CodeHS

Nevada Advanced Computer Science I Course Syllabus
1 year for High School, 160 hours

Course Overview and Goals

The Nevada Advanced Computer Science I course will introduce students to the essential concepts of computer science and show how computing and technology can influence the world. This course focuses on using technology and programming to develop creative solutions to computational problems.

Learning Environment: The course utilizes a blended classroom approach. The content is fully web-based, with students writing and running code in the browser. 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, and written programming exercises, adding up to over 100 hours of hands-on programming practice in total. Each unit ends with a comprehensive unit test that assesses students' mastery of the material from that unit.

Programming Environment: Students write and run JavaScript programs in the browser using the CodeHS editor.

More information: Browse the content of this course at https://codehs.com/course/20051/explore

Prerequisites

 Successful completion of Computer Science Principles is recommended but not required. The Nevada Advanced Computer Science I course is designed so that beginners with no previous background in computer science may still take the course. The course is highly visual, dynamic, and interactive, making it engaging for new coders.

Course Breakdown

Unit 1: What is Computing? (3 weeks/15 - 20 hours)
Browse the full content of this unit at https://codehs.com/course/20051/explore/module/27676

Objectives / Topics Covered	- History of Computers - Computer Organization - Software - Hardware - Future of Computing - What is Computing? Quiz
Assignments / Labs	- History - Research famous computer innovators - What roles do computers play in your life? - Summarize an era of advances in computers - Computer Organization

	○ What parts do modern computers have?
	○ What are input/output devices?
	○ Draw a computer and label all of its parts
	● Software/Hardware
	○ What's the difference?
	What hardware components make up a computer?
	○ Label the parts of your computer
	● Future of Computing
	○ Research uses of Artificial Intelligence in use now
	○ Research new ways of storing data
	○ In what ways can we use technology that we couldn't 10 years ago. Are these technological advances helpful or harmful overall?

Unit 2: Programming with Karel (3 weeks/15 hours)

Browse the full content of this unit at https://codehs.com/course/20051/explore/module/27587

Objectives / Topics Covered	● Commands ● Defining vs. Calling Methods ● Designing Methods ● Program Entry Points ● Control Flow ● Looping ● Conditionals ● Classes ● Commenting Code ● Preconditions and Postconditions ● Top Down Design

Assignments / Labs	● 27 Karel programming exercises in total
	● Program-specific tasks for Karel the Dog
	     ○ Example Exercise: Pyramid of Karel
	        Write a program to have Karel build a pyramid. There should be three balls on the first row, two in the second row, and one in the third row.
	● Teach Karel new commands like `turnRight()` or `makePancakes()`
	     ○ Example Exercise: Pancakes
	        Karel is the waiter. He needs to deliver a stack of pancakes to the guests on the 2nd, 4th, and 6th columns. Each stack of pancakes should have three pancakes. Create a function called `makePancakes()` to help Karel solve this problem. The world should end up exactly as shown here.
	     ○
	● Solve large Karel problems by breaking them down into smaller, more manageable problems using Top Down Design
	     ○ Example Exercise: The Two Towers
	        In this program, Karel should build two towers of tennis balls. Each tower should be 3 tennis balls high. At the end, Karel should end up on top of the second tower, facing East.
	     ○
	● Using control structures and conditionals to solve general problems
	     ○ Example Exercise: Random Hurdles

	Write a program that has Karel run to the other side of first row, jumping over all of the hurdles. Karel should only jump if there is a hurdle blocking the way. However, the hurdles can be in random locations. The world is fourteen columns long. You must write a function named `jumpHurdle()` as part of your solution.

Unit 3: JavaScript Basics (1 week/5 hours)

Browse the full content of this unit at https://codehs.com/course/20051/explore/module/27589

Objectives / Topics Covered	- Variables - User Input - Arithmetic Expressions - Constants - Collaborative Programming - Random Numbers - Functions
Assignments / Labs	12 JavaScript programming exercises in total - Using variables and getting user input using JavaScript - Example Exercise: Dinner Plans Prompt the user for their name, then ask them what time you should meet for dinner. Greet them by name and tell them you will meet them at the time they specified!

Unit 4: Computer Science Careers (1.5 week/8 - 10 hours)

Browse the full content of this unit at https://codehs.com/course/20051/explore/module/27580

Objectives / Topics Covered	- Computer Science Careers - Career and Technical Student Organizations - Project: Work-Based Learning - Career Readiness Quiz
Assignments / Labs	- Computer Science Careers - Explore the careers available in computer science and learn how bias can affect computer programs. - Career and Technical Student Organizations - Learn about the CTSOs that operate in Nevada. Explore events and competitions that are hosted by CTSOs and make a plan to attend. - Project: Work-Based Learning - Explore local work-based learning opportunities to enhance career readiness. Students will also investigate community service opportunities in their area.

