

Course Title:	AP Computer Science A
Grade(s):	10,11,12

Course Description
AP Computer Science A introduces students to computer science through programming. Fundamental topics in this course include the design of solutions to problems, the use of data structures to organize large sets of data, the development and implementation of algorithms to process data and discover new information, the analysis of potential solutions, and the ethical and social implications of computing systems. The course emphasizes object-oriented programming and design using the Java programming language.
Approved Curricular Materials/Textbook(s)
CodeHS

Unit Title	Unit Description (Include Unit Objectives)	Unit Pacing
Unit 1: Using Objects & Methods	This unit introduces students to the Java programming language and the use of variables and classes, providing students with an important foundation of concepts that will be leveraged and built upon in all future units. Students will learn about three built-in data types and how to create variables, store values, and interact with those variables using basic operations. The ability to write expressions is essential to representing the variability of the real world in a program. Several Math and String class methods are introduced, and students will learn the fundamentals of calling and using classes.	5 weeks
Unit 2: Selection & Iteration	Algorithms are composed of three building blocks: sequencing, selection, and iteration. While Unit 1 introduced sequencing, this unit focuses on selection and iteration. Selection is important to a computer program because it gives the programmer the ability to make a decision and respond to that decision using conditional statements. These allow programmers to incorporate choice into their programs: to create games that react to user interactions, to develop simulations	4 weeks

	that are more real-world by allowing for variability, or to discover new knowledge in a sea of information by filtering out irrelevant data. Iteration is a form of repetition and changes the flow of control by repeating a segment of code. It is represented by while and for loops. In addition, students will build on the introduction of Boolean variables in Unit 1 by writing Boolean expressions with relational and logical operators. This unit also introduces several standard algorithms that use iteration. Knowledge of standard algorithms makes solving similar problems easier, as algorithms can be modified or combined to suit new situations.	
Unit 3: Class Creation	This unit will pull together information from the previous two units to create new, user-defined reference data types in the form of classes. The ability to accurately model real-world entities in a computer program is a large part of what makes computer science so powerful. By being able to design their own classes, programmers are not limited to the existing classes provided within the Java libraries and can therefore represent their own ideas through classes. This unit focuses on identifying appropriate behaviors and attributes of real-world entities and organizing these into classes and their corresponding methods. The creation of computer programs can have an extensive impact on societies, economies, and cultures. The legal and ethical concerns that come with programs and the responsibilities of programmers are also addressed in this unit.	4 weeks
Unit 4: Data Collections	This unit introduces the data structures array, ArrayList, and 2D array, which are used to represent collections of related data using a single variable rather than multiple variables. Arrays have a static size, which causes limitations related to the number of elements stored, and it can be challenging to reorder elements stored in arrays. An ArrayList object has a dynamic size, and the class contains methods for insertion and deletion of elements, making reordering and shifting items easier. Deciding which data structure to select becomes increasingly important as the size of the data set grows, such as when using a large real-world data set. A 2D array is most suitable to represent a table. Unlike 1D arrays, 2D arrays require nested iterative statements to traverse and access all elements. The easiest way to accomplish this is in row-major order, but it is important to discuss additional traversal patterns, such as column-major or back and forth. Just as there are useful standard algorithms when dealing with primitive data, there are standard algorithms to use with data structures. Additional algorithms,	11 weeks

	such as two common searching and three common sorting algorithms, are also covered. Sometimes a problem can be solved by solving smaller or simpler versions of the same problem rather than attempting an iterative solution. This is called recursion, and it is a powerful math and computer science concept. In this unit, students will learn how to write simple recursive methods and determine the purpose or output of a recursive method by tracing. Students will revisit how control is passed when methods are called, which is necessary knowledge when working with recursion. Tracing skills are also helpful. Also in this unit, students will learn about privacy concerns related to storing large amounts of personal data and about what can happen if such information is compromised. They will also examine the potential for bias in collecting and using data.	
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