

# Computer Science 1

## Course Syllabus

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### Course Overview and Goals

The Computing Ideas course is a first-year computer science course introducing the basics of programming with Karel the Dog, the basics of designing a web page, and how information is represented digitally and sent over the Internet. Students will learn to code using blocks to drag and drop, but they can switch between blocks and text as desired. Students will create a personal portfolio website showing projects they build throughout the course.

With a unique focus on creativity, problem solving and project-based learning, Computing Ideas gives students the opportunity to explore several important topics of computing using their own ideas and creativity to develop an interest in computer science that will foster further endeavors in the field.

**Learning Environment:** The course utilizes a blended classroom approach. The content is a mix of web-based and physical activities. Students will write and run code in the browser, create websites and digital presentations, and engage in in-person collaborative exercises with classmates. Teachers utilize tools and resources provided by CodeHS to leverage time in the classroom and give focused 1-on-1 attention to students.

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

**Quizzes :** Each lesson includes at least one formative short multiple choice quiz. At the end of each unit, students take a summative multiple choice unit quiz that assesses their knowledge of the concepts covered in the unit.

**Prerequisites:** The Computing Ideas course is designed for complete beginners with no previous background in computer science. The course is highly visual, dynamic, and interactive, making it engaging for those new to computer science.

**More information:** Browse the content of this course at <https://codehs.com/course/649>

## Course Breakdown

### Unit 1: What is Computing? (5 weeks/25 hours)

Browse the full content of this unit at <https://codehs.com/library/course/649/module/1223>

Objectives / Topics Covered	<ul style="list-style-type: none"><li>•</li><li>• History of computers What is a computer?</li><li>• What is software?</li><li>• What is hardware?</li><li>• Future of computing</li></ul>
Example Assignments / Labs	<ul style="list-style-type: none"><li>• History<ul style="list-style-type: none"><li>○ Find out when the first computers were created</li><li>○ Research famous computer innovators</li><li>○ What roles do computers play in your life?</li><li>○ Example Activity:<ul style="list-style-type: none"><li>■ Summarize an era of advances in computers</li></ul></li></ul></li><li>• What is a computer?<ul style="list-style-type: none"><li>○ What parts do modern computers have?</li><li>○ What are input devices?</li><li>○ What are output devices?</li><li>○ Example Activity:<ul style="list-style-type: none"><li>■ Draw a computer and label all of its parts, including the input devices and output devices</li></ul></li></ul></li><li>• Software/Hardware<ul style="list-style-type: none"><li>○ What's the difference?</li><li>○ What hardware components make up a computer?</li><li>○ What is software used for?</li><li>○ Example Activity:<ul style="list-style-type: none"><li>■ Label the parts of your computer</li></ul></li></ul></li><li>• Future of Computing<ul style="list-style-type: none"><li>○ Research uses of Artificial Intelligence in use now</li><li>○ Research new ways of storing data</li><li>○ Example Class Activity:<ul style="list-style-type: none"><li>■ In what ways can we use technology that we couldn't 10 years ago. Are these technological advances helpful or harmful overall?</li></ul></li></ul></li></ul>

	<ul style="list-style-type: none"> <li>• Final Project <ul style="list-style-type: none"> <li>○ Create a presentation about a computer. Choose any computer -- a phone, an early computer model, drones, etc. Who built it and why? How does it interact with people? How do people interact with the computer?</li> </ul> </li> </ul>
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## Unit 2: Introduction to Programming with Karel the Dog (5 weeks/25 hours)

Browse the full content of this unit at <https://codehs.com/library/course/649/module/1170>

Objectives / Topics Covered	<ul style="list-style-type: none"> <li>• Commands</li> <li>• Defining versus Calling Methods</li> <li>• Designing methods</li> <li>• Control flow</li> <li>• Looping</li> <li>• Conditionals</li> <li>• Commenting code</li> <li>• Preconditions and Postconditions</li> <li>• Top Down Design</li> </ul>
Example Assignments / Labs	<ul style="list-style-type: none"> <li>• Commands <ul style="list-style-type: none"> <li>○ Program-specific tasks for Karel the Dog</li> <li>○ Example Exercise: Pyramid of Karel</li> </ul> <p>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.</p> </li> <li>• Functions <ul style="list-style-type: none"> <li>○ Teach Karel new commands like <code>turnRight()</code> or <code>makePancakes()</code></li> <li>○ Example Exercise: Pancakes</li> </ul> <p>Karel is the waiter. He needs to deliver a stack of pancakes to the guests on the 2nd, 4th, and 6th avenue. Each stack of pancakes should have three pancakes.</p> <p>Create a method called <code>makePancakes()</code> to help Karel solve this problem.</p> </li> </ul>

	<ul style="list-style-type: none"> <li>• Top Down Design <ul style="list-style-type: none"> <li>◦ Solve large Karel problems by breaking them down into smaller, more manageable problems</li> <li>◦ Example Exercise: The Two Towers</li> </ul> <p>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.</p> </li> <li>• Loops and Conditionals <ul style="list-style-type: none"> <li>◦ Example Exercise: Random Hurdles</li> </ul> <p>Write a program that has Karel run to the other side of first street, jumping over all of the hurdles. However, the hurdles can be in random locations. The world is fourteen avenues long.</p> <li>◦ Example Exercise: Super Cleanup Karel</li> </li></ul> <p>Karel's world is a complete mess. There are tennis balls all over the place, and you need to clean them up. Karel will start in the bottom left corner of the world facing east, and should clean up all of the tennis balls in the world. This program should be general enough to work on any size world with tennis balls in any locations.</p>
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### Unit 3: The Internet (5 weeks/25 hours)

