

Wallenpaupack Area School District Planned Course Curriculum Guide

Department

Business, Computers, and Information Technology (BCIT)

Name of Course

AP Computer Science A

Course Description:

AP Computer Science A is an introductory college-level computer science course. Students will cultivate their understanding of coding through analyzing, writing, and testing code as they explore concepts like modularity, variables, control structures, iteration, classes, arrays, and inheritance. Students will be using Java as the designated programming language. Students will be required to take the Advanced Placement exam in Computer Science A. The cost of the exam will be covered by the school district.

Initial Creation Date (if applicable) and Revision Dates: November 2024

Wallenpaupack Area School District Curriculum	
COURSE: AP Computer Science A	GRADE/S: 11-12
UNIT 1: Primitive Types	TIMEFRAME: 10 Days

<p>PA COMMON CORE/NATIONAL STANDARDS:</p> <ul style="list-style-type: none"> • 3B-AP-12 – Compare and contrast fundamental data structures and their uses. • 3B-AP-14 – Construct solutions to problems using student-created components, such as procedures, modules and/or objects. • 3B-DA-06 – Select data collection tools and techniques to generate data sets that support a claim or communicate information.
<p>UNIT OBJECTIVES (SWBATS):</p> <ul style="list-style-type: none"> • Complete a partial line of code. • Determine the results of printing an expression concatenating two strings. • Explain why a given line of code is incorrect. • Find an alternative expression which gives the same results in a code segment. • Determine the results of running a section of code with multiple unary and assignment operators. • Design a program to individually print out the digits of a three-digit number. • Determine the result of casting a number.
<p>INSTRUCTIONAL STRATEGIES/ACTIVITIES:</p> <ul style="list-style-type: none"> • Online Project STEM Course and LMS • Class Discussions • Direct Instruction
<p>ASSESSMENTS (Diagnostic/Benchmark/Formative/Summative):</p> <ul style="list-style-type: none"> • Lesson Practices • Quizzes • Unit Project • Unit Test
<p>DIFFERENTIATED INSTRUCTION (Acceleration/Enrichment):</p> <ul style="list-style-type: none"> • Students work at their own pace throughout this course with teachers adding enrichment where needed based on individual strengths. Accelerated students have the opportunity to finish the course and complete independent projects. • Extension projects are incorporated into each unit and may be used at teacher discretion with accelerated students based on their individual interests.
<p>RESOURCES (Technology Based Resources, Text Resources, etc.):</p> <ul style="list-style-type: none"> • Project STEM Website and LMS • Laptop/Desktop/iPad
<p>KEY VOCABULARY: Input, Output, Variable, Data Types, Int, Double, Modular Division, Numeric Casting</p>

Wallenpaupack Area School District Curriculum	
COURSE: AP Computer Science A	GRADE/S: 11-12
UNIT 2: Using Objects	TIMEFRAME: 8 Days

<p>PA COMMON CORE/NATIONAL STANDARDS:</p> <ul style="list-style-type: none"> • 3B-AP-12 – Compare and contrast fundamental data structures and their uses. • 3B-AP-14 – Construct solutions to problems using student-created components, such as procedures, modules and/or objects. • 3B-AP-16 – Demonstrate code reuse by creating programming solutions using libraries and APIs.
<p>UNIT OBJECTIVES (SWBATS):</p> <ul style="list-style-type: none"> • Determine the output of a statement with multiple different operators used. • Determine the result of executing a line of code containing multipole method calls. • Use methods to take user input, then create objects based upon the input. • Choose a code segment to change the state of an object which is declared in the question text. • Write code which creates objects, then call methods to both determine and change the state of the object. • Explain why a line of code is incorrect.
<p>INSTRUCTIONAL STRATEGIES/ACTIVITIES:</p> <ul style="list-style-type: none"> • Online Project STEM Course and LMS • Class Discussions • Direct Instruction
<p>ASSESSMENTS (Diagnostic/Benchmark/Formative/Summative):</p> <ul style="list-style-type: none"> • Lesson Practices • Quizzes • Unit Project • Unit Test
<p>DIFFERENTIATED INSTRUCTION (Acceleration/Enrichment):</p> <ul style="list-style-type: none"> • Students work at their own pace throughout this course with teachers adding enrichment where needed based on individual strengths. Accelerated students have the opportunity to finish the course and complete independent projects. • Extension projects are incorporated into each unit and may be used at teacher discretion with accelerated students based on their individual interests.
<p>RESOURCES (Technology Based Resources, Text Resources, etc.):</p> <ul style="list-style-type: none"> • Project STEM Website and LMS • Laptop/Desktop/iPad
<p>KEY VOCABULARY: Primitive Data, Class Data Types, Computer Memory, Storage, String Functions, Concatenation, Constructors, Classes, Objects, Void and Non-Void Methods, Wrapper Classes</p>

