



# New York Computer Science & Digital Fluency 4th Grade Course Syllabus

One Year for Elementary School, 36 Hours

## Course Overview and Goals

The **New York Computer Science & Digital Fluency 4th Grade Course** introduces students to foundational programming concepts through **Scratch**, a block-based programming language. Students will develop computational thinking and problem-solving skills while learning to create interactive projects, animations, and games. This course emphasizes creativity and collaboration, providing students with a solid base in computer science concepts and digital literacy.

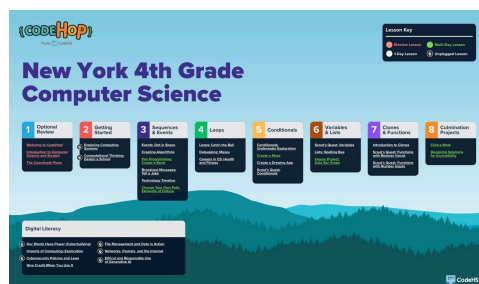
**Learning Environment:** This course is designed to be teacher-led, with ready-to-use lesson plans that follow a structured format: **Introduction, Guided Practice, Independent Practice, Extension, and Reflection**. Lessons are built with spiral review to reinforce key concepts and culminate in engaging projects to showcase student understanding.

The lessons are delivered in an **"I do, we do, you do"** format, ensuring a gradual release of responsibility and fostering confidence in students as they learn. Teachers can adapt the content to fit their schedule and instructional needs. The concepts taught in this course spiral across grade levels, ensuring that students can revisit and build upon their understanding year after year, even if all lessons are not completed within a single year. The course includes a total of 36 **contact hours**, each approximately 45 minutes long. This provides a full school year of material if teaching one lesson per week. Digital literacy lessons are also available to complement the programming curriculum with non-programming computer and technology skills.

**Programming Environment:** Students will write and run programs in **Scratch** embedded and saved in students' accounts. The environment supports interactive, hands-on programming, enabling students to create and debug projects in a user-friendly interface.

**Prerequisites:** There are no prerequisites for this course. It is designed to support all learners, regardless of prior computer science experience.

**More Information:** Browse the content of this course at [https://codehs.com/course/NY\\_4/overview](https://codehs.com/course/NY_4/overview)



A clickable PDF can be found at <https://codehs.com/NY-K-5Roadmaps>

## Course Breakdown

### Optional Review

In this optional unit, students are introduced to key computer science vocabulary, practice logging into and navigating the Playground, and explore basic programming in Scratch. They also learn to use the coordinate plane to position sprites and create open-ended animations, building spatial reasoning and foundational coding skills.

Objectives / Topics Covered	<ul style="list-style-type: none"><li>• Log in and navigate the Playground.</li><li>• Understand and use key computer science vocabulary.</li><li>• Create a simple Scratch program to demonstrate basic programming skills.</li><li>• Use the coordinate plane to position sprites.</li></ul>
Lessons	<p><b>Welcome to CodeHop!</b></p> <ul style="list-style-type: none"><li>• Learn how to log in and explore the Playground to prepare for future lessons.</li></ul> <p><b>Introduction to Computer Science and Scratch</b></p> <ul style="list-style-type: none"><li>• Define key computer science vocabulary and create a simple Scratch program to apply foundational programming concepts.</li></ul> <p><b>The Coordinate Plane</b></p> <ul style="list-style-type: none"><li>• Use the coordinate plane in Scratch to position sprites and create an open-ended animation.</li></ul>

### Unit 1: Getting Started (2 weeks)

In this unit, students apply computational thinking skills to design a school, using strategies like breaking down tasks, identifying patterns, and organizing ideas logically.

Objectives / Topics Covered	<ul style="list-style-type: none"><li>• Apply computational thinking skills.</li><li>• Learn about the components and functions of computing systems.</li></ul>
Lessons	<p><b>Exploring Computing Systems</b></p> <ul style="list-style-type: none"><li>• Explore the components and functions of computing systems and learn basic troubleshooting techniques.</li></ul> <p><b>Computational Thinking: Design a School</b></p> <ul style="list-style-type: none"><li>• Apply computational thinking by breaking down tasks, identifying patterns, and organizing ideas to design a school layout.</li></ul>

### Unit 2: Sequences and Events (8 weeks)

In this unit, students deepen their understanding of events by programming with multiple event types and using broadcast messages to coordinate sprite interactions. They also design algorithms, collaborate through pair programming, and apply coding skills creatively to build interactive projects such as a band performance and a cultural choose-your-own-path game.

