



DISCRETE MATHEMATICS

Counselors are available to assist parents and students with course selections and career planning. Parents may arrange to meet with the counselor by calling the school's guidance department.

COURSE DESCRIPTION

Discrete Mathematics offers methods of problem-solving which are not normally found in the algebra, geometry, trigonometry, or mathematical analysis courses. Problems in the area of management science such as modeling problems with graphs, scheduling, designing efficient delivery routes, and optimization are emphasized along with social decision-making topics including fair division.

PREREQUISITE

Algebra II or Algebra II/Trigonometry

OPTION FOR NEXT COURSE

Trigonometry and/or Probability and Statistics

REQUIRED STUDENT TEXTBOOK

Excursions in Modern Mathematics, Fifth Edition, Tannenbaum, Pearson/Prentice Hall (2004)

RECOMMENDED CALCULATOR

TI-83 Plus or TI-84 Plus

Virginia Beach Instructional Objectives
Discrete Mathematics (1 Semester) – MA3125

School Net Objective	Objective
Election Theory and Fair Division	
MA.D.1.1	The student will determine group rankings through a variety of election methods, including plurality, majority, Borda, runoff, sequential runoff, Condorcet, and approval. The student will be able to analyze the advantages and disadvantages of each method in a given situation and identify flaws in group-ranking methods. (SOL DM.8)
MA.D.1.2	The student will select, apply, and justify a method of fair division such as divide and choose, lone divider, marker, or last diminisher. The student will compare and contrast the continuous and the discrete cases of fair division. (SOL DM.7)
MA.D.1.3	The student will apply apportionment methods to allocation decisions. The students will be able to compare, contrast, and identify flaws in apportionment methods, including Hamilton, Webster, Jefferson, Adams, and Hill-Huntington. (SOL DM.9)
Recursion and Optimization	
MA.D.2.1	The student will determine minimum project time, be able to construct an order-requirement digraph to model a given situation, and determine the critical path(s) in a given graph. The student will be able to use the list-processing algorithm and determine if the result is optimum and compare and contrast student-created algorithms with the list-processing algorithm. (SOL DM.5)
MA.D.2.2	The student will apply linear programming to problem solving. This includes: determining the constraints (inequalities) for a given problem; being able to graph the system of constraints using a graphing calculator; determining the corner points of the feasible region and finding the optimal solution; and applying the Simplex Method of problems with more than two variables. (SOL DM.6)
Graphs	
MA.D.3.1	The student will create matrices to represent a situation, perform matrix operations using a graphing calculator, and apply matrices to problem solving. (SOL DM.1)
MA.D.3.2	The student will construct a vertex-edge graph to model a problem and be able to determine connectedness, planarity, and valences of a graph. The student will be able to model a problem with a directed graph, determine isomorphism given two or more graphs, and create an adjacency matrix for a graph. (SOL DM.1)
MA.D.3.3	The student will solve problems through investigation and application of circuits, cycles, Euler Paths, Euler Circuits, Hamilton Paths, and Hamilton Circuits. Students will use existing algorithms and student-created algorithms. (SOL DM.2)
MA.D.3.4	The student will be able to apply vertex-edge graphs to conflict-resolutions problems, such as map coloring, scheduling, matching, and optimization using graph coloring and chromatic numbers. (SOL DM.3)
MA.D.3.5	The student will apply vertex-edge graphs to problem solving using algorithms such as Kruskal's, Prim's, or Dijkstra's, relating trees, networks, and paths, in order to determine the number of possible solutions and generate solutions when a feasible number exists. (SOL DM.4)



VIRGINIA BEACH CITY PUBLIC SCHOOLS

A H E A D O F T H E C U R V E

MISSION STATEMENT

The Virginia Beach City Public Schools, in partnership with the entire community, will empower every student to become a life-long learner who is a responsible, productive and engaged citizen within the global community.

DEPARTMENT OF CURRICULUM AND INSTRUCTION

2512 George Mason Drive P.O. Box 6038

Virginia Beach, VA 23456-0038

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Alternative formats of this publication which may include taped, Braille, or large print materials are available upon request for individuals with disabilities. Call or write The Department of Curriculum and Instruction, Director of Secondary Instructional Services, Virginia Beach City Public Schools, 2512 George Mason Drive, P.O. Box 6038, Virginia Beach, VA 23456-0038, Telephone (757) 263-1070 or (757) 263-1429, fax (757) 263-1412.