Wallenpaupack Area School District Curriculum	
COURSE: AP Computer Science A	GRADE/S: 11-12
UNIT 3: Boolean Expressions and If Statements	TIMEFRAME: 8 Days

<p>PA COMMON CORE/NATIONAL STANDARDS:</p> <ul style="list-style-type: none"> • 3B-AP-14 – Construct solutions to problems using student-created components, such as procedures, modules and/or objects. • 3B-AP-16 – Demonstrate code reuse by creating programming solutions using libraries and APIs.
<p>UNIT OBJECTIVES (SWBATS):</p> <ul style="list-style-type: none"> • Identify an error in a short segment of code. • Identify which code segments from a selection are equivalent. • Complete a partially completed code segment. • Write code with multipole conditional statements to produce a desired output. • Describe the details of how a particular statement will be evaluated in a Java program. • Identify equivalent Boolean statements. • Evaluate the output from a code segment containing multiple conditionals.
<p>INSTRUCTIONAL STRATEGIES/ACTIVITIES:</p> <ul style="list-style-type: none"> • Online Project STEM Course and LMS • Class Discussions • Direct Instruction
<p>ASSESSMENTS (Diagnostic/Benchmark/Formative/Summative):</p> <ul style="list-style-type: none"> • Lesson Practices • Quizzes • Unit Project • Unit Test
<p>DIFFERENTIATED INSTRUCTION (Acceleration/Enrichment):</p> <ul style="list-style-type: none"> • Students work at their own pace throughout this course with teachers adding enrichment where needed based on individual strengths. Accelerated students have the opportunity to finish the course and complete independent projects. • Extension projects are incorporated into each unit and may be used at teacher discretion with accelerated students based on their individual interests.
<p>RESOURCES (Technology Based Resources, Text Resources, etc.):</p> <ul style="list-style-type: none"> • Project STEM Website and LMS • Laptop/Desktop/iPad
<p>KEY VOCABULARY: If Statements, Else Statements, Logical Operators, Booleans, Truth Tables, Short Circuit Evaluation</p>

Wallenpaupack Area School District Curriculum	
COURSE: AP Computer Science A	GRADE/S: 11-12
UNIT 4: Iteration	TIMEFRAME: 8 Days

<p>PA COMMON CORE/NATIONAL STANDARDS:</p> <ul style="list-style-type: none"> • 3B-AP-10 – Use and adapt classic algorithms to solve computation problems. • 3B-AP-12 – Compare and contrast fundamental data structures and their uses. • 3B-AP-14 – Construct solutions to problems using student-created components, such as procedures, modules and/or objects. • 3B-AP-16 – Demonstrate code reuse by creating programming solutions using libraries and APIs. • 3B-AP-21 – Develop and use a series of test cases to verify that a program performs according to its specific design specifications.
<p>UNIT OBJECTIVES (SWBATS):</p> <ul style="list-style-type: none"> • Explain why a given code segment will not run as intended. • Explain what is calculated by a given code segment. • Complete missing code in a loop header. • Use both selection and iteration to produce a desired output when the main method of a program executes. • Explain the results of running a code segment. • Determine the results of running a code segment with nested iteration statements. • Write nested iteration statements to produce a desired outcome.
<p>INSTRUCTIONAL STRATEGIES/ACTIVITIES:</p> <ul style="list-style-type: none"> • Online Project STEM Course and LMS • Class Discussions • Direct Instruction
<p>ASSESSMENTS (Diagnostic/Benchmark/Formative/Summative):</p> <ul style="list-style-type: none"> • Lesson Practices • Quizzes • Unit Project • Unit Test
<p>DIFFERENTIATED INSTRUCTION (Acceleration/Enrichment):</p> <ul style="list-style-type: none"> • Students work at their own pace throughout this course with teachers adding enrichment where needed based on individual strengths. Accelerated students have the opportunity to finish the course and complete independent projects. • Extension projects are incorporated into each unit and may be used at teacher discretion with accelerated students based on their individual interests.
<p>RESOURCES (Technology Based Resources, Text Resources, etc.):</p> <ul style="list-style-type: none"> • Project STEM Website and LMS • Laptop/Desktop/iPad
<p>KEY VOCABULARY: Algorithms, While Loop, For Loop, Nested Loop</p>

