

## Course Overview and Goals

The World of Computing course is a first year computer science course introducing the basics of programming , and the history and impact of computing . Students will learn to code using blocks to drag and drop, but they can switch between blocks and text as desired.

With a unique focus on creativity, problem solving and project based learning, World of Computing 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 Nexitto 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 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 World of Computing 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.

## Course Breakdown

### Unit 1: Introduction to Programming with Karel the Dog (10 weeks/50 hours)

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 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.</li> </ul> </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 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. Create a method called <code>makePancakes()</code> to help Karel solve this problem.</li> </ul> </li> <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 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.</li> </ul> </li> <li>• Loops and Conditionals             <ul style="list-style-type: none"> <li>◦ Example Exercise: Random Hurdles 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.</li> <li>◦ Example Exercise: Super Cleanup Karel Karel's world is a complete mess. There are tennis balls</li> </ul> </li> </ul>

	<p>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 2: What is Computing? (5 weeks/25 hours)

Objectives / Topics Covered	<ul style="list-style-type: none"> <li>• History of computers</li> <li>• 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> <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>

