

SPRINGFIELD PUBLIC SCHOOLS

DISCRETE MATHEMATICS I

Course Description

Discrete Mathematics I is designed for students who are planning a career in computer science, business, education, the biological sciences, the social sciences, or liberal arts. Calculators, “hands-on” activities, computer technology, and visual media will be used to explore, develop, and solve problems dealing with management science which includes route networks and applications, scheduling, and linear programming. This class also deals with social choices which include election theory, fair division, and game theory. Optional topics that may be covered are fractal geometry and apportionment. This course will encourage the modeling of real-world situations through finite methods. Prerequisite: Algebra II, Integrated Algebra II, or Integrated Math III.

Course Rationale

Discrete Mathematics courses have been developed for students interested in computer science, pre-law, business, education, social studies, biological science, etc. Computers are discrete machines so topics from discrete mathematics are essential in solving problems by computer methods. The topics for courses in discrete mathematics are not selected just because of their computer applications, but because they will give college-bound students the background to solve math-related problems in their selected areas of interest. The students will be involved in collecting information and communicating the information mathematically to solve problems and make decisions.

Major Instructional Goals

The intent of the Springfield R-12 Secondary Mathematics Program is to explore, investigate, and understand the importance of mathematics through real-world experiences. In mathematics, students will acquire the knowledge and skills to problem solve, communicate, reason, create models, and make connections. Students will:

1. Apply concepts of **Number and Operations** including:
 - a. Judge the reasonableness of numerical computations and their results. (MA1; 3.8)
 - b. Solve problems involving proportions. (MA1; MA4; 3.3)
 - c. Investigate and analyze fair-division problems involving two or more players and one or more objects to divide. (MA6; 1.10, 3.4)
2. Apply concepts of **Algebraic Relationships** including:
 - a. Compare and contrast various forms of representation of patterns. (MA4; 1.6)
3. Apply concepts of **Geometric and Spatial Relationships** including:
 - a. Draw or use visual models to represent and solve problems. (MA2; 3.1)
 - b. Analyze and solve applications problems involving vertex-edge graphs or networks to find optimal solutions. (MA6; 1.8, 3.4)

- c. Create trees to model problems, including planning, scheduling, and critical-path analysis, in order to find optimal solutions. (MA6; 1.8, 3.4)
4. Apply concepts of **Data Analysis and Probability** including:
- a. Apply concepts from election theory to evaluate various voting systems, including weighted voting systems. (MA6; 1.10, 3.4)