Wallenpaupack Area School District Curriculum	
COURSE: AP Computer Science A	GRADE/S: 11-12
UNIT 5: Writing Classes	TIMEFRAME: 10 Days

<p>PA COMMON CORE/NATIONAL STANDARDS:</p> <ul style="list-style-type: none"> • 3B-AP-11 – Evaluate algorithms in terms of their efficiency, correctness, and clarity. • 3B-AP-12 – Compare and contrast fundamental data structures and their uses. • 3B-AP-14 – Construct solutions to problems using student-created components, such as procedures, modules and/or objects. • 3B-AP-16 – Demonstrate code reuse by creating programming solutions using libraries and APIs. • 3B-AP-20 – Use version control systems, integrated development environments (IDEs), and collaborative tools and practices (code documentation) in a group software project. • 3A-IC-24 – Evaluate the ways computing impacts personal, ethical, social, economic, and cultural practice.
<p>UNIT OBJECTIVES (SWBATS):</p> <ul style="list-style-type: none"> • Determine what is printed by a method that uses selection. • Write a method which uses selection to meet a specification for what will be printed. • Determine what is output by a code segment which calls a method. • Write a method using iteration and selection which returns values according to a specification. • Create a custom class, which is used to create objects representing vehicles.
<p>INSTRUCTIONAL STRATEGIES/ACTIVITIES:</p> <ul style="list-style-type: none"> • Online Project STEM Course and LMS • Class Discussions • Direct Instruction
<p>ASSESSMENTS (Diagnostic/Benchmark/Formative/Summative):</p> <ul style="list-style-type: none"> • Lesson Practices • Quizzes • Unit Project • Unit Test
<p>DIFFERENTIATED INSTRUCTION (Acceleration/Enrichment):</p> <ul style="list-style-type: none"> • Students work at their own pace throughout this course with teachers adding enrichment where needed based on individual strengths. Accelerated students have the opportunity to finish the course and complete independent projects. • Extension projects are incorporated into each unit and may be used at teacher discretion with accelerated students based on their individual interests.
<p>RESOURCES (Technology Based Resources, Text Resources, etc.):</p> <ul style="list-style-type: none"> • Project STEM Website and LMS • Laptop/Desktop/iPad
<p>KEY VOCABULARY: Void Methods, Return Methods, Parameters, Classes, Constructors, Static, Instance</p>

Wallenpaupack Area School District Curriculum	
COURSE: AP Computer Science A	GRADE/S: 11-12
UNIT 6: Array	TIMEFRAME: 8 Days

<p>PA COMMON CORE/NATIONAL STANDARDS:</p> <ul style="list-style-type: none"> • 3B-AP-10 – Use and adapt classic algorithms to solve computation problems. • 3B-AP-12 – Compare and contrast fundamental data structures and their uses. • 3B-AP-14 – Construct solutions to problems using student-created components, such as procedures, modules and/or objects. • 3B-AP-16 – Demonstrate code reuse by creating programming solutions using libraries and APIs.
<p>UNIT OBJECTIVES (SWBATS):</p> <ul style="list-style-type: none"> • Determine the results of executing a block of code with multiple operators working on array elements. • Determine a code needed to complete a partially created code segment. • Write code which traverses an array and returns information about its contents. • Describe the effect of changing an existing segment of code. • Write a method which traverses an array and changes the value of its elements by inserting an element. • Determine the output of a code segment with multiple method calls.
<p>INSTRUCTIONAL STRATEGIES/ACTIVITIES:</p> <ul style="list-style-type: none"> • Online Project STEM Course and LMS • Class Discussions • Direct Instruction
<p>ASSESSMENTS (Diagnostic/Benchmark/Formative/Summative):</p> <ul style="list-style-type: none"> • Lesson Practices • Quizzes • Unit Project • Unit Test
<p>DIFFERENTIATED INSTRUCTION (Acceleration/Enrichment):</p> <ul style="list-style-type: none"> • Students work at their own pace throughout this course with teachers adding enrichment where needed based on individual strengths. Accelerated students have the opportunity to finish the course and complete independent projects. • Extension projects are incorporated into each unit and may be used at teacher discretion with accelerated students based on their individual interests.
<p>RESOURCES (Technology Based Resources, Text Resources, etc.):</p> <ul style="list-style-type: none"> • Project STEM Website and LMS • Laptop/Desktop/iPad
<p>KEY VOCABULARY: One-Dimensional Array, Search Algorithms, Arrays of Strings, Enhanced For Loop</p>

Wallenpaupack Area School District Curriculum	
COURSE: AP Computer Science A	GRADE/S: 11-12
UNIT 7: ArrayList	TIMEFRAME: 8 Days

