transitions and signposts.

Critical Analysis and Logical Thinking (E)

2. Formulating arguments: Formulates good arguments, including a significant focus on inductive reasoning.
3. Analysis: Break subject matter into components and identify their interrelations to ascertain the defining features of the work and their contributions to the whole.
5. Synthesis: Draw together disparate claims into a coherent whole in order to arrive at well-reasoned and well - supported inferences that can be justified as a conclusion.

Quantitative Reasoning (D)

1. Represent mathematical and quantitative information symbolically, graphically, numerically, and verbally.
2. Apply quantitative methods to investigate routine and novel problems. This includes calculations/procedures, mathematical and/or statistical modeling, prediction, and evaluation.
3. Interpret mathematical and quantitative information and draw logical inferences from representations such as formulas, equations, graphs, tables, and schematics.
4. Evaluate the results obtained from quantitative methods for accuracy and/or reasonableness.

(D) Designated (E) Embedded

Number indicates the numbered item in the TAP Competency Report

Unit #	Instructional Unit	Specific Objectives of Unit
1	<i>Linear Equations and Vectors.</i>	<p>Analyze systems of equations, and write them in matrix format.</p> <p>Solve a system of equations by the Gauss-Jordan elimination method.</p> <p>Solve a system of equations by putting the corresponding matrix in reduced echelon form.</p> <p>Classify vector spaces, and perform corresponding operations.</p> <p>Test for linear independence of vectors.</p> <p>Solve for the dot product of two vectors, and diagnose related applications.</p>
2	<i>Matrices and Linear Transformations</i>	<p>Perform various operations on matrices.</p> <p>Solve systems of equations by using the inverse of a matrix.</p> <p>Formulate and use various matrix transformations.</p> <p>Perform linear transformations on matrices.</p>
3	<i>Determinants and Eigenvectors</i>	<p>Categorize basic properties of determinants, and perform operations on determinants.</p> <p>Calculate determinants, so as to solve systems of equations.</p> <p>Solve for eigenvalues and eigenvectors of a matrix, using determinants.</p> <p>Analyze applications, such as Markov Chains.</p>
4	<i>General Vector Spaces</i>	<p>Demonstrate and use properties of vector spaces and subspaces.</p> <p>Analyze linear combinations of vectors.</p> <p>Demonstrate linear independence and dependence of vectors, and basis vectors.</p> <p>Analyze other properties and applications of vector spaces, and linear transformations.</p>
5	<i>Coordinate representations</i>	<p>Solve for coordinate vectors</p> <p>Analyze linear transformations on vector spaces.</p> <p>Calculate matrix representations of linear transformations.</p> <p>Use and diagonalize matrices.</p> <p>Formulate other applications.</p>