



**VIRGINIA BEACH CITY PUBLIC SCHOOLS**  
CHARTING THE COURSE

*Department of Teaching & Learning*  
*Parent/Student Course Information*

*Advanced Placement Computer Science Principles*  
*(MA 3166)*  
*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 course is designed to be equivalent to a first semester introductory college computing course. Students will develop computational thinking vital for success across all disciplines, such as using computational tools to analyze and study data and working with large data sets to analyze, visualize and draw conclusions from trends. The course is unique in its focus on fostering student creativity. Students are encouraged to apply creative processes when developing computational artifacts and to think creatively while using computer software and other technology to explore questions that interest them. They will also develop effective communication and collaborative skills, working individually and collaboratively to solve problems.

**CO-REQUISITE**

Geometry Honors, Algebra, Functions and Data Analysis (AFDA), Algebra II or Algebra II/Trigonometry

**REQUIRED TEXTBOOK**

None

**RECOMMENDED CALCULATOR**

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

**Virginia Beach Instructional Objectives**  
**AP Computer Science Principles – MA3166**

<b>VBO#</b>	<b>Objective</b>
<b>LO 1.1.1</b>	Apply a creative development process when creating computational artifacts. <b>(P2)</b>
<b>LO 1.2.1</b>	Create a computational artifact for creative expression. <b>(P2)</b>
<b>LO 1.2.2</b>	Create a computational artifact using computing tools and techniques to solve a problem. <b>(P2)</b>
<b>LO 1.2.3</b>	Create a new computational artifact by combining or modifying existing artifacts. <b>(P2)</b>
<b>LO 1.2.4</b>	Collaborate in the creation of computational artifacts. <b>(P6)</b>
<b>LO 1.2.5</b>	Analyze the correctness, usability, functionality and suitability of computational artifacts. <b>(P4)</b>
<b>LO 1.3.1</b>	Use computing tools and techniques for creative expression. <b>(P2)</b>
<b>LO 2.1.1</b>	Describe the variety of abstractions used to represent data. <b>(P3)</b>
<b>LO 2.1.2</b>	Explain how binary sequences are used to represent digital data. <b>(P5)</b>
<b>LO 2.2.1</b>	Develop an abstraction when writing a program or creating other computational artifacts. <b>(P2)</b>
<b>LO 2.2.2</b>	Use multiple levels of abstraction to write programs. <b>(P3)</b>
<b>LO 2.2.3</b>	Identify multiple levels of abstractions that are used when writing programs. <b>(P3)</b>
<b>LO 2.3.1</b>	Use models and simulations to represent phenomena. <b>(P3)</b>
<b>LO 2.3.2</b>	Use models and simulations to formulate, refine and test hypotheses. <b>(P3)</b>
<b>LO 3.1.1</b>	Find patterns and test hypotheses about digitally processed information to gain insight and knowledge. <b>(P4)</b>
<b>LO 3.1.2</b>	Collaborate when processing information to gain insight and knowledge. <b>(P6)</b>
<b>LO 3.1.3</b>	Explain the insight and knowledge gained from digitally processed data by using appropriate visualizations, notations and precise language. <b>(P5)</b>
<b>LO 3.2.1</b>	Extract information from data to discover and explain connections or trends. <b>(P1)</b>
<b>LO 3.2.2</b>	Determine how large data sets impact the use of computational processes to discover information and knowledge. <b>(P3)</b>
<b>LO 3.3.1</b>	Analyze how data representation, storage, security and transmission of data involve computational manipulation of information. <b>(P4)</b>
<b>LO 4.1.1</b>	Develop an algorithm for implementation in a program. <b>(P2)</b>
<b>LO 4.1.2</b>	Express an algorithm in a language. <b>(P5)</b>
<b>LO 4.2.1</b>	Explain the difference between algorithms that run in a reasonable time and those that do not run in a reasonable time. <b>(P1)</b>
<b>LO 4.2.2</b>	Explain the difference between a solvable and unsolvable problem in computer science. <b>(P1)</b>
<b>LO 4.2.3</b>	Explain the existence of undecidable problems in computer science. <b>(P1)</b>
<b>LO 4.2.4</b>	Evaluate algorithms analytically and empirically for efficiency, correctness and clarity. <b>(P4)</b>
<b>LO 5.1.1</b>	Develop a program for creative expression, to satisfy personal curiosity or to create a new knowledge. <b>(P2)</b>
<b>LO 5.1.2</b>	Develop a correct program to solve problems. <b>(P2)</b>
<b>LO 5.1.3</b>	Collaborate to develop a program. <b>(P6)</b>
<b>LO 5.2.1</b>	Explain how programs implement algorithms. <b>(P3)</b>
<b>LO 5.3.1</b>	Use abstraction to manage complexity in programs. <b>(P3)</b>
<b>LO 5.4.1</b>	Evaluate the correctness of a program. <b>(P4)</b>
<b>LO 5.5.1</b>	Employ appropriate mathematical and logical concepts in programming. <b>(P1)</b>
<b>LO 6.1.1</b>	Explain the abstractions in the Internet and how the Internet functions. <b>(P3)</b>
<b>LO 6.2.1</b>	Explain characteristics of the Internet and the systems built on it. <b>(P5)</b>
<b>LO 6.2.2</b>	Explain how the characteristics of the Internet influence the systems built on it. <b>(P4)</b>
<b>LO 6.3.1</b>	Identify existing cybersecurity concerns and potential options to address these issues

VBO#	Objective
	with the Internet and the systems built on it. <b>(P1)</b>
<b>LO 7.1.1</b>	Explain how computing innovations affect communication, interaction and cognition. <b>(P4)</b>
<b>LO 7.1.2</b>	Explain how people participate in a problem-solving process that scales. <b>(P4)</b>
<b>LO 7.2.1</b>	Explain how computing has impacted innovations in other fields. <b>(P1)</b>
<b>LO 7.3.1</b>	Analyze the beneficial and harmful effects of computing. <b>(P4)</b>
<b>LO 7.4.1</b>	Explain the connections between computing and real-world contexts, including economic, social and cultural contexts. <b>(P1)</b>
<b>LO 7.5.1</b>	Access, manage and attribute information using effective strategies. <b>(P1)</b>
<b>LO 7.5.2</b>	Evaluate online and print resources for appropriateness and credibility. <b>(P5)</b>

**P1: Connecting Computing**

Students will learn to draw connections between different computing concepts.

**P2: Creating Computational Artifacts**

Students will engage in the creative aspect of computing by designing and developing interesting computational artifacts as well as by applying computing techniques to creatively solve problems.

**P3: Abstracting**

Students will use abstraction to develop models and simulations of natural and artificial phenomena, use them to make predictions about the world and analyze their efficiency and validity.

**P4: Analyzing Problems and Artifacts**

Students will design and produce solutions, models and artifacts, and they will evaluate and analyze their own computational work as well as the computational work that others have produced.

**P5: Communicating**

Students will describe computation and the impact of technology and computation, explain and justify the design and appropriateness of their computational choices and analyze and describe both computational artifacts and the results or behaviors of those artifacts.

**P6: Collaborating**

Students will collaborate effectively by drawing on diverse perspectives, skills and the background of peers to address complex and open-ended problems. They will collaborate on a number of activities, including the investigations on questions using data sets and the production of computational artifacts.

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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(Revised August 2017)