Unit 5: Digital Citizenship and Cyber Hygiene (3 week/15 hours)

Browse the full content of this unit at https://codehs.com/course/20051/explore/module/27570

Objectives / Topics Covered	- What is Cybersecurity? - The CIA Triad - Digital Footprint and Reputation - Cyberbullying - Internet Safety - Privacy and Security - Information Literacy - Browser Configuration - Visualizing and Interpreting Data - Data Collection and Limitations - Creative Credit and Copyright - Hacking Ethics
Example Assignments / Labs	- Digital Footprint and Reputation - What is a digital footprint? - What is *your* digital footprint and reputation? - What does it mean that the internet is public and permanent? - Who looks at your digital footprint and reputation? - What are some recommended social media guidelines? - How can you maintain your digital footprint? - What does your digital footprint say about you? - Example activities: - What is your digital footprint? - Are you going to make any changes in what you post on social media? - Cyberbullying - What is cyberbullying? - What are the impacts of cyberbullying? - Are there cyberbullying roles? - What do you do if you are being bullied? - What do you do if you see bullying? - How can you be an upstander? - Example activities: - Explore cyberbullying scenarios: What would you do? - Internet Safety - What are some ways to stay safe online? - What are some online safety guidelines? - Example activities: - Explore Internet safety scenarios: What would you do? - Privacy and Security - What are data privacy and security? - How can you keep personal data secure and private? - What can happen if your data is stolen and what can you do about it? - Example activities: - Test out various passwords on a site - Explore Google's privacy policy: What do they know about you? - Information Literacy - What is information literacy? - How can you do effective internet searches? - What are some techniques for judging source legitimacy and identifying misinformation?

	○ Example activities:
	■ Create and test search queries
	■ Explore the evidence for using sources
	● Browser Configuration
	○ Cached CodeHS
	○ Is Your Popup Blocker On?
	○ Browser Extension Lab
	○ Example activities:
	■ Checking popup blocker functionality
	■ Explore cached snapshots
	● Creative Credit and Copyright
	○ What is copyright?
	○ What are the different types of copyright licenses
	○ Example activities:
	■ Create citations for sources
	■ Explore image search tools
	● Hacking Ethics
	○ What are hackers?
	○ Are there different kinds of hackers? (white, black, grey)
	○ What are bug bounty programs?
	○ Is hacking always illegal?
	○ What are the consequences of illegal hacking?
	○ Example activities:
	■ Explore what penetration testing is
	■ Sign ethical hacker agreement
	● Final project: Create a Public Service Announcement
	○ Create a Public Service Announcement (PSA) to teach your peers about your selected topic in digital citizenship and cyber hygiene. You can select any of the topics covered in this module. Be creative and make it fun! You could make a video, song, poster, or slideshow.

Unit 6: The Canvas and Graphics (1 week/5 hours)

Browse the full content of this unit at https://codehs.com/course/20051/explore/module/27596

Objectives / Topics Covered	● JavaScript Canvas ● JavaScript Graphics ● Positioning Graphics Objects ● Mouse Events ● Keyboard Events
Assignments / Labs	● 7 JavaScript programming and graphics exercises in total 　○ Example Exercise: Create Your Own Meme 　In this exercise, you are going to create your own meme! The only requirements are that you add at least one image and one text element.

Unit 7: JavaScript Control Structures (3 weeks/15 hours)

Browse the full content of this unit at https://codehs.com/course/20051/explore/module/27590

Objectives / Topics Covered	● Booleans ● If/Else Statements

	● Logical Operators ● Comparison Operators ● Conditionals ● While Loops ● Break Statements ● For Loops ● Nested Control Structures
Assignments / Labs	● 31 control structures programming exercises in total ● Using comparison and logical operators to control the flow of the program 　○ Example Exercise: Inventory 　　Write a program that keeps track of a simple inventory for a store. While there are still items left in the inventory, ask the user how many items they would like to buy. Then print out how many are left in inventory after the purchase. You should use a while loop for this problem. 　　Make sure you catch the case where the user tries to buy more items than there are in the inventory. In that case, you should print a message to the user saying that their request isn't possible. ● Using for loops 　○ Example Exercise: Jukebox 　　■ In the days before the internet, many restaurants would have a jukebox that allowed customers to choose what music they wanted to play. Customers would enter a coin and choose from the jukebox's music collection by selecting a song's number. You could choose one song per coin. In this exercise, you will create a digital jukebox where the user can enter any number of quarters to create a playlist of songs. ● Drawing basic graphics using JavaScript 　○ Example Exercise: Caterpillar 　　This graphics program should draw a caterpillar. A caterpillar has NUM_CIRCLES circles. Every other circle is a different color, the even circles are red, and the odd circles are green (by even we mean when i is an even number). Use a for loop to draw the caterpillar, centered vertically on the screen. Also, be sure that the caterpillar is still drawn across the whole canvas even if the value of NUM_CIRCLES is changed.

