



Public Schools of North Carolina  
State Board of Education | Department of Public Instruction

## **2019 – 2003 Standards Crosswalk Discrete Mathematics for Computer Science and Discrete Mathematics**

This document is designed to help North Carolina educators teach the NC Standard Course of Study for Mathematics. NCDPI staff are continually improving these tools to better serve teachers.

This document is a general comparison of the current 2003 Discrete Math Standard Course of Study and the new 2019 Discrete Mathematics for Computer Science Standard Course of Study. It provides initial insight into sameness and difference between these two sets of standards. This document is not intended to answer all questions about the nuances of the new standards versus the old – in fact, we imagine you will develop questions as you do a close reading of the new standards. Please send the K-12 Math Section of the NC DPI any thoughts, feedback, questions and ideas about additional resources that would be helpful as you start preparing to teach the standards. You can email Beverly Vance at [beverly.vance@dpi.nc.gov](mailto:beverly.vance@dpi.nc.gov) with additional questions and comments.

2019 Discrete Mathematics for Computer Science Standards	2003 Discrete Mathematics Standards	
Strand		
Standard	Competency Goal	Comments/Notes
Objective	Objective	
Number and Quantity		
<b>DCS.N.1 Apply operations with matrices and vectors.</b>	COMPETENCY GOAL 1: The learner will use matrices and graphs to model relationships and solve problems.	
<b>DCS.N.1.1</b> Implement procedures of addition, subtraction, multiplication, and scalar multiplication on matrices.	1.01 Use matrices to model and solve problems. b) Write and evaluate matrix expressions to solve problems.	
<b>DCS.N.1.2</b> Implement procedures of addition, subtraction, and scalar multiplication on vectors.	1.01 Use matrices to model and solve problems. b) Write and evaluate matrix expressions to solve problems.	
<b>DCS.N.1.3</b> Implement procedures to find the inverse of a matrix.	1.01 Use matrices to model and solve problems. b) Write and evaluate matrix expressions to solve problems.	
<b>DCS.N.2 Understand matrices to solve problems.</b>	COMPETENCY GOAL 1: The learner will use matrices and graphs to model relationships and solve problems.	
<b>DCS.N.2.1</b> Organize data into matrices to solve problems.	1.01 Use matrices to model and solve problems. a) Display and interpret data.	
<b>DCS.N.2.2</b> Interpret solutions found using matrix operations including Leslie Models and Markov Chains, in context.	1.01 Use matrices to model and solve problems. a) Display and interpret data.	
<b>DCS.N.2.3</b> Represent a system of equations as a matrix equation.		New Content
<b>DCS.N.2.4</b> Use inverse matrices to solve a system of equations with technology.		New Content
<b>DCS.N.3 Understand set theory to solve problems.</b>		New Content
<b>DCS.N.3.1</b> Recognize sets, subsets, and proper subsets.		New Content

<b>DCS.N.3.2</b> Implement set operations to find unions, intersections, complements and set differences with multiple sets.		New Content
<b>DCS.N.3.3</b> Represent properties and relationships among sets using Venn diagrams.		New Content
<b>DCS.N.3.4</b> Interpret Venn diagrams to solve problems.		New Content
<b>DCS.N. 4 Understand statements related to number theory and set theory.</b>		New Content
<b>DCS.N.4.1</b> Use the Euclidean Algorithm to determine greatest common factor and least common multiple.		New Content
<b>DCS.N.4.2</b> Use the Fundamental Theorem of Arithmetic to solve problems.		New Content
<b>DCS.N.4.3</b> Conclude that sets are equal using the properties of set operations.		New Content
<b>DCS.N.4.4</b> Explain theorems related to greatest common factor, least common multiple, even numbers, odd numbers, prime numbers, and composite numbers.		New Content

2019 Discrete Mathematics for Computer Science Standards		2003 Discrete Mathematics Standards	Comments/Notes
Strand			
Standard	Competency Goal		
Objective	Objective		
Functions			
<b>DCS.F.1 Apply recursively-defined relationships to solve problems.</b>	COMPETENCY GOAL 3: The learner will describe and use recursively defined relationships to solve problems.		
<b>DCS.F.1.1</b> Implement procedures to find the <i>n</i> th term in an arithmetic or geometric sequence using spreadsheets.	3.01 Use recursion to model and solve problems. d) Write explicit definitions using iterative processes, including finite differences and arithmetic and geometric formulas.		
<b>DCS.F.1.2</b> Represent the sum of a sequence using sigma notation.	3.01 Use recursion to model and solve problems. a) Find the sum of a finite sequence.		

	b) Find the sum of an infinite sequence.	
<b>DCS.F.1.3</b> Implement procedures to find the sum of a finite sequence.	3.01 Use recursion to model and solve problems. a) Find the sum of a finite sequence.	
<b>DCS.F.1.4</b> Implement procedures to find the sum of an infinite sequence and determine if the series converges or diverges.	3.01 Use recursion to model and solve problems. b) Find the sum of an infinite sequence. c) Determine whether a given series converges or diverges.	
<b>DCS.F.1.5</b> Interpret the solutions to arithmetic and geometric sequences and series problems, in context.		New Content