Browse the full content of this unit at <https://codehs.com/library/course/649/module/1172>

Objectives / Topics Covered	<ul style="list-style-type: none"> <li>• Structure of the internet</li> <li>• How network data is transmitted</li> <li>• Hardware involved in the transmission of data</li> <li>• How the internet has impacted everyday life</li> </ul>
Example Assignments / Labs	<ul style="list-style-type: none"> <li>• Structure of the internet <ul style="list-style-type: none"> <li>◦ Explore the differences between IPv4 and IPv6. Why are we running out of addresses?</li> <li>◦ Explore the different levels of the internet.</li> <li>◦ Example Activity <ul style="list-style-type: none"> <li>■ Trace a website request from the server,</li> </ul> </li> </ul> </li> </ul>
	through the network, and to your computer

	<ul style="list-style-type: none"> <li>• How data is transmitted <ul style="list-style-type: none"> <li>○ How are internet packets able to find their way to your computer?</li> <li>○ 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?</li> <li>○ Example Activity: <ul style="list-style-type: none"> <li>■ 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.</li> </ul> </li> </ul> </li> <li>• Hardware involved <ul style="list-style-type: none"> <li>○ Explore the role of routers</li> <li>○ Why are protocols so important?</li> <li>○ Explore how data is able to be transmitted across the ocean by using underwater cables</li> </ul> </li> <li>• Final Project <ul style="list-style-type: none"> <li>○ Create a presentation, graphic, video, or audio recording detailing a specific Internet-Based Innovation. The subject may be a product that depends on the internet for its core functionality, a cyber security innovation, or social phenomenon. What is the purpose of the innovation? What are the beneficial and harmful effects this innovation has had?</li> </ul> </li> </ul>
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#### Unit 4: Digital Citizenship and Cyber Hygiene (3 weeks/15 hours)

Browse the full content of this unit at <https://codehs.com/library/course/649/module/13051>

Objectives / Topics Covered	<ul style="list-style-type: none"> <li>• Digital Footprint and Reputation Cyberbullying</li> <li>• Internet Safety</li> <li>• Privacy and Security</li> <li>• Information Literacy</li> <li>• Creative Credit and Copyright</li> </ul>
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<p>Example Assignments / Labs</p>	<ul style="list-style-type: none"> <li>● Digital Footprint and Reputation <ul style="list-style-type: none"> <li>○What is a digital footprint?</li> <li>○What is <b>your</b> digital footprint and reputation? <ul style="list-style-type: none"> <li>○What does it mean that the internet is public and permanent?</li> <li>○Who looks at your digital footprint and reputation?</li> <li>○What are some recommended social media guidelines?</li> <li>○How can you maintain your digital footprint?</li> <li>○What does your digital footprint say about you?</li> <li>○Example activities: <ul style="list-style-type: none"> <li>■What is your digital footprint?</li> <li>■Are you going to make any changes in what you post on</li> </ul> </li> </ul> </li> </ul> </li> </ul>
	<p>social media?</p> <ul style="list-style-type: none"> <li>● Cyberbullying <ul style="list-style-type: none"> <li>○What is cyberbullying?</li> <li>○What are the impacts of cyberbullying?</li> <li>○Are there cyberbullying roles?</li> <li>○What do you do if you are being bullied?</li> <li>○What do you do if you see bullying?</li> <li>○How can you be an upstander?</li> <li>○Example activities: <ul style="list-style-type: none"> <li>■Explore cyberbullying scenarios: What would you do?</li> </ul> </li> </ul> </li> <li>● Internet Safety <ul style="list-style-type: none"> <li>○What are some ways to stay safe online?</li> <li>○What are some online safety guidelines?</li> <li>○Example activities: <ul style="list-style-type: none"> <li>■Explore Internet safety scenarios: What would you do?</li> </ul> </li> </ul> </li> <li>● Privacy and Security <ul style="list-style-type: none"> <li>○What are data privacy and security?</li> <li>○How can you keep personal data secure and private?</li> <li>○What can happen if you data is stolen and what can you do about it?</li> <li>○Example activities: <ul style="list-style-type: none"> <li>■Test out various passwords on a site</li> <li>■Explore Google's privacy policy: What do they know about you?</li> </ul> </li> </ul> </li> </ul>

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|  | <ul style="list-style-type: none"><li>● Information Literacy<ul style="list-style-type: none"><li>○ What is information literacy?</li><li>○ How can you do effective internet searches?</li><li>○ What are some techniques for judging source legitimacy and identifying misinformation?</li><li>○ Example activities:<ul style="list-style-type: none"><li>■ Create and test search queries</li><li>■ Explore evidence for using sources</li></ul></li></ul></li><li>● Creative Credit and Copyright<ul style="list-style-type: none"><li>○ What is copyright?</li><li>○ What are the different types of copyright licenses</li><li>○ Example activities:<ul style="list-style-type: none"><li>■ Create citations for sources</li><li>■ Explore image search tools</li></ul></li></ul></li></ul> |
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Utica High School  
Computer Science Class

I, \_\_\_\_\_, understand I will have be working with computers that are property of North Fork Local Schools and will act responsibly while using the equipment. I understand that any unauthorized use of Computer Science Class equipment may lead to your dismissal from the class, disciplinary action, and/or pursuant to fees for damages to equipment.

Signature:

Date:

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