Objectives / Topics Covered	<ul style="list-style-type: none"><li>• Create programs using multiple types of event blocks to control when actions happen.</li><li>• Develop and compare algorithms to solve problems efficiently.</li><li>• Use broadcast messages to coordinate interactions between sprites.</li></ul>
Lessons	<p><b>Events: Dot in Space</b></p> <ul style="list-style-type: none"><li>• Create a Scratch program using multiple types of event blocks to trigger different actions.</li></ul> <p><b>Creating Algorithms</b></p> <ul style="list-style-type: none"><li>• Write and compare different algorithms to determine which one best fits the goal of the program.</li></ul>

	<p><b>Pair Programming: Create a Band (2 part lesson)</b></p> <ul style="list-style-type: none"> <li>Work with a partner to design and code a musical band in Scratch using keyboard inputs to control sprites.</li> </ul> <p><b>Broadcast Messages: Tell a Joke</b></p> <ul style="list-style-type: none"> <li>Use broadcast messages to program two sprites that take turns telling a knock-knock joke.</li> </ul> <p><b>Technology Timeline</b></p> <ul style="list-style-type: none"> <li>Create an interactive timeline showing the evolution of technology and its impact on cultural practices.</li> </ul> <p><b>Choose Your Own Path: Elements of Culture (2 part lesson)</b></p> <ul style="list-style-type: none"> <li>Create a choose-your-own-path game that explores elements of culture through branching storylines and interactive programming.</li> </ul>
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### Unit 3: Loops (3 weeks)

In this unit, students learn to use different types of loops to create a simple interactive game and understand how repetition can simplify code. They also practice debugging by breaking down and analyzing a program to identify and fix errors, strengthening their problem-solving skills.

Objectives / Topics Covered	<ul style="list-style-type: none"> <li>Use different types of loops to simplify algorithms.</li> <li>Break down and analyze code to identify and fix errors.</li> </ul>
Lessons	<p><b>Loops: Catch the Ball</b></p> <ul style="list-style-type: none"> <li>Use two types of loops in Scratch to create a simple interactive game where players catch a moving ball.</li> </ul> <p><b>Debugging: Mazes</b></p> <ul style="list-style-type: none"> <li>Break down and analyze a Scratch program to find and fix errors, focusing on loops and logical flow.</li> </ul> <p><b>Careers in CS: Health and Fitness</b></p> <ul style="list-style-type: none"> <li>Explain how fitness and coding can amplify human strengths.</li> </ul>

### Unit 4: Conditionals (5 weeks)

Students explore conditional logic in Scratch to make programs respond dynamically to different conditions and inputs.

Objectives / Topics Covered	<ul style="list-style-type: none"> <li>Use if/then and if/else blocks in Scratch programs.</li> <li>Use conditionals to build interactive and reactive programs.</li> </ul>
Lessons	<p><b>Conditionals: Underwater Exploration</b></p> <ul style="list-style-type: none"> <li>Create a Scratch program that uses conditionals to control sprite behavior.</li> </ul> <p><b>Create a Maze (2 part lesson)</b></p> <ul style="list-style-type: none"> <li>Draw a maze and program Scout to navigate the maze.</li> </ul> <p><b>Create a Drawing App</b></p> <ul style="list-style-type: none"> <li>Program keyboard and mouse inputs using loops and conditionals to create a drawing app.</li> </ul> <p><b>Scout's Quest: Conditionals</b></p> <ul style="list-style-type: none"> <li>Use if/then conditionals to build a program that makes decisions based on input or events.</li> </ul>

### Unit 5: Variables and Lists (4 weeks)

In this unit, students explore variables, lists, and comparison operators to manage and organize data in programs.

Objectives	<ul style="list-style-type: none"> <li>Learn how variables store information.</li> </ul>
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/ Topics Covered	<ul style="list-style-type: none"> <li>Use comparison operators to create more complex decision-making logic.</li> </ul>
Lessons	<p><b>Scout's Quest: Variables</b></p> <ul style="list-style-type: none"> <li>Create and use variables to track information such as points in a game.</li> </ul> <p><b>Lists: Spelling Bee</b></p> <ul style="list-style-type: none"> <li>Use lists to build a spelling bee game that stores and displays words.</li> </ul> <p><b>Inquiry Project: Data Bar Graph (2 part lesson)</b></p> <ul style="list-style-type: none"> <li>Follow the inquiry process to gather data and modify a Scratch program to display findings as a bar graph.</li> </ul>

### Unit 6: Clones and Functions (3 weeks)

In this unit, students explore how to use clones and functions to create more efficient and dynamic programs.