<p>PA COMMON CORE/NATIONAL STANDARDS:</p> <ul style="list-style-type: none"> • 3B-AP-10 – Use and adapt classic algorithms to solve computation problems. • 3B-AP-11 – Evaluate algorithms in terms of their efficiency, correctness, and clarity. • 3B-AP-12 – Compare and contrast fundamental data structures and their uses. • 3B-AP-14 – Construct solutions to problems using student-created components, such as procedures, modules and/or objects. • 3A-NI-05 – Give examples to illustrate how sensitive data can be affected by malware and other attacks. • 3A-NI-06 – Recommend security measures to address various scenarios based on factors such as efficiency, feasibility, and ethical impacts.
<p>UNIT OBJECTIVES (SWBATS):</p> <ul style="list-style-type: none"> • Write code which creates and then manipulates the contents of an ArrayList. • Determine the output of a code segment which makes multiple calls to ArrayList and String methods. • Write a method according to exact specifications given. • Create a method which implements a selection sort algorithm: manipulating an ArrayList by changing the order of its values. • Work out the value of a variable by determining the number of times a particular statement runs in a method call.
<p>INSTRUCTIONAL STRATEGIES/ACTIVITIES:</p> <ul style="list-style-type: none"> • Online Project STEM Course and LMS • Class Discussions • Direct Instruction
<p>ASSESSMENTS (Diagnostic/Benchmark/Formative/Summative):</p> <ul style="list-style-type: none"> • Lesson Practices • Quizzes • Unit Project • Unit Test
<p>DIFFERENTIATED INSTRUCTION (Acceleration/Enrichment):</p> <ul style="list-style-type: none"> • Students work at their own pace throughout this course with teachers adding enrichment where needed based on individual strengths. Accelerated students have the opportunity to finish the course and complete independent projects. • Extension projects are incorporated into each unit and may be used at teacher discretion with accelerated students based on their individual interests.
<p>RESOURCES (Technology Based Resources, Text Resources, etc.):</p> <ul style="list-style-type: none"> • Project STEM Website and LMS • Laptop/Desktop/iPad
<p>KEY VOCABULARY: ArrayList, Linear Search, Selection and Insertion Sort</p>

Wallenpaupack Area School District Curriculum	
COURSE: AP Computer Science A	GRADE/S: 11-12
UNIT 8: 2-D Arrays	TIMEFRAME: 6 Days

<p>PA COMMON CORE/NATIONAL STANDARDS:</p> <ul style="list-style-type: none"> • 3B-AP-10 – Use and adapt classic algorithms to solve computation problems. • 3B-AP-11 – Evaluate algorithms in terms of their efficiency, correctness, and clarity. • 3B-AP-14 – Construct solutions to problems using student-created components, such as procedures, modules and/or objects.
<p>UNIT OBJECTIVES (SWBATS):</p> <ul style="list-style-type: none"> • Complete a partially completed code segment by determining a correct condition to use. • Write a method which is used to create a 2-D array and traverse it to edit the values stored to desired results. • Trace code which traverses a 2-D array and determine what output is when the code is executed.
<p>INSTRUCTIONAL STRATEGIES/ACTIVITIES:</p> <ul style="list-style-type: none"> • Online Project STEM Course and LMS • Class Discussions • Direct Instruction
<p>ASSESSMENTS (Diagnostic/Benchmark/Formative/Summative):</p> <ul style="list-style-type: none"> • Lesson Practices • Quizzes • Unit Project • Unit Test
<p>DIFFERENTIATED INSTRUCTION (Acceleration/Enrichment):</p> <ul style="list-style-type: none"> • Students work at their own pace throughout this course with teachers adding enrichment where needed based on individual strengths. Accelerated students have the opportunity to finish the course and complete independent projects. • Extension projects are incorporated into each unit and may be used at teacher discretion with accelerated students based on their individual interests.
<p>RESOURCES (Technology Based Resources, Text Resources, etc.):</p> <ul style="list-style-type: none"> • Project STEM Website and LMS • Laptop/Desktop/iPad
<p>KEY VOCABULARY: 2-D Arrays</p>

Wallenpaupack Area School District Curriculum	
COURSE: AP Computer Science A	GRADE/S: 11-12
UNIT 9: Inheritance	TIMEFRAME: 8 Days

