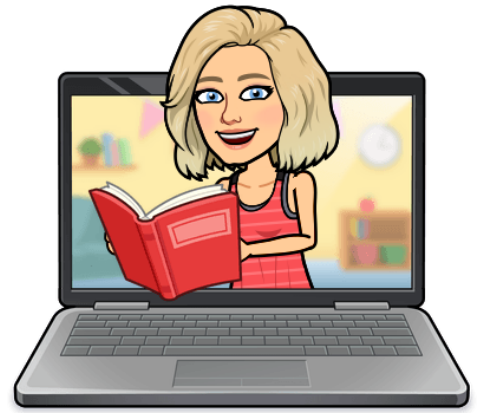# AP Computer Science Principles
Mrs. Goldschmidt
2021-2022 Syllabus

Introduction
AP Computer Science Principles (AP CSP) is a full-year, rigorous course that introduces students to the foundational concepts of computer science and explores the impact computing and technology have on our society. The course covers a broad range of foundational topics including: programming, algorithms, the Internet, big data, digital privacy and security, and the societal impacts of computing.

Course Overview

Prerequisites
The College Board suggests students successfully complete a first year high school Algebra course prior to enrolling in AP CSP. An Algebra course will provide a strong foundation in problem solving, basic linear functions, composition of functions, and the Cartesian (x,y) coordinate system. These skills and topics are essential for student facility in this course. For further preparation, we recommend students complete our Introduction to Computer Science course prior to taking this course. That course introduces students to the fundamentals of computing, providing a foundation on which this course can build.

The College Board adheres to an open enrollment policy for this course, meaning any student that is willing and academically prepared can participate in the course.

Programming Requirements
No prior programming knowledge is required! We will be learning the Python programming language throughout this course. Python is a text-based language with easy to read and write syntax - perfect for beginning programmers.

Course Goals
The six Computational Thinking Practices contain skills that students should develop to not just learn about content, but to change their way of thinking.

Computational Thinking Practices
- Computational Solution Design
- Algorithms and Program Development
- Code Analysis
- Computing Innovations
- Responsible Computing

The course material focuses on Five Big Ideas. These ideas encompass concepts that are foundational to computer science.

Five Big Ideas
- Creative Development
- Data
- Algorithms and Programming
- Computing Systems and Networks
- Impact of Computing

The AP Exam

The AP Exam will test students on their understanding of the five big ideas through a multiple-choice exam and one through-course performance task. Together, these components will be used to calculate the AP score (on a 1-5 scale).

Multiple Choice Exam
The (approximately) 70-question multiple choice exam will test students' understanding of computational logic, which they will learn over the course of the year. This section is programming language agnostic, meaning students don't have to know a formal coding language to complete this part of the exam. The multiple-choice exam will be on May 9, 2022, at Noon local time and accounts for 70% of a student's total AP score.

Performance Task
The performance task in this course is called the Create Task. This task functions as a project that students must complete independently and submit online prior to taking the multiple-choice portion of the exam. The Create Task is worth 30% of a student's overall AP score. In this task, students will create their own program. Students will submit a video of their program running and a written response describing how their program works. The students must be given a minimum of 12 hours in class to work on it.

Students are required to submit their performance task via the College Board's online Digital Portfolio by April 30, 2022 at 11:59 p.m. ET.

Grading

In the HHS math department, 70% of your grade is summatives and 30% is formatives. To model this class after the AP exam, your summatives will be split into Unit assessments and Unit PTs.

- 50% - Unit Assessments (AP Level Multiple Choice Questions)
- 20% - Unit PTs (Projects relating to the content of the unit)
- 30% - Quizzes, Homework, Activities, etc.

Materials
- 3 Ring Notebook - I will provide guided notes as well an handouts. These will all have a 3 hold punch that you will want to keep organized.
- Charged Chromebook - Plan on using your chromebook every day.

Course Sequencing

The year-long curriculum directly addresses the College Board's AP Computer Science Principles curriculum framework. It has been carefully designed to teach students the core skills for 1) creating and using computational tools 2) applying logical reasoning and creative problem solving and 3) recognizing real-world applications for digital technology. The curriculum also provides one window of time for students to complete the required Create Task.

Unit 1: Introduction to Computer Science *(Approx 2 weeks)*
- 1A: Students will be able to summarize the key points in the historical development of modern computers.
- 1B: Students will be able to understand and write algorithms for everyday tasks.
- 1C: Students will be able to identify the various hardware and software components of a computer.
- 1D: Students will be able to explain the role of computer languages in computer science.
- 1E: Students will be able to explain how the effect of a computing innovation can be both beneficial and harmful.

Unit 2: Digital Information *(Approx 2.5 weeks)*
- 2A: Students will understand how binary is used in computer programming languages.
- 2B: Students will be able to convert between binary, decimal, and hexadecimal representations.
- 2C: Students will understand how characters, sound, and images are represented inside a computer.
- 2D: Students will compare data compressions algorithms.

Unit 3: The Internet *(Approx 3 weeks)*
- 3A: Students will understand how computers are connected into networks and the tradeoffs involved in building different types of networks.
- 3B: Students will understand how computers are able to send information across a network using the internet protocols and routing.
- 3C: Students will understand how websites are shared on the Internet and examine whether everyone actually has equal access to information on the World Wide Web.
- 3D: Students will understand how the Internet has changed data processing and storage with distributed, parallel, and cloud computing.
- 3E: Students will investigate and describe issues that contribute to the digital divide.

Unit 4: Big Data and Privacy *(Approx 3 weeks)*
- 4A: Students will understand the term big data and how we use data science to make decisions.
- 4B: Students will understand how artificial intelligence (AI) uses heuristics and data science to learn.
- 4C: Students will explain how the use of computing can raise legal and ethical concerns.
- 4D: Students will describe the risks to privacy from collecting and storing personal data on a computer system.
- 4E: Students will explain how unauthorized access to computing resources happens and explore ways to prevent it.

Unit 5: Programming *(Approx 6 weeks)*
- 5A: Students will trace and write code that demonstrates how program code executes commands from top to bottom, including mathematical expressions.
- 5B: Students will trace through the AP Exam pseudocode to determine program outcomes, including "turtle" problems.
- 5C: Students will trace and write code that demonstrates how selection (using if and if-else statements) is used to control the flow of a program and it's execution, including nested conditionals.
- 5D: Students will trace and write code involving boolean conditions.
- 5E: Students will trace and write code that demonstrates how iteration (using while and for loops) is used to control the flow of a program and it's execution, including nested loops.
- 5F: Students will trace and write code that uses procedural abstraction in a program.
- 5G: Students will trace and write code involving the use of data structures (lists), including sequential and binary searches.

College Board Create PT *(Approx 3 weeks)*

Unit 6: Social Issues in Computing *(Approx 2 weeks)*
- 6A: Students will explain how people participate in problem-solving processes at scale using citizen science.
- 6B: Students will use ethical reasoning to evaluate social issues related to computing.
- 6C: Students will discuss trade-offs between the rights of personal privacy and governments' concerns with safety and security.
- 6D: Students will describe cyberbullying and why legal remedies are so difficult to apply.
- 6E: Students will discuss how social media makes it easier to globally disseminate rumors and false information that can have a profound effect on governments worldwide.

Unit 7: AP Exam Review
- Students will take practice exams and review for the AP Exam

Extensions:
- Programming with Javascript
- Python GUI
- Working with data in Google Sheets