



VIRGINIA BEACH CITY PUBLIC SCHOOLS
CHARTING THE COURSE

Department of Teaching & Learning
Parent/Student Course Information

COMPUTER PROGRAMMING

(MA 3172)

One credit, One year

Grades 11-12

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

This year-long course is designed to introduce students to the fundamentals of programming using a variety of tools. Although students may have had previous computer experience, no programming knowledge is assumed. Students will be introduced to problem-solving and programming concepts using *Alice*, a three-dimensional graphics-oriented programming environment. Through *Alice*, students will be introduced to the object-oriented computer programming paradigm used by many modern programming languages. The course includes the history of computing, hardware and software, problem solving, computer graphics, objects, functions, control structures, strings and arrays. Students will apply the concepts learned through *Alice* to the Java programming language using the BlueJ programming environment during the second semester of the course.

PREREQUISITE

Geometry Honors or Geometry Part 2

REQUIRED TEXTBOOKS

Learning to Program with Alice, Third Edition, Dann, Cooper, and Pausch, Pearson Education (2012)

Exploring Wonderland: Java Programming Using Alice and Media Computation, Dann, Cooper, and Ericson, Pearson Education (2012)

Virginia Beach Instructional Objectives
Computer Programming (Year) – MA3172

VBO#	Objective
	Unit 1: Introduction to Computer Programming and Alice
MA.CP.1.1	The student will be able to outline the history of computers and trace the development of programming languages.
MA.CP.1.2	The student will be able to list the components of the computer and related terminology, including the physical components used for storage, input, output and processing. (SOL COM.11)
MA.CP.1.3	The student will use the five windows of the Alice interface to create a new virtual world, add objects to the world and position those objects, including moving subparts, to satisfy an initial setup. (SOL COM.2)
MA.CP.1.4	The student will learn the concepts of an object’s orientation in the world, center and distance from other objects. (SOL COM.8)
	Unit 2: Program Design and Implementation
MA.CP.2.1	The student will understand that a scenario is a problem statement and will create a story board based on a scenario. (SOL COM.4)
MA.CP.2.2	The student will create a scenario for a given problem. (SOL COM.3)
MA.CP.2.3	The student will translate a story board into a computer program by using an object’s built-in methods. (SOL COM.2)
MA.CP.2.4	The student will test a program by running it, evaluating the results and revising if needed. (SOL COM.2)
MA.CP.2.5	The student will understand the purpose of documentation and include basic documentation in a program. (SOL COM.2)
	Unit 3: Putting Together the Pieces
MA.CP.3.1	The student will select and implement built-in functions in processing data. (SOL COM.13)
MA.CP.3.2	The student will translate a mathematical expression into a computer statement. (SOL COM.12)
MA.CP.3.3	The student will use relational operators to create Boolean expressions. (SOL COM.14)
MA.CP.3.4	The student will implement conditional statements that include “if/then” statements, “if/then/else” statements and Boolean logic. (SOL COM.14)
MA.CP.3.5	The student will implement simple count controlled loops. (SOL COM.15)
	Unit 4: Classes, Objects, Methods and Parameters
MA.CP.4.1	The student will create new world-level and class-level methods and call (invoke) those methods in the program. (SOL COM.5)
MA.CP.4.2	The student will create a new parameter, use the parameter to communicate with a method and send an argument value to the method parameter. (SOL COM.11)
MA.CP.4.3	The student will understand that every object is a unique instance of a class. (SOL COM.5)
MA.CP.4.4	The student will illustrate a simple form of inheritance by creating a new class based on an existing class. (SOL COM.5)
MA.CP.4.5	The student will use basic programming constructs and top-down design to solve a complex problem. (SOL COM.5)
	Unit 5: Working with Objects in Java
MA.CP.5.1	The student will use an integrated development environment to type, save, compile and run Java programs. (SOL COM.2)
MA.CP.5.2	The student will create and name objects in Java. (SOL COM.10)
MA.CP.5.3	The student will declare and initialize primitive variables. (SOL COM.10)
MA.CP.5.4	The student will create new methods with parameters and invoke methods on objects in Java. (SOL COM.5, SOL COM.11)