<p>PA COMMON CORE/NATIONAL STANDARDS:</p> <ul style="list-style-type: none"> • 3B-AP-16 – Demonstrate code reuse by creating programming solutions using libraries and APIs. • 3B-AP-23 – Evaluate key qualities of a program through a process such as a code review.
<p>UNIT OBJECTIVES (SWBATS):</p> <ul style="list-style-type: none"> • Create a new class. • Write their codes so it interacts with existing code by extending a class for which they are given the source code. • Override a method according to specification by calling a method from the superclass. • Make decisions about how they would design a class hierarchy for a program.
<p>INSTRUCTIONAL STRATEGIES/ACTIVITIES:</p> <ul style="list-style-type: none"> • Online Project STEM Course and LMS • Class Discussions • Direct Instruction
<p>ASSESSMENTS (Diagnostic/Benchmark/Formative/Summative):</p> <ul style="list-style-type: none"> • Lesson Practices • Quizzes • Unit Project • Unit Test
<p>DIFFERENTIATED INSTRUCTION (Acceleration/Enrichment):</p> <ul style="list-style-type: none"> • Students work at their own pace throughout this course with teachers adding enrichment where needed based on individual strengths. Accelerated students have the opportunity to finish the course and complete independent projects. • Extension projects are incorporated into each unit and may be used at teacher discretion with accelerated students based on their individual interests.
<p>RESOURCES (Technology Based Resources, Text Resources, etc.):</p> <ul style="list-style-type: none"> • Project STEM Website and LMS • Laptop/Desktop/iPad
<p>KEY VOCABULARY: Inheritance, Inheritance Overriding Methods, Is-a Relationship, Has-a Relationship</p>

Wallenpaupack Area School District Curriculum	
COURSE: AP Computer Science A	GRADE/S: 11-12
UNIT 10: Recursion	TIMEFRAME: 7 Days

<p>PA COMMON CORE/NATIONAL STANDARDS:</p> <ul style="list-style-type: none"> • 3B-AP-10 – Use and adapt classic algorithms to solve computation problems. • 3B-AP-11 – Evaluate algorithms in terms of their efficiency, correctness, and clarity. • 3B-AP-14 – Construct solutions to problems using student-created components, such as procedures, modules and/or objects.
<p>UNIT OBJECTIVES (SWBATS):</p> <ul style="list-style-type: none"> • Determine the output when a recursive method is called. • Determine how many times a line of code is executed in a certain method call. • Explain why a given method will not execute correctly. • Write a recursive method according to a given specification. • Test their method with a variety of test cases.
<p>INSTRUCTIONAL STRATEGIES/ACTIVITIES:</p> <ul style="list-style-type: none"> • Online Project STEM Course and LMS • Class Discussions • Direct Instruction
<p>ASSESSMENTS (Diagnostic/Benchmark/Formative/Summative):</p> <ul style="list-style-type: none"> • Lesson Practices • Quizzes • Unit Project • Unit Test
<p>DIFFERENTIATED INSTRUCTION (Acceleration/Enrichment):</p> <ul style="list-style-type: none"> • Students work at their own pace throughout this course with teachers adding enrichment where needed based on individual strengths. Accelerated students have the opportunity to finish the course and complete independent projects. • Extension projects are incorporated into each unit and may be used at teacher discretion with accelerated students based on their individual interests.
<p>RESOURCES (Technology Based Resources, Text Resources, etc.):</p> <ul style="list-style-type: none"> • Project STEM Website and LMS • Laptop/Desktop/iPad
<p>KEY VOCABULARY: Recursion, Recursive Functions, Binary Search, Merge Sort</p>

Wallenpaupack Area School District Curriculum	
COURSE: AP Computer Science A	GRADE/S: 11-12
UNIT 11: AP Exam Prep	TIMEFRAME: 10 Days

PA COMMON CORE/NATIONAL STANDARDS: No new standards – review for AP Exam.
UNIT OBJECTIVES (SWBATS): <ul style="list-style-type: none"> • Determine their areas of strengths and weaknesses using Diagnostic Exams. • Create a plan to prepare for the AP Exam.
INSTRUCTIONAL STRATEGIES/ACTIVITIES: <ul style="list-style-type: none"> • Online Project STEM Course and LMS • Class Discussions • Direct Instruction
ASSESSMENTS (Diagnostic/Benchmark/Formative/Summative): <ul style="list-style-type: none"> • Diagnostic Review • Multiple-Choice Review • Free-Response Question Review
DIFFERENTIATED INSTRUCTION (Acceleration/Enrichment): Not necessary for this unit.
RESOURCES (Technology Based Resources, Text Resources, etc.): <ul style="list-style-type: none"> • Project STEM Website and LMS • Laptop/Desktop/iPad
KEY VOCABULARY: No new vocabulary.