Objectives / Topics Covered	<ul style="list-style-type: none"> <li>Explore how clones affect program behavior.</li> <li>Use functions with number and boolean inputs to trigger actions based on conditions.</li> </ul>
Lessons	<p><b>Introduction to Clones</b></p> <ul style="list-style-type: none"> <li>Create an animation using clones in Scratch and explore how clone behavior affects the program's outcome.</li> </ul> <p><b>Scout's Quest: Functions with Boolean Inputs</b></p> <ul style="list-style-type: none"> <li>Build a function that uses a boolean input to perform different actions, such as checking if a password is correct.</li> </ul> <p><b>Scout's Quest: Functions with Number Inputs</b></p> <ul style="list-style-type: none"> <li>Use number inputs in a function to create a drawing that changes based on input values.</li> </ul>

### Unit 7: Culmination Projects (4 weeks)

In this unit, students apply their understanding of conditionals, variables, booleans, and events to design and build an interactive Whack-a-Mole style game. This culmination project reinforces key programming concepts while encouraging creativity, problem-solving, and independent project development.

Objectives / Topics Covered	<ul style="list-style-type: none"> <li>Apply key programming concepts including conditionals, variables, and events.</li> <li>Demonstrate mastery of coding skills through creative problem-solving and game design.</li> </ul>
Lessons	<p><b>Click-a-Mole (2 part lesson)</b></p> <ul style="list-style-type: none"> <li>Create an interactive Whack-a-Mole style game using conditionals, variables, and events to demonstrate mastery of core programming concepts.</li> </ul> <p><b>Designing Solutions for Accessibility (2 part lesson)</b></p> <ul style="list-style-type: none"> <li>Explore how to apply design thinking to create digital tools and experiences that are accessible to everyone.</li> </ul>

### Unit 8: Digital Literacy (7 weeks)

In this unit, students develop digital literacy by exploring safe online behaviors, understanding how information travels across the internet, and creating interactive projects to communicate what they've learned. They investigate technology's impact on culture and begin to explore concepts such as digital ownership, accessibility, and cybersecurity.

Objectives / Topics Covered	<ul style="list-style-type: none"> <li>Practice safe online behavior.</li> <li>Describe the impact of technology on the world.</li> <li>Learn how information travels through the Internet.</li> </ul>
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Lessons	<p><b>Our Words Have Power (Cyberbullying)</b></p> <ul style="list-style-type: none"> <li>Discuss the definition and consequences of cyberbullying.</li> </ul> <p><b>Impacts of Computing: Exploration</b></p> <ul style="list-style-type: none"> <li>Explore how computing affects individuals, society, and the world around us.</li> </ul> <p><b>Cybersecurity Policies and Laws</b></p> <ul style="list-style-type: none"> <li>Research and explain a cybersecurity law specific to New York.</li> </ul> <p><b>Give Credit When You Use It</b></p> <ul style="list-style-type: none"> <li>Research information online to answer questions and give credit to sources properly.</li> </ul> <p><b>File Management and Data in Action</b></p> <ul style="list-style-type: none"> <li>Organize, save, and manage digital files effectively.</li> </ul> <p><b>Networks, Packets, and the Internet</b></p> <ul style="list-style-type: none"> <li>Learn how information travels across the internet by modeling how messages are broken into packets, sent, and reassembled, and create a secure classroom communication system.</li> </ul> <p><b>Ethical and Responsible Use of Generative AI</b></p> <ul style="list-style-type: none"> <li>Complete a class code of conduct to follow when using AI.</li> </ul>
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## New York Computer Science & Digital Fluency 4th Grade Course Supplemental Materials

Resources	Description
<a href="#">Parent Welcome Letter (Spanish)</a>	Send this letter home to introduce families to their new computer science curriculum.
<a href="#">Warm-Up Activities</a>	This warm-up activity slide deck provides 5-10 minute problems aligned with computer science skills to engage students at the start of class, allowing teachers to preview or review concepts with answer keys and discussion tips included in the Speaker Notes.
<a href="#">Program Self-Assessment (Spanish)</a>	This is a student self-assessment tool designed to help K-6 learners reflect on their programming projects, evaluate their skills in algorithms, debugging, collaboration, and reflection, and set goals for improvement.
<a href="#">Peer Review Resources (Spanish)</a>	This provides structured worksheets to facilitate student feedback during collaborative coding projects. It encourages reflection by guiding students to highlight successes, ask questions, and offer constructive feedback on their partner's work.
<a href="#">Lesson Reflection &amp; Computational Thinking (Spanish)</a>	This guides students in engaging with computational thinking concepts, preparing for discussions, reflecting on lessons, and applying their learning to real-world problem-solving.
<a href="#">Design-Your-Own-Lesson Scratch Templates</a>	Empower your students to explore and express their knowledge creatively with our versatile Scratch graphic organizer templates. Designed with adaptability and ease of use in mind, these interactive tools transform any subject into an engaging, hands-on learning experience.
All of these resources and more are found on the <a href="#">CodeHop Resources Page</a> .	