Unit 8: Networks and the Internet (1.5 weeks/8 hours)
Browse the full content of this unit at https://codehs.com/course/20051/explore/module/27573

Objectives / Topics Covered	● Structure of the internet ● How network data is transmitted ● Hardware involved in the transmission of data ● How the internet has impacted everyday life
Example Assignments / Labs	● Structure of the internet 　○ Explore the differences between IPv4 and IPv6. Why are we running out of addresses? 　○ Explore the different levels of the internet. 　○ Example Activity

	■ Trace a website request from the server, through the network, and to your computer
	● How data is transmitted
	○ How are internet packets able to find their way to your computer?
	○ Explain in your own words how a request from your computer travels through the various levels of servers to reach and return the correct webpage and resources?
	○ Example Activity:
	■ As a class, create a protocol that will allow one classmate to send another classmate a note, without the need for talking to each other.
	● Hardware involved
	○ Explore the role of routers
	○ Why are protocols so important?
	○ Explore how data is able to be transmitted across the ocean by using underwater cables

Unit 9: Functions (2 weeks/10 hours)

Browse the full content of this unit at https://codehs.com/course/20051/explore/module/27592

Objectives / Topics Covered	● Parameters ● Return Values ● Default Parameters ● Scope

Assignments / Labs	● 12 functions programming exercises in total
	● Using various kinds of functions such as functions with and without parameters, and functions with and without return values
	  ○ Example Exercise: Is it even?
	  Write a program that continually asks the user for integers and then prints whether their input is even or odd. The user should keep entering numbers until they enter 0; at that point, print "Done!" on its own line.
	
	  In order to check if the inputted integer is even or odd, you should define and call a function named `isEven()`. This function should return a Boolean value of `true` or `false` depending if the number is even or not.

Unit 10: Arrays (3 weeks/15 - 20 hours)

Browse the full content of this unit at https://codehs.com/course/20051/explore/module/27594

Objectives / Topics Covered	● Intro to Lists/Arrays ● Indexing Into an Array ● Adding/Removing From an Array ● Array Length and Looping Through Arrays ● Iterating Over an Array

	● Finding an Element in a List ● Removing an Element From an Array ● Sorting an Array ● Arrays Quiz

Assignments / Labs	● 16 array/list programming exercises in total
	● Create and manipulate arrays using array methods
	    ○ Example Exercises: Coin Flip
	        Starting with a program that creates an array of coin flips, add a function that prints out the total number of heads and total number of tails flipped. In this function, you need to use two variables to keep track of the heads and tails totals.

Unit 11: More Data Structures and Algorithms (3 weeks/15 - 20 hours)

Browse the full content of this unit at https://codehs.com/course/20051/explore/module/27594

Objectives / Topics Covered	● What is an Algorithm? ● Introduction to Sets and Grids ● Introduction to recursive programming ● AI in gaming

Assignments / Labs	● 16 array/list programming exercises in total
	● Create and manipulate arrays using array methods
	    ○ Example Exercises: Tic Tac Toe
	        Students build a Tic Tac Toe game that can run in the console. After creating the game, they create an NPC to play against.

Unit 12: Final Project (2 weeks/10 hours)

Browse the full content of this unit at https://codehs.com/course/20051/explore/module/27579

Objectives / Topics Covered	● Project Planning ● Final Project Creation

Assignments / Labs	● Collaborative open-ended final project which encourages creativity
	● Program Requirements:
	Your program:
	    ○ must use JavaScript Graphics
	    ○ must allow the user to interact with your project with either their mouse or keyboard
	    ○ must use at least one timer
	    ○ must break down the program into multiple functions
	    ○ must utilize control structures where applicable

Supplemental: Animations and Games (3 weeks/15 hours)

This supplemental material can be assigned after unit 9 (Functions).

Objectives / Topics Covered	● Timers ● Randomizing Games

	● Mouse Events ● Keyboard Events
Assignments / Labs	● 19 animations programming exercises in total Throughout the lessons in this module, you will be developing a simple game that incorporates basic animation techniques and input events.