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	Unit 6: Drawing in Java
MA.CP.6.1	The student will use existing Java class methods, including String methods, in a Java program. (SOL COM.13)
MA.CP.6.2	The student will type appropriate comments in Java programs. (SOL COM.2)
MA.CP.6.3	The student will use the Java Application Programming Interface (API) to explore classes and packages in order to choose methods to solve a problem. (SOL COM.13)
MA.CP.6.4	The student will use Java graphics classes for simple drawing and Java2D for more complex drawing. (SOL COM.8)
MA.CP.6.5	The student will use a Java interface to illustrate another form of inheritance. (SOL COM.5)
	Unit 7: (Chapter 5 Alice) Interactive Events and Event Handling
MA.CP.7.1	The student will create methods to handle single or multiple events. (SOL COM.5)
MA.CP.7.2	The student will use parameters in event handling methods. (SOL COM.11)
MA.CP.7.3	The student will link events to event handling methods. (SOL COM.6)
MA.CP.7.4	The student will design and implement the input phase of the program by way of user interaction. (SOL COM.6)
MA.CP.7.5	The student will test a program, using an appropriate set of data. (SOL COM.18)
MA.CP.7.6	The student will use incremental development and testing to create an interactive program. (SOL COM.20)
	Unit 8: Functions and If /Else
MA.CP.8.1	The student will use built-in functions and describe the differences between a function and a method. (SOL COM.13)
MA.CP.8.2	The student will design a new function in order to return an appropriate value. (SOL COM.5)
MA.CP.8.3	The student will use a compound conditional statement to execute a decision at runtime and include an else clause, when appropriate. (SOL COM.14)
MA.CP.8.4	The student will use built-in and user defined Boolean functions to execute conditionally. (SOL COM.14)
	Unit 9: Repetition: Definite and Conditional Loops
MA.CP.9.1	The student will use a counted for loop to repeat a block of statements. (SOL COM.15)
MA.CP.9.2	The student will create and use nested for loops to coordinate distinct, repetitive actions. (SOL COM.15)
MA.CP.9.3	The student will use a while statement to perform conditional repetition. (SOL COM.15)
	Unit 10: Modifying Pictures Using Loops
MA.CP.10.1	The student will create a List variable in Alice and process the List using for all in order and for all together control structures. (SOL COM.15, SOL COM.16)
MA.CP.10.2	The student will describe how images are encoded digitally. (SOL COM.11, SOL COM.16)
MA.CP.10.3	The student will define and use primitive data types. (SOL COM.9)
MA.CP.10.4	The student will declare and load a one-dimensional array with pixel information. (SOL COM.16)
MA.CP.10.5	The student will traverse or iterate an array using for-each, while and for loops. (SOL COM.15, SOL COM.16)
MA.CP.10.6	The student will use loop structures and conditional statements to modify pictures. (SOL COM.1, SOL COM.17)
MA.CP.10.7	The student will demonstrate understanding of the scope of a variable in Java. (SOL COM.8)
	Unit 11: Modifying Pixels in a Matrix
MA.CP.11.1	The student will use nested loops for processing the elements in a matrix. (SOL COM.15, SOL COM.16)

VBO#	Objective
MA.CP.11.2	The student will declare and load a two-dimensional array (matrix) with a given data type. (SOL COM.16)
MA.CP.11.3	The student will change multiple variables using a loop. (SOL COM.1, SOL COM.15)
MA.CP.11.4	The student will utilize tracing strategies to monitor variable changes as code is executed. (SOL COM.7, SOL COM.19)
MA.CP.11.5	The student will break long methods into smaller pieces. (SOL COM.5)
MA.CP.11.6	The student will use methods that return a value. (SOL COM.5)
MA.CP.11.7	The student will overload methods to simplify program design and implementation. (SOL.COM.5)

KEY TO OBJECTIVE STRANDS:
Program Design (PD)
Program Implementation (PI)
Control Structures (CS)
Fundamentals of Computer Science (FC)
Data Structures (DS)

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For further information please call (757) 263-1070.

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