# SUFFOLK COUNTY COMMUNITY COLLEGE
# COLLEGE-WIDE COURSE SYLLABUS
## MAT121 (formerly MA36)

**I. COURSE TITLE:**
Finite Mathematics

**II. CATALOG DESCRIPTION:**
For students interested in business, social and managerial sciences. Introduction to basic concepts and techniques of those areas in mathematics which deal with finite sets. Topics include linear programming, probability theory, matrix manipulations, Markov Chains, game theory and optimization problems.
A-E-G / 3 cr. hrs.

**III. COURSE GOALS:**
A. Introduce applied methods of mathematics that are used in business and management science.
B. This course satisfies the SUNY general education requirement for mathematics.

**IV. COURSE OBJECTIVES:**
Upon successful completion of this course, students will be able to:
A. perform matrix manipulations, including: addition, subtraction, and multiplication (both scalar and matrix);
B. write matrix inverses;
C. solve matrix equations, write algebraic equations in matrix form, and switch between algebraic and matrix forms; solve the matrix equation AX = B by Guassian elimination;
D. solve linear programming problems by graphing and the simplex algorithm;
E. model stochastic processes; determine if a transition matrix is regular; calculate and interpret the equilibrium vector;
F. do the basics of 2-person, zero sum games: including: payoffs, saddle points, dominance, and strategy for 2x2, 2xn, and mx2 games.

**V. Topics Outline with Timeline**

| **Topics** | **Approximate Time (Including Examinations)** |
|---|---|
| A. Introductory Matrix Theory<br>1. arithmetic of matrices<br>2. special matrices - zero, identity, diagonal, row, column<br>3. elementary row operations<br>4. inverse of a matrix | 2 weeks |
| B. Systems of Equations<br>1. solutions of matrix equations AX=B (homogeneous, non-homogeneous case)<br>2. Gaussian elimination techniques | 2 ½ weeks |
| C. Linear Programming<br>1. solution of a 2-dimensional system by graphing<br>2. simplex algorithm | 4 ½ weeks |
| D. Stochastic Processes<br>1. regular Markov chains<br>2. equilibrium or steady-state vector | 1 ½ weeks |
| E. Game Theory<br>1. saddle points<br>2. dominance<br>3. zero sum games<br>4. 2x2 games<br>5. 2xm, mx2 games | 1 week |
| Optional Topics: (If interest and time permit, instructors may introduce any topic that expands on the ideas in the core outline.) | 3 weeks |
| F. Graph Theory: digraphs, connected graphs, applications to sociology, psychology<br>G. Transportation problem<br>H. Assignment problem<br>I. Absorbing Markov chains<br>J. n x m games; m, n $\geq$ 3, by simplex algorithm<br>K. Arithmetic, Geometric Progressions, and Math of Finance<br>L. Additional Methods for Solving Systems of Equations<br>1. $X = A^{-1}B$, (inverse matrix technique)<br>2. Cramer's Rule and determinants<br>3. parametric equations<br>4. parametric solutions<br>M. Two and Three Dimensional Optimization Problems by Slack Tables<br>N. Counting and Probability<br>1. formula for permutations, combinations<br>2. basic probability rules - and, or events<br>3. complements<br>4. sample spaces (counting principles)<br>5. probability distributions of discrete random variable<br>O. Traffic Flow Problems | |

**VI. Evaluation of Student Performance:**
To be determined by the instructor

**VII. Programs that require this course:**
Accounting/AS (recommended)
Business Administration/AS (required)
Information Technology/AAS (recommended)

**VIII. Courses that require this course as a prerequisite:**
None

**IX. Supporting Information:**
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, Orient 213).