

**NOVA COLLEGE-WIDE COURSE CONTENT SUMMARY
MTH 181 - FINITE MATHEMATICS I (3 CR.)**

Course Description

Introduces set theory, systems of linear equations, matrices, linear programming, probability, and game theory. Lecture 3 hours per week.

General Course Purpose

This course is primarily to give the student an appreciation for the use of mathematics as a tool (applications and mathematical modeling), as well as developing problem solving and critical thinking abilities.

Course Prerequisites/Corequisites

Prerequisites: Competency in Math Essentials Units MTE 1-6 as demonstrated through the placement and diagnostic tests, or by completion through unit 6 in an MTT course. A student who provides official evidence of a minimum mathematics score of 520 on the SAT or a minimum score of 22 on the ACT taken within the last two years may register for these courses without taking the math placement test

Course Objectives

As a result of the learning experiences provided in this course, the student should be able to:

- perform set operations,
- understand the basic concepts of probability,
- graph linear equation in two unknowns,
- solve verbal problems using algebraic or graphical techniques,
- perform matrix operations and use matrices to solve problems,
- graph linear inequalities in two unknowns,
- solve systems of linear inequalities by graphing,
- understand the importance of optimization, and realize that different situations require different optimization techniques,
- understand that many situations can be described in the quantitative terms of a mathematical model, and that the form a mathematical model assumes depends on both the information available and the information desired.

Major Topics to be Included

- A. Sets
 - 1. Relations: equality, equivalence, subset
 - 2. Operations:
 - a. union, intersection
 - b. complement, relative complement
- B. Matrices
 - 1. Matrix equality
 - 2. Matrix arithmetic
 - 3. Properties of matrix arithmetic
 - 4. Equivalent matrices: reduced matrices
 - 5. Rank of a matrix
 - 6. Matrix solution of systems of linear equations*
 - 7. Multiplicative inverse of a matrix by row reduction

- 8. Applications
- C. Linear Programming (graphical/algebraic solution)
 - 1. Graphing linear inequalities
 - 2. Graphing systems of linear inequalities in two unknowns
 - 3. Convex sets
 - 4. Graphical solutions to linear programming problems
- D. Linear Programming (simplex method solution)
 - 1. Pivot operations
 - 2. Writing of constraint equations
 - 3. The simplex method for maximizing a linear programming problem.
 - 4. The simplex method for minimizing a linear programming problem.
- E. Probability
 - 1. Sample spaces and assignment of probabilities
 - 2. Simple events
 - 3. Probability for equally likely events
- F. Markov Chains
 - 1. Transition Matrix
 - 2. Probability distribution after K observations
 - 3. Fixed probability vector
 - 4. Regular chains
 - 5. Applications
- G. Game theory
 - 1. Construct a game matrix for a two person zero sum game.
 - 2. Expected pay off of a two person zero sum game.
 - 3. Optimal strategy of a two person zero sum game.
- H. Mathematical Modeling - Application of previous topics in the social natural and managerial sciences

Extra Topics (optional)

Absorbing chains

* May need to review linear equations and algebraic solution of systems of linear equations