

AP Computer Science A

General Information

Description

This class focuses on preparing students to pass the AP CS A exam. In addition, this class lays the foundation for learning advanced programming algorithm techniques and data structure, which are fundamental to becoming a strong software developer. This class teaches advanced algorithms and data structures such as 2D arrays, recursion, binary search, and advanced sorting algorithms. This course is a must-have for those who want a future in software development.

Expectations and Outcomes

The AP CS A course is designed to give students a strong foundation in programming. Upon completion of this course, students will have a good grasp of major programming paradigms and best practices. Students will be able to easily jump between various programming languages and other computer science topics. This course is a strong foundational course for those who look to go into software engineering and web development. Here are some additional outcomes:

- Students will become more confident in using technology and computer science in solving problems in the future.
- Students will consider computer science as a possible career path for their futures.
- Students will improve in coding and designing complex algorithms to solve problems. As such, they will consider computer science as a tool to solve various problems in the world.
- The school will increase the diversity and equity in computer science by offering this course through Rex Academy.
- Students will be able to analyze various artifacts and determine their functions, correct any types of errors, and explain how the artifact works.
- Students will behave ethically and responsibly when using technology.

Course Materials

Prerequisites

- A foundational class in computer science such as:
 - AP CS Principles, Introduction to Java, Introduction to Python, Foundations of Computer Science
- Typing Skills (25 - 40 wpm preferred)

Device Requirements

Any device with Internet connection is sufficient.

Additional Information and Resources

Course Length	Delivery Method	Recommended Age Group
120 hours / 2 Semesters	Online / Classroom	High School (Ages 14+)

Certifications Offered	Pathway Alignment	Standards Aligned
		

Requires additional prep beyond the AP Course

Attention to Equity and Diversity

Rex Academy is dedicated to bringing this course to all interested students, regardless of their background or the zip code in which they reside.

As such, special attention has been given to the curriculum in the following manner:

1. The AP CS A content can run on any device (Chromebooks, tablets, phones, PCs, etc). The Internet connection needs to be minimal. We are determined to remove all obstacles for access.
2. AP CS A is self-paced and does not require a specialized instructor. Just load the curriculum and enjoy.
3. The course can be conducted in a direct classroom setting or in an after-school environment. Students can learn in groups or individually.
4. Instruction and assessment are performed in various ways, thus accommodating various learning styles.

Interdisciplinary Instruction

Rex Academy combines technology instructional materials with common core alignment to integrate other disciplines into the curriculum.

In the case of AP CS A, here is an example of a practice lab from Chapter 4.

Ask for input for the three sides of a triangle.

First, determine if it is possible to construct this triangle with the given lengths.

Second, if a triangle is possible, have the program determine if it is an isosceles, scalene, or equilateral triangle.

Third, if a triangle is possible, have the program determine if it is an acute, obtuse, or right triangle.

As you can see, we have taken some common core standards from geometry and inserted it into the AP CS curriculum. This type of assessment reaches the top of Bloom's taxonomy.

Course Syllabus

Unit Number	Topic	Content	Brief Description
Unit 1	Primitives	6 Practices 5 Homework Labs 4 Practice Labs 1 Main Lab 1 Unit Exam	Students will learn the basics of creating the integer and double variables, create assignments, get input from the user, and send output to the console.
Unit 2 - Part 1	The Math Class	4 Practices 2 Quizzes 6 Homework Labs 2 Practice Labs 1 Main Lab 1 Unit Exam	Students will learn to summon the Math class and use various methods such as Math.random().
Unit 2 - Part 2	The String Class	5 Practices 2 Quizzes 5 Homework Labs 2 Practice Labs 1 Written Practical 1 Main Lab 1 Unit Exam	Students will learn to declare strings and assign values. You must also know the following string methods: <ul style="list-style-type: none"> length() indexOf() substring()
Unit 2 - Part 3	Objects and Methods	5 Practices 3 Quizzes 4 Homework Labs 1 Written Practical 1 Main Lab 1 Unit Exam	Students will create objects in data, assign values, and learn the importance of data encapsulation.
Unit 3	Boolean Logic	5 Practices 2 Quizzes 5 Homework Labs 1 Main Lab 1 Unit Exam	Students will learn to develop algorithms to decision-making problems using branching control statements.

Unit Number	Topic	Content	Brief Description
Unit 4 - Part 1	Iteration - the 'for' loop	8 Practices 2 Quizzes 6 Homework Labs 4 Practice Labs 1 Written Practical 1 Main Lab 1 Unit Exam	Students will learn to create and develop algorithms that are iterative in nature.
Unit 4 - Part 2	Iteration - the 'while' loop	5 Practices 2 Quizzes 5 Homework Labs 4 Practice Labs 1 Main Lab 1 Unit Exam	Students will learn to create and develop algorithms that are iterative in nature.
Unit 5	Writing Classes	5 Practices 2 Quizzes 2 Homework Labs 1 Written Practical 1 Main Lab 1 Unit Exam	Students will create objects in Java and learn the fundamentals of data encapsulation and information hiding.
Unit 6	Arrays	5 Practices 2 Quizzes 7 Homework Labs 1 Written Practical 3 Practice Labs 1 Main Lab 1 Unit Exam	Students will create the array data structure and understand how to iterate through its indexes.
Unit 7	ArrayLists	8 Practices 2 Quizzes 4 Homework Labs 1 Written Practical 1 Main Lab 1 Unit Exam	Students will create the array list data structure and learn its various methods. Also learn various searching and sorting techniques.
Unit 8	2D Arrays	5 Practices 2 Quizzes 5 Homework Labs 1 Written Practical 1 Main Lab	Students will create the 2D array data structure and understand how to iterate through its indexes.

Unit Number	Topic	Content	Brief Description
		1 Unit Exam	
Unit 9	Inheritance	5 Practices 2 Quizzes 3 Homework Labs 1 Written Practical 1 Main Lab 1 Unit Exam	Students will use objects in Java to learn the fundamentals of inheritance, abstraction, and polymorphism.
Unit 10	Recursion	5 Practices 2 Quizzes 5 Homework Labs 1 Written Practical 1 Main Lab 1 Unit Exam	Students will learn to develop recursive solutions to various problems. Students will understand why some recursive solutions are preferable to iterative ones.

