AP Computer Science Principles Scope and Sequence

AP Computer Science Principles is the newest AP® course from the College Board. This course introduces students to the foundational concepts of computer science and explores the impact computing and technology have on our society.

With a unique focus on creative problem solving and real-world applications, the CodeHS AP Computer Science Principles course gives students the opportunity to explore several important topics of computing using their own ideas and creativity, use the power of computing to create artifacts of personal value, and develop an interest in computer science that will foster further endeavors in the field.

Module 1: Web Development	
15 hours (3 weeks)	Introduces HTML, CSS, and the processes involved in viewing web pages on the Internet. Students create several simple web pages using the CodeHS online editor, including their own website about themselves, hosted on their own custom codehs.me URL.

Enduring Understandings:
1.1 Creative development can be an essential process for creating computational artifacts.

1.2 Computing enables people to use creative development processes to create computational artifacts for creative expression or to solve a problem.

1.3 Computing can extend traditional forms of human expression and experience.

3.2 Computing facilitates exploration and the discovery of connections in information.

5.1 Programs can be developed for creative expression, to satisfy personal curiosity, to create new knowledge, or to solve problems (to help people, organizations, or society).

5.2 People write programs to execute algorithms.

6.1 The Internet is a network of autonomous systems.

7.1 Computing enhances communication, interaction, and cognition.

7.2 Computing enables innovation in nearly every field.

Module 2: Introduction to Programming with Karel the Dog

20 hours (4 weeks)	Teaches what it means to "program" and allows students to focus on solving problems using code, rather than getting bogged down in syntax. Students solve problems by moving Karel the Dog around the grid.

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1.1 Creative development can be an essential process for creating computational artifacts.

1.2 Computing enables people to use creative development processes to create computational artifacts for creative expression or to solve a problem.

2.2 Multiple levels of abstraction are used to write programs or create other computational artifacts

4.1 Algorithms are precise sequences of instructions for processes that can be executed by a computer and are implemented using programming languages.

4.2 Algorithms can solve many but not all computational problems.

5.1 Programs can be developed for creative expression, to satisfy personal curiosity, to create new knowledge, or to solve problems (to help people, organizations, or society).

5.2 People write programs to execute algorithms.

5.3 Programming is facilitated by appropriate abstractions.

5.4 Programs are developed, maintained, and used by people for different purposes.

Module 3: Programming with JavaScript

30 hours (6 weeks)	This unit introduces students to the basics of JavaScript, and gives students practice writing JavaScript programs to solve general problems. Students will be able to compare and contrast JavaScript with Karel and identify the abstractions Karel provides over JavaScript.

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1.3 Computing can extend traditional forms of human expression and experience.

2.1 A variety of abstractions built upon binary sequences can be used to represent all digital data.

2.2 Multiple levels of abstraction are used to write programs or create other computational artifacts

2.3 Models and simulations use abstraction to generate new understanding and knowledge.

3.1 People use computer programs to process information to gain insight and knowledge.

4.1 Algorithms are precise sequences of instructions for processes that can be executed by a computer and are implemented using programming languages.

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5.5 Programming uses mathematical and logical concepts.

Module 4: Digital Information	
30 hours (6 weeks)	Students will learn about the various ways we represent information digitally. Topics covered include number systems, encoding data, programmatically creating pixel images, comparing data encodings, compressing and encrypting data. Students will work in pairs to develop their own data encryption algorithms, and attempt to crack the encryptions of their peers. Their text encryption tool will be embedded in their portfolio websites.

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3.1 People use computer programs to process information to gain insight and knowledge.

3.2 Computing facilitates exploration and the discovery of connections in information.

3.3 There are trade offs when representing information as digital data.

4.2 Algorithms can solve many but not all computational problems.

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6.3 Cybersecurity is an important concern for the Internet and the systems built on it.

Module 5: The Internet	
30 hours (6 weeks)	This unit explores the structure and design of the internet, and how this design affects the reliability of network communication, the security of data, and personal privacy. Students will learn about the protocols and algorithms used in the internet, and the importance of cybersecurity. Students will choose an innovation that was enabled by the Internet and explore the positive and negative impacts of their innovation on society, economy, and culture. Students will develop a computational artifact that illustrates, represents, or explains the innovation's purpose, its function, or its effect, and embed this artifact in their personal portfolio website.

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6.1 The Internet is a network of autonomous systems.

6.2 Characteristics of the Internet influence the systems built on it.

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7.1 Computing enhances communication, interaction, and cognition.

7.2 Computing enables innovation in nearly every field.

7.3 Computing has global effects -- both beneficial and harmful -- on people and society.

7.4 Computing innovations influence and are influenced by the economic, social, and cultural contexts in which they are designed and used.

7.5 An investigative process is aided by effective organization and selection of resources. Appropriate technologies and tools facilitate the accessing of information and enable the ability to evaluate the credibility of sources.

Module 6: Data	
25 hours (5 weeks)	In this unit, students will explore using computational tools to store massive amounts of data, manipulate and visualize data, find patterns in data, and pull conclusions from data. Students will consider how the modern wealth of data collection has impacted society in positive and negative ways. Students will work in teams to investigate a question of personal interest, and use public data to present a data driven insight to their peers. They will develop visualizations to communicate their findings, and embed their visualizations in their portfolio websites.

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Module 7: Performance Tasks	
20 hours (4 weeks)	This time is set aside for students to prepare for and create their AP Performance Tasks. Students will be given the chance to review course content and practice the skills necessary to complete each performance task. The Explore PT will be administered over 8 hours of class time, and the Create PT will be administered over 12 hours of class time.
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Module 8: Review for the AP Exam	
15 hours (3 weeks)	This unit gives students a review of the topics covered in the course and provides practice solving AP Exam style multiple choice questions.
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Module 9: Final Project	
Remainder of School Year	In this unit students will brainstorm their own final project, discuss their ideas with their peers, scope their project to fit within the time constraints of the class, plan out milestones for incremental development, and create their own final product from scratch. This project allows students to think creatively about the applications of the concepts covered in the course, and create something of personal value.

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