



VIRGINIA BEACH CITY PUBLIC SCHOOLS
CHARTING THE COURSE

Department of Teaching & Learning
Parent/Student Course Information

Advanced Placement Computer Science A
(MA 3185)
One credit, One year
Grades 9-12

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 Java-based, introductory college-level course is geared toward a more object-oriented style of programming. The course meets the requirements set forth in the syllabus of the College Board. Topics include computer systems, object-oriented program design concepts and implementation, classes, strings, arrays, recursion, data structures and analysis of algorithms. Standard Java classes and methods will be used.

PREREQUISITE

Algebra II or Algebra II/Trigonometry

REQUIRED TEXTBOOK

Java™ Software Solutions for AP Computer Science A, Third Edition, and AP Test Prep Workbook (AP Test Prep Series – AP Computer Science, Fourth Edition), John Lewis, William Loftus, and Cara Cocking, Pearson Education (2011)*

RECOMMENDED CALCULATOR

TI-89 or a similar graphing calculator

TI-83 Plus, TI-84 Plus, TI-84 Plus C or TI-84 Plus CE

Virginia Beach Instructional Objectives
AP Computer Science A – MA3185

VBO#	Objective
	Unit 1: Introduction to Computer Systems
MA.APCS.1.1	The student will demonstrate knowledge of the historical landmarks in the evolution of computing systems, including key people.
MA.APCS.1.2	The student will demonstrate knowledge of types of system software and major computer languages.
MA.APCS.1.3	The student will demonstrate knowledge of system hardware components within the framework of computer architecture.
MA.APCS.1.4	The student will distinguish between networks and single-user systems.
MA.APCS.1.5	The student will demonstrate conversion mastery between decimal, binary, hexadecimal and octal numeration systems.
MA.APCS.1.6	The student will demonstrate responsible use of a computer system, including privacy, legal, social and ethical issues.
MA.APCS.1.7	The student will categorize errors as compile-time, run-time or logic and use various debugging techniques.
	Unit 2: Objects and Primitive Data
MA.APCS.2.1	The student will identify an object, its attributes and behaviors and discuss the software development process as it relates to object-oriented programming.
MA.APCS.2.2	The student will compare and contrast built-in primitive data types.
MA.APCS.2.3	The student will declare and initialize primitive data types.
MA.APCS.2.4	The student will create meaningful identifiers.
MA.APCS.2.5	The student will describe and declare string and numeric constants.
MA.APCS.2.6	The student will use arithmetic expressions, including Math class methods, and use casting to handle differences in precision.
MA.APCS.2.7	The student will use wrapper classes to create objects representing primitive data.
MA.APCS.2.8	The student will construct and concatenate strings, use string methods and convert to and from strings.
MA.APCS.2.9	The student will use an import statement to utilize classes from other packages.
MA.APCS.2.10	The student will select an appropriate stream for interactive input and output, construct and open a stream, read from or write to a stream and handle input/output exceptions.
MA.APCS.2.11	The student will list various characteristics of program design and identify boundary cases and generate appropriate test data.
	Unit 3: Program Statements and Control Structures
MA.APCS.3.1	The student will discuss the software development process as it relates to control of flow.
MA.APCS.3.2	The student will construct and analyze Boolean expressions including short-circuit evaluation and De Morgan's Law.
MA.APCS.3.3	The student will design and implement selection structures.
MA.APCS.3.4	The student will design and implement repetition structures.
MA.APCS.3.5	The student will design and implement nested selection and repetition structures.
	Unit 4: Writing Classes
MA.APCS.4.1	The student will design a class by identifying its attributes and behaviors and use the software development process as it relates to object-oriented programming.
MA.APCS.4.2	The student will use visibility modifiers to enforce encapsulation.
MA.APCS.4.3	The student will identify instance data and initialize the data using a constructor.
MA.APCS.4.4	The student will instantiate objects, pass parameters and invoke accessor and mutator methods.

VBO#	Objective
MA.APCS.4.5	The student will identify, use, design and write overloaded methods.
MA.APCS.4.6	The student will identify and preserve method preconditions and postconditions.
MA.APCS.4.7	The student will use method decomposition to break up a complex method into several simpler support methods.
MA.APCS.4.8	The student will test classes and libraries in isolation and perform integration testing.
MA.APCS.4.9	The student will use the characteristics of program design to identify boundary cases and generate appropriate test data.
	Unit 5: Arrays, ArrayLists and Generics
MA.APCS.5.1	The student will declare and initialize one-dimensional arrays.
MA.APCS.5.2	The student will access individual elements, iterate over the elements and determine the length of an array.
MA.APCS.5.3	The student will implement common array algorithms.
MA.APCS.5.4	The student will sort one-dimensional arrays using the Selection Sort and Insertion Sort algorithms.
MA.APCS.5.5	The student will search an array for a specific value using the Sequential Search and Binary Search Algorithms.
MA.APCS.5.6	The student will declare and instantiate an ArrayList specifying the type of data using Generics.
MA.APCS.5.7	The student will implement the “for each” loop.
	Unit 6: Inheritance, Polymorphism and Interfaces
MA.APCS.6.1	The student will identify conditions that result in a null pointer exception.
MA.APCS.6.2	The student will explain the impact of multiple naming (aliasing) of the same object when referencing objects.
MA.APCS.6.3	The student will declare and use static variables.
MA.APCS.6.4	The student will write and call static methods.
MA.APCS.6.5	The student will design an interface.
MA.APCS.6.6	The student will write a class that implements an interface.
MA.APCS.6.7	The student will create subclasses using inheritance.
MA.APCS.6.8	The student will use the super reference to access the members of the parent class.
MA.APCS.6.9	The student will override methods.
MA.APCS.6.10	The student will use the definition of an abstract class to implement the abstract methods in a subclass.
MA.APCS.6.11	The student will identify and use polymorphic references in an inheritance hierarchy.
	Unit 7: Recursion
MA.APCS.7.1	The student will identify the base case and iterative case of a recursive method.
MA.APCS.7.2	The student will write and call recursive methods.
MA.APCS.7.3	The student will identify and trace recursive methods, including the merge sort algorithm.
MA.APCS.7.4	The student will compare and contrast iterative and recursive algorithms.

Dr. Aaron C. Spence, Superintendent
Virginia Beach City Public Schools
2512 George Mason Drive, Virginia Beach, VA 23456-0038

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

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To seek resolution of grievances resulting from alleged discrimination or to report violations of these policies, please contact the Title VI/Title IX Coordinator/Director of Student Leadership at (757) 263-2020, 1413 Laskin Road, Virginia Beach, Virginia, 23451 (for student complaints) or the Section 504/ADA Coordinator/Chief Human Resources Officer at (757) 263-1133, 2512 George Mason Drive, Municipal Center, Building 6, Virginia Beach, Virginia, 23456 (for employees or other citizens). Concerns about the application of Section 504 of the Rehabilitation Act should be addressed to the Section 504 Coordinator/Executive Director of Student Support Services at (757) 263-1980, 2512 George Mason Drive, Virginia Beach, Virginia, 23456 or the Section 504 Coordinator at the student's school. For students who are eligible or suspected of being eligible for special education or related services under IDEA, please contact the Office of Programs for Exceptional Children at (757) 263-2400, Laskin Road Annex, 1413 Laskin Road, Virginia Beach, Virginia, 23451.

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