SUFFOLK COUNTY COMMUNITY COLLEGE
COLLEGE-WIDE COURSE SYLLABUS
MAT210

I. COURSE TITLE:
Applied Linear Algebra

II. CATALOG DESCRIPTION:
An introduction to the theory and use of vectors and matrices. Matrix theory including systems of linear equations. Theory of Euclidean and abstract vector spaces. Eigenvalues and eigenvectors. Linear Transformations. May not be taken for credit in addition to MAT206. Prerequisite: MAT141 with C or higher.

A/ 3 cr. hrs.

III. COURSE OBJECTIVES:
Upon successful completing of this course, students will be able to:

A. Become familiar with a diverse set of linear models and use them to interpret theory and techniques throughout the course; a system of 3 linear equations in 3 unknowns; a Markov chain model; a dynamic (iterative) linear systems of equations; a general equilibrium model.
B. Compute and apply basic vector-matrix operations: scalar products; matrix-vector products; matrix multiplication.
C. Demonstrate diverse uses of scalar and vector measures of a matrix: matrix norms; dominant eigenvalue and dominant eigenvector.
D. Solve a system of linear equations using: Gaussian elimination; determinants; matrix inverses; iterative methods, least squared approximate solutions using pseudo-inverses.
E. Demonstrate how Gaussian elimination determines if a system of linear equations is: overdetermined; under-determined—and how to determine the family of solutions; uniquely determined—and find the solution.
F. Apply basic ideas of numerical linear algebra: computational complexity of matrix operations; LU decomposition; using partitioning to simplify matrix operations; ill-conditioned matrices and the condition number of a matrix.
G. Learn and use basic theory about the vector spaces associated with a linear transformation: linear independence; the null space; the range space; orthonormal spaces.
H. Examine a sampling of linear models, chosen from linear regression, computer graphics, Markov chains, and linear programming.
I. Strengthen ability in communicating and translating of mathematical concepts, models to real world settings: present solutions to problems in a clear, well-laid out fashion; explain key concepts from the class in written English; convert problems described in written English into an appropriate mathematical form; convert the mathematical solutions into a written answer.

IV. TOPICS OUTLINE WITH TIMELINE

Topics	Approximate Time (Including Examinations)
A. Introductory Models	1 1/3 Weeks
B. Matrices: 1. matrix operations, 2. matrix algebra, 3. matrix norms, 4. eigenvalues and eigenvectors	3 2/3 Weeks
C. Solving Systems of Linear Equations: 1. Gaussian elimination, 2. inverses, 3. determinants, 4. iterative methods, 5. condition numbers, and 6. related numerical analysis	4 weeks
D. Applications: 1. regression, 2. Markov chains, 3. growth models	2 2/3 weeks
E. Theory of Systems of Linear Equations: 1. linear independence, 2. bases, 3. rank, 4. null space and range, 5. orthogonal bases, 6. pseudoinverse	3 1/3 weeks

V. Evaluation of Student Performance:

To be determined by the instructor

VI. Programs that require this course:

Computer Science/AS (required)