

SUFFOLK COUNTY COMMUNITY COLLEGE
COLLEGE-WIDE COURSE SYLLABUS
MAT206 (formerly MA93)

I. COURSE TITLE:

Linear Algebra

II. CATALOG DESCRIPTION:

Study of vector spaces, subspaces, linear independence, bases, dimension, linear transformations, matrices, diagonalization processes, eigenvalues and eigenvectors, determinants, Euclidean spaces and orthonormal bases.

Prerequisite: C or better in MAT142.

A-G / 4 cr. hrs.

III. COURSE GOALS:

- A. Introduce the formal concept of a vector space.
- B. Provide a gateway to the study of advanced mathematics.
- C. This course satisfies the SUNY general education requirement for mathematics.

IV. Learning Outcomes: (*Main concepts, principles, and skills you want students to learn from this course*)

Upon completion of this course, students will be able to:

- a. Use matrices to represent systems of linear equations and use elementary row operations as well as matrix algebra to solve systems of linear equations.
- b. Perform matrix operations and find inverses for matrices (where possible).
- c. Use properties of inverse and transpose to perform matrix manipulations as well as to prove simple statements about matrices.
- d. Find determinants and use properties of determinants to determine if a matrix is nonsingular.
- e. Use the definitions of vector space, subspace, linear independence, basis, dimension and linear transformation to prove statements about vector spaces and to find a basis for a space or a subspace.
- f. Prove whether or not a set is a vector space.
- g. Describe the rank-nullity theorem for matrices and for linear transformations.
- h. Find a matrix representation for a linear transformation and composition of transformations using matrix multiplication.
- i. Calculate eigenvalues and eigenvectors for matrices.
- j. Diagonalize symmetric matrices.

V. Major Topics Required:

Topics	Approximate Time (Including Examinations)
A. <u>Matrices:</u> 1. solutions of systems of linear equations 2. the augmented matrix and reduced echelon form 3. matrix operations and properties 4. inverse of a matrix and its properties	3 weeks
B. <u>Vector Spaces:</u> 1. definition and examples 2. subspaces and spanning sets 3. linear independence 4. basis and dimension 5. change of basis	3 ¾ weeks
C. <u>Linear Transformations:</u> 1. definition 2. kernel, rank and nullity 3. operations with linear transformations 4. isomorphisms 5. matrix representations of linear transformations	3 weeks
D. <u>Determinants:</u> 1. definition and properties 2. manual calculation of determinants 3. inverses and Wronskians	1 ½ weeks
E. <u>Eigenvalues and Eigenvectors:</u> 1. definitions 2. eigenspaces and similarity 3. representation by a diagonal matrix 4. stability and eigenvalues 5. eigenvalue problems and applications	3 ¾ weeks

VI. EVALUATION OF STUDENT PERFORMANCE:

To be determined by the instructor

VII. PROGRAMS THAT REQUIRE THIS COURSE: *(List or indicate none.)*

Liberal Arts and Sciences: Mathematics Emphasis LAMA-AA

VIII. COURSE(S) THAT REQUIRE THIS COURSE AS A PREREQUISITE:

(List courses or indicate none)

NONE

VII. Supporting Information: *(Examples – newspapers, journals, Internet resources, CD-ROMS, Videos, other teaching materials, textbooks, etc.)*

Mathematics tutoring services, as well as video and computer aids, are provided for all students through the Math Learning Center (Ammerman Campus, Riverhead 235), the Center for Academic Excellence (Grant Campus, Health, Sports and Education Center 129), and the Academic Skills Center (Eastern Campus, Montaukett 224).