

Dublin City Schools Graded Course of Study Discrete Math (Semester)

Program Description:

Discrete mathematics is the branch of mathematics dealing with objects that can assume only distinct, separated values. The course will cover topics including Game/Decision Theory, Voting Theory, Graph Theory, Probability, Matrices, Counting and Number Theory and Set Theory while focusing on mathematical logic. This semester course involves the study of mathematical models and students will develop mastery in problem solving, communication and reasoning.

I. Discrete Math Major Topic: Number and Quantity

Topics	Benchmarks
A. Use matrices to model and solve problems.	<ul style="list-style-type: none"> • Use matrices to represent and manipulate data. • Multiply matrices by scalars to produce new matrices (e.g., as when all the payoffs in a game are doubled).
B. Reason quantitatively and use units to solve problems.	<ul style="list-style-type: none"> • Define appropriate quantities for the purpose of descriptive modeling. • Choose a level of accuracy appropriate to limitations on measurement when reporting quantities.

II. Discrete Math Major Topic: Algebra

Topics	Benchmarks
A. Understand the concept of a function and use function notation.	<ul style="list-style-type: none"> • Recognize that sequences are functions, sometimes defined recursively, whose domain is a subset of the integers.
B. Build a function that models a relationship between quantities.	<ul style="list-style-type: none"> • Determine an explicit expression, a recursive process, or steps from calculation from a context. • Write arithmetic and geometric



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	sequences both recursively and with an explicit formula, use them to model situations, and translate them between the two forms.
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III. Discrete Math Major Topic: Geometry

Topics	Benchmarks
A. Apply geometric concepts in modeling situations.	<ul style="list-style-type: none"> Apply geometric methods to solve design problems (e.g., designing an object or structure to satisfy physical constraints or minimize cost).
B. Understand the main concepts of graph theory.	<ul style="list-style-type: none"> Apply concepts of graph theory to model real world problems.

IV. Discrete Math Major Topic: Statistics and Probability

Topics	Benchmarks
A. Understand and evaluate random processes underlying statistical experiments.	<ul style="list-style-type: none"> Decide if a specified model is consistent with results from a given data-generating process (e.g., using simulation).
B. Make inferences and justify conclusions from sample surveys, experiments, and observational studies.	<ul style="list-style-type: none"> Recognize the purposes of and differences among sample surveys, experiments, and observational studies; explain how randomization relates to each. Use data from a randomized experiment to compare two different treatments; use simulations to decide if differences between parameters are significant.
C. Understand independence and conditional probability and use them to interpret data.	<ul style="list-style-type: none"> Describe events as subsets of a sample space using characteristics of the outcomes, or as unions, intersections, or complements of other events.



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<p>D. Use probability to evaluate outcomes of decisions.</p>	<ul style="list-style-type: none">• Weigh the possible outcomes of a decision by assigning probabilities to payoff values and finding expected values.<ul style="list-style-type: none">○ Find the expected payoff for a game of chance.○ Evaluate and compare strategies on the basis of expected values.• Use probabilities to make fair decisions.• Analyze decisions and strategies using probability concepts (e.g., product testing, medical testing, pulling a hockey goalie at the end of a game).
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