AP Computer Science (AP CSA)

Course Overview: AP CSA is intended for students who want to pursue a career in Software Development or a college major in Computer Science. Arizona is projected to have the largest growth in STEM-related jobs in the next ten years[1]. Computer Science careers also have some of the highest paying introductory salaries for new careers[2]. If you know you want to be involved in Computer Science: this is the right class for you, and there is a growing industry waiting to hire someone with the skills you'll learn in this class.

This class assumes you have *some* prior programming experience. This could be because you took one of the earlier Computer Science classes *or* because you've learned a programming language independently on your own. Aside from an initial refresher of basic programming structures, this course is taught entirely in Java (which is dictated by the AP Exam)

Unit	Description
Unit 0: Programming Basics	This unit is spent reviewing basic programming concepts using whatever language you have prior experience in. Topics to be reviewed are: input/output, if-statement, strings, while-loops, for-loops, functions, and random numbers. We will spend most of our time working through projects and practice programs to refresh our memory and prepare for the transition to the Java programming language.
Unit 1: Classes & Greenfoot	We dive into Java using the Greenfoot programming environment, focusing on the relationship between Classes and Objects. We focus on the structure of a Java class, such as constructors, public vs private attributes, and types of accessor and mutator methods. We use the Greenfoot API to implement new methods and create an inherency hierarchy to classify types of objects. Using the graphical interface, we will collaborate to make our own games and interactive projects that can be shared with our classmates
Unit 2: Data Structures & BlueJ	With the foundations of Java underway, we transition to the BlueJ programming environment to explore the foundations of Java. We explore the differences between Objects and primitives, how to manipulate String and List objects, and how to create classes with static methods. Emphasis is placed on topics that will appear on the AP Exam and how Java manages these objects and classes 'under the hood' in memory. Several projects are given that mimic a real-world development scenario where you are a developer and a customer has given a list of features they want implemented: your job is to create a program that meets the needs of the customer.
Unit 3: Programming Labs	We continue to develop our understanding of Java with two programming labs tied to the AP Exam: the MagPie chat bot and the Picture Lab image manipulator. The MagPie lab involves creating a pseudo artificial intelligence chat bot that responds differently based on the input given by a user, emphasizing String methods and manipulations. We also explore the Picture Lab image manipulator program, which lets us manipulate and control individual pixels of an image, emphasizing 2D Arrays.
Unit 4: Searching & Sorting	As the AP Exam gets closer, we hone in on the more theoretical concepts of the course: how to efficiently sort a collection of data, and how the efficiently search for an element in a piece of data. Specifically, the Bubble Sort, Selection Sort, and Insertion Sort algorithms are taught, along with the Linear Search and Binary Search algorithms. We'll get hands-on experience by sorting decks of cards, using the experience to compare and contrast which algorithms perform better under certain circumstances.
Unit 5: AP Prep	In the weeks leading up to the exam, we look at past AP Exams and Free Response questions to help prepare for the upcoming exam. Sample multiple-choice questions are given along with sample free response questions. Problems are given in groups and some will be presented to the entire class.

[1] https://stem.sfaz.org/page/arizonaindicators
[2] https://www.bls.gov/ooh/computer-and-information-technology/home.htm

AP CSA Big Ideas

Programming Fundamentals • Data Structures • Logic • Algorithms • Object-Oriented • Recursion • Software Engineering

This is An AP Course. Here's What That Means

Grades & College Credit: AP stands for 'Advanced Placement' – it means that you can earn *college credit* for taking this class and passing an exam at the end. Most colleges accept this class as their Computer Science 101 class, which lets you skip a class in your Computer Science major *or* eliminates an elective class in a similar STEM major (such as: engineering, physics, math, etc). This class is also *weighted*, which means that it can really help your GPA. In most classes, a B is worth a 3.0 – but, in this class, a B is worth a 4.0, which is the same as an A in most other classes.

What to Expect: AP doesn't always mean *harder* or *faster* or *more work*, and that's especially true for this course. However, we do have high expectations in how you behave as a student and how responsible you are for your own learning. You are expected to do each of the following for the *entire* school year:

Manage your time so you can finish assignments and be prepared for class discussions	Read the board, check your email, and communicate with your peers so you are prepared for class	Contribute positively when working in groups or with a partner
Speak up when you don't understand something, even if that means coming to office hours	Be able to work independently without getting distracted	Prepare for tests and quizzes by reviewing and studying your notes and assignments
Keep your Promises	**Be In Class**	**Complete Your Work**

The AP Exam: In order to earn your college credit, you need to pass an exam in two parts: a Multiple Choice section and a Free Response section. This exam is given *without a computer* – all coding questions must be evaluated and written by hand.

Multiple Choice Questions	**Free Response Questions**
This is a 40-question exam with 1 hour and 30 minutes to complete this section of the exam. This exam focuses on the 7 Big Ideas of the course: Programming Fundamentals, Data Structures, Logic, Algorithms/Problem Solving, Object-Oriented Programming, Recursion, and Software Engineering.	This is a 4-question exam (with each question having multiple parts) with 1 hour and 30 minutes to complete these questions. This portion of the exam requires you to *hand-write* sections of code, with emphasis placed on having the correct structure and using Object methods correctly as opposed to minor syntax errors. Each question is graded on a 9-point rubric.
If you are taking this course, you are expected to take the AP Exam. If you already know you're not planning on taking the Exam, we should talk *now*.	

Grades

Programs, Projects, & Research Papers: **35%** | Quizzes & Tests: **25%** | Everything Else: **30%**
Taking the AP Exam: **10%**

AP CSA Big Ideas
Programming Fundamentals ● Data Structures ● Logic ● Algorithms ● Object-Oriented ● Recursion ● Software Engineering