



CodeHS

Computer Science Principles Course Syllabus

Course Overview

This one semester 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 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.

Prerequisites: There are no official prerequisites for the CodeHS Computer Science Principles course. This course is meant to be a first-time introduction to computer science and does not require students to come in with any computer programming experience. However, we recommend that students complete a first-year high school algebra course prior to taking this course. Students should be comfortable with functions and function notation such as $f(x) = x + 2$ as well as using a Cartesian (x, y) coordinate system to represent points in a plane.

Learning Environment: Students will write and run code in the browser and create websites and digital artifacts. Teachers utilize tools and resources provided by CodeHS to leverage time in the classroom and give focused 1-on-1 attention to students. Each unit of the course is broken down into lessons. Lessons consist of video tutorials, short quizzes, example programs to explore, written programming exercises, free response exercises, collaborative creation projects, and research projects.

Programming Environment: Students write and run programs in the browser using the CodeHS editor. Students will be able to write both text-based and block-based JavaScript programs. Students gain programming experience that will enable them to explore the rest of the course topics through computational thinking practices.

More information: Browse the content of this course at <https://codehs.com/course/7421>

Course Breakdown

Unit 1: Web Development (4 weeks, 20 hours)

In this unit, students will go through a high-level introduction to HTML, CSS, and the processes involved in viewing web pages on the internet. Students will create several simple web pages using the CodeHS online editor to gain practice using the various features of HTML and CSS. This unit culminates with each student making their own website about themselves, hosted on their own custom CodeHS URL. This personal website will be continually improved by the student as they continue on in the course and will serve as a running portfolio of each creative project they create in the course.

Browse the full content of this unit at <https://codehs.com/library/course/7421/module/10859>

Subsection	Lessons / Topics
HTML	Hierarchical layout of HTML documents HTML tags Formatting Lists Tables Creating your own websites
CSS	CSS Selectors Separating style from structure Using CSS to style your own websites
Viewing Websites	Locating a resource with URLs Requesting a resource Browsers

Unit 2: Benchmark 1: Website Design (1 week/5 hours)

Students are asked to explore and compare websites with respect to their layout and design elements. They will either create a website advertising and promoting their new FRED game or use HTML and CSS to design the gaming interface of their marine robot program.

Browse the full content of this unit at <https://codehs.com/library/course/7421/module/11672>

Unit 3: Introduction to Programming with Karel the Dog (4 weeks, 20 hours)

Students will use Karel, a dog that only knows how to move, turn left, and place tennis balls in his world, to show students what it means to program, and allow students to focus on computational problem-solving. Students will learn about the need for programming languages, the uses of programs, how to write programs to solve computational problems, how to design algorithms, how to analyze and compare potential solutions to programming problems, and learn the value and challenges involved in collaborating with others to solve programming problems.

Browse the full content of this unit at <https://codehs.com/library/course/7421/module/10859>

Subsection	Lessons / Topics
Abstraction	Procedural Abstraction Modularity Program Reuse Digital Data (Bits) Reducing Complexity
Programming Style	Program Documentation Using Existing Code and Libraries APIs Commenting Code
Control Structures	If/Else Statements (Selection) For Loops and While Loops (Iteration)
Debugging Strategies	Logic Errors Syntax Errors Run-Time Error Testing
Designing Algorithms	Sequencing, Selection, Iteration Clarity and Readability Using Existing Algorithms Optimization and Efficiency

Unit 4: Benchmark 2: Creating and Using a Prototype (1 weeks/5 hours)

Students are asked to research and use components of creative development and project management. They will use Karel to build a prototype of their FRED game. The prototype will include commands, functions and control structures that will be needed while further exploring top down design and abstraction. They will examine how these concepts apply to program development, problem solving, and project planning.

Browse the full content of this unit at <https://codehs.com/library/course/7421/module/11675>

Unit 5: The Internet (3 weeks, 15 hours)

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 on the internet and the importance of cybersecurity.

Browse the full content of this unit at <https://codehs.com/library/course/7421/module/10870>

Subsection	Lessons / Topics
Internet Hardware and Addresses	Protocols Computing Devices Computer Networks Bandwidth
Routing	Routing Scalability Fault-Tolerance Redundancy
Packets and Protocols	Datastreams Packets IP, TCP, UDP HTTP Metadata
Computing Systems	Parallel Systems Scalability of Systems Sequential Computing Parallel Computing Distributed Computing Efficiency of Solutions
Impact of the Internet	Computing Innovations Unintended Effects Impact on Society Rapid Sharing Digital Divide Citizen Science Crowdsourcing Creative Credit and Copyright
Cybersecurity	Legal and Ethical Concerns Personally Identifiable Info (PII) Digital Footprint Authentication Certificate Authorities (CAs) Computer Viruses Malware Phishing Keylogging Rogue Access Points Encryption

Unit 6: Benchmark 3: Website Design (1 weeks/5 hours)

Students will research an emerging ocean technology and its intended effects as well as any unintended effects, security concerns or ethical concerns. With the intention of avoiding negative effects while designing their FRED game, students will choose an example of an emerging ocean technology and explore the effects of this innovation. They will research its intended effects as well as any unintended effects or security concerns.

Browse the full content of this unit at <https://codehs.com/library/course/7421/module/11676>

Unit 7: Data (2 weeks, 10 hours)

In this unit, students will explore using computational tools to store massive amounts of data, manipulate and visualize data, find patterns in data, and draw 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.

Browse the full content of this unit at <https://codehs.com/library/course/7421/module/10872>

Subsection	Lessons / Topics
Visualizing and Interpreting Data	Filtering and Cleaning Data Patterns and Trends Search Tools Tables, Diagrams and Displays Interactive Visualizations Combining Data Sources
Collecting Data and Data Limitations	Metadata Correlation Using a Variety of Sources Incomplete or Invalid Data Bias Surveys, Testing, Interviews

Unit 8: Benchmark 4: Present a Data-Driven Insight (1 weeks/5 hours)

Students will research and use data from a reputable source about the amount of plastic in the ocean. They will also explore different data visualizations that can be used to present patterns and draw conclusions. They will present their visualization and conclusions to a group of investors to draw attention to the growing need for a clean water solution. Using data from a reputable source about the amount of plastic in the ocean, students will find patterns and draw conclusions. They will create an informative data visualization and present their findings.

Browse the full content of this unit at <https://codehs.com/library/course/7421/module/11677>