<b>2019 Discrete Mathematics for Computer Science Standards</b>	<b>2003 Discrete Mathematics Standards</b>	
<b>Strand</b>		<b>Comments/Notes</b>
<b>Standard</b>	<b>Competency Goal</b>	
<b>Objective</b>	<b>Objective</b>	
<b>Statistics and Probability</b>		
<b>DCS.SP.1 Apply combinatorics concepts to solve problems.</b>	COMPETENCY GOAL 2: The learner will analyze data and apply probability concepts to solve problems.	
<b>DCS.SP.1.1</b> Implement the Fundamental Counting Principle to solve problems.	2.01 Describe data to solve problems. a) Apply and compare methods of data collection.	
<b>DCS.SP.1.2</b> Implement procedures to calculate a permutation or combination.	2.01 Describe data to solve problems. b) Apply statistical principles and methods in sample surveys.	

2019 Discrete Mathematics for Computer Science Standards	2003 Discrete Mathematics Standards	Comments/Notes
Strand		
Standard	Competency Goal	
Objective	Objective	
Graph Theory		
<b>DCS.GT.1 Apply combinatorics concepts to solve problems.</b>	COMPETENCY GOAL 1: The learner will use matrices and graphs to model relationships and solve problems.	
<b>DCS.GT.1.1</b> Represent real world situations using a vertex-edge graph, adjacency matrix, and vertex-edge table.	1.02 Use graph theory to model relationships and solve problems.	
<b>DCS.GT.1.2</b> Test graphs and digraphs for Euler paths, Euler circuits, Hamiltonian paths, or Hamiltonian circuits	1.02 Use graph theory to model relationships and solve problems.	
<b>DCS.GT.1.3</b> Interpret a complete digraph to determine rank.	1.02 Use graph theory to model relationships and solve problems.	
<b>DCS.GT.2 Apply graph theory to solve problems.</b>	COMPETENCY GOAL 1: The learner will use matrices and graphs to model relationships and solve problems.	
<b>DCS.GT.2.1</b> Implement critical path analysis algorithms to determine the minimum project time.	1.02 Use graph theory to model relationships and solve problems.	
<b>DCS.GT.2.2</b> Implement the brute force method, the nearest-neighbor algorithm, and the cheapest-link algorithm to find solutions to a Traveling Salesperson Problem.	1.02 Use graph theory to model relationships and solve problems.	
<b>DCS.GT.2.3</b> Implement vertex-coloring techniques to solve problems.	1.02 Use graph theory to model relationships and solve problems.	
<b>DCS.GT.2.4</b> Implement Kruskal and Prim's algorithms to determine the weight of the minimum spanning tree of a connected graph.	1.02 Use graph theory to model relationships and solve problems.	

2019 Discrete Mathematics for Computer Science Standards		2003 Discrete Mathematics Standards	Comments/Notes
Strand			
Standard	Competency Goal		
Objective	Objective		
Logic			
<b>DCS.L.1 Evaluate mathematical logic to model and solve problems.</b>			New Content
<b>DCS.L.1.1</b> Construct truth tables that encode the truth and falsity of two or more statements.			New Content
<b>DCS.L.1.2</b> Critique logic arguments (e.g., determine if a statement is valid or whether an argument is a tautology or contradiction).			New Content
<b>DCS.L.1.3</b> Check 1s and 0s to determine whether a statement is true or false using Boolean logic circuits.			New Content
<b>DCS.L.1.4</b> Judge whether two statements are logically equivalent using truth tables.			New Content

		2003 Discrete Mathematics Standards	Comments/Notes
Removed 2003 Content			
Standard	Competency Goal		
Objective	Objective		
	COMPETENCY GOAL 2: The learner will analyze data and apply probability concepts to solve problems.		
	2.01 Describe data to solve problems.		Removed Content

	<ul style="list-style-type: none"> <li>a) Apply and compare methods of data collection.</li> <li>b) Apply statistical principles and methods in sample surveys.</li> <li>c) Determine measures of central tendency and spread.</li> <li>d) Recognize, define, and use the normal distribution curve.</li> <li>e) Interpret graphical displays of data.</li> <li>f) Compare distributions of data.</li> </ul>	
	<p>2.02 Use theoretical and experimental probability to model and solve problems.</p> <ul style="list-style-type: none"> <li>c) Create and use simulations for probability models.</li> <li>d) Find expected values and determine fairness.</li> <li>e) Identify and use discrete random variables to solve problems.</li> <li>f) Apply the Binomial Theorem.</li> </ul>	Removed Content
	<p>2.03 Model and solve problems involving fair outcomes:</p> <ul style="list-style-type: none"> <li>a) Apportionment.</li> <li>b) Election Theory.</li> <li>c) Voting Power.</li> <li>d) Fair Division.</li> </ul>	Removed Content
	COMPETENCY GOAL 3: The learner will describe and use recursively defined relationships to solve problems.	
	3.01 Use recursion to model and solve problems.	Removed Content

	e) Verify an explicit definition with inductive proof.	
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