Arkansas MS Introduction to Coding

Middle School (60 Contact Hours)

Course Overview and Goals

The Arkansas MS Introduction to Coding course introduces middle school students to coding through interactive lessons with Karel the Dog and Tracy the Turtle. Students learn JavaScript and Python basics such as loops, functions, and variables while exploring real-world topics such as cybersecurity, digital citizenship, and the internet. They also create visual art and animations using p5.js, building both programming skills and creative expression.

Learning Environment

The course utilizes a blended classroom approach. The content is a mix of web-based and physical activities. Each module of the course is broken down into lessons. Lessons are composed of short video tutorials, interactive learning pages, quizzes, explorations, and free-response prompts.

Technology Requirements

To complete all activities and exercises in this course, students must have access to the 3rd party sites and tools listed here: Arkansas MS Introduction to Coding Course Links.

Prerequisites

The Arkansas MS Introduction to Coding 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/26384/overview.

Course Breakdown

Module 1: Karel Adventures (10 hours)

Students learn the basics of JavaScript as they follow Karel the Dog on a fun-filled adventure.

Browse the full content of this unit at https://codehs.com/course/26384/explore/module/37291

Topics Covered	• Syntax • Commands • Conditional Statements • Control Statements

	• Functions • Top-Down Decomposition • Loops

Example Assignments	• Karel Clean Up
	  ○ For this exercise, you are going to help Karel pick up all the dropped balls to take them to the park and hide them for the scavenger hunt. There are multiple Karel worlds of different sizes, so you will need to use a “while” loop to get you to the end, and inside the while loop you will need an “if” statement to pick up a ball if one is present.
	• Find the Park
	  ○ Karel needs to set up the scavenger hunt in the park. You need to help Karel navigate the city streets to make it to the park. Watch out for the cars (black squares)! Karel needs to go around these squares on the way to the park. Once at the park, Karel should grab the tennis ball and finish facing east.
	• Making Custom Colors
	  ○ For this activity, you are going to create 4 squares with custom colors. The first will be all red, the second all green, and the third all blue. The fourth color can be any color you choose!
	• Collect the Tennis Balls
	  ○ In this challenge, you will combine all of the coding skills you have learned with Karel to write a program that has Karel pick up all of the tennis balls. Your program should work in all three worlds.

Module 2: Tracy the Turtle Adventures (10 hours)

Students will learn how to use basic commands, variables, and functions in their programs using the Python programming language.

Browse the full content of this unit at https://codehs.com/course/26384/explore/module/37292

Topics Covered	• Intro to Tracy’s Grid World • Debugging with Error Messages • Functions • Color • Effects • Size • Variables • Input/Output
Example Assignments	• A Day at the Carnival ○ Students will help Tracy through a day at the carnival and will learn basic Tracy commands, how to call and define functions, and how to add artistic effects to their programs. • Stuffed Bear Prize

	○ You'll need to help finish drawing the bear before Tracy can bring it home. To finish the bear, fill in the commands that make up the function definitions by following the provided steps. ● Shipwreck ○ Direct Tracy through the shipwreck yard without running into any of the ships. Once she reaches the yellow star, she has made it out! The difference here, though, is that the ships will be located in random positions every time the program is run, so we'll need to use user input to direct Tracy through the shipwreck yard as the program is running. ● Sea Turtle ○ Get user input to tell Tracy where the tallest sea grass is so she can go meet a turtle and ask about her cousin.

Module 3: Exploring Computing (10 hours)

Students explore different technologies and the impact they have on our world.

Browse the full content of this unit at https://codehs.com/course/26384/explore/module/37293

Topics Covered	● History of Computing ● Software ● Hardware ● Operating Systems ● Cloud Computing ● Ethics and Legal Considerations ● The Future of Computing
Example Assignments	● History of Computing ○ *Jigsaw: Computer Interaction Over the Decades:* In this activity, students are going to work in small groups to research what it was like to interact with computers over the various decades. For each section, students will want to consider what was typical for most computers. For example, GUI interfaces were first used in the 1970s, but they were not typical until the 1980s. ● Cloud Computing ○ *Case Study: Cloud Computing vs. Physical Computing:* Is cloud computing more efficient? Is physical computing the way to go? Students will read through a case study for a middle school that needs to decide between implementing a cloud computing solution or a physical computing solution. What are the pros and cons of each? Which way would you ultimately choose to implement? ● Hardware ○ *Brainstorm: New Computer Components:* In this activity, students are going to work with a partner to brainstorm 3 new components for a computer. It can be an entirely new idea or an improvement of an

	existing component. For each idea, answer the following questions: What is it? Does it replace something, or is it an additional item? If it replaces something, what is it replacing? How will this be helpful in the future? ● The Future of Computing ○ *Computer Science Career Exploration:* Careers in computer science are on the rise. With new emerging technologies, comes new job options and exciting opportunities for professionals in the computer science field. Knowing the basics of computer science can help any professional in all fields of study, not just computer science positions. Choose two different careers to explore further.

Module 4: Exploring the Internet (10 hours)

Students are introduced to network protocols and different strategies used to protect online information.

Browse the full content of this unit at https://codehs.com/course/26384/explore/module/37294

Objectives / Topics Covered	● What is the Internet? ● Need for Protocols ● Impact of the Internet ● Cybersecurity ● CIA Triad ● Encryption ● Steganography
Example Assignments / Labs	● Network Simulation ○ In this simulation, there are six devices in a network. Click the green RUN button to start the simulation. Clicking on a device will prepare it to send a message. Clicking on a second device will send the message to that device. ● Internet in My Daily Life ○ Envision a normal day, from the time you wake up to the time you go to sleep. In what ways do you use the Internet during your day? For what purposes do you use the Internet? As you go through a normal day in your mind, write down all the ways you use the Internet. Include the device you use and the purpose. ● Cybersecurity ○ Students will learn what is meant by *cybersecurity* and explore a few news worthy cyber attacks. They will also discuss the *Internet of Things* and the increase in connected devices. ● Project: Steganography ○ In the following activity, you will see a picture and the corresponding color codes associated with the pixels. There is a message hidden in the first 12 pixels! Below is the method used to hide the message.

	Your mission will be to reverse the process and find the secret message!

Module 5: Exploring Digital Citizenship (10 hours)

Students learn about Internet etiquette and how to stay safe on the world wide web.

Browse the full content of this unit at https://codehs.com/course/26384/explore/module/37295

Objectives / Topics Covered	• Digital Footprint • Cyberbullying • Internet Safety • Privacy & Security • Information Literacy • Copyright • Hacking Ethics • Cyber Hygiene

Example Assignments / Labs	• Digital Footprint and Reputation
	  ○ *Building a Positive Digital Footprint:* Spend some time reflecting on you and your friends' social media activity. Give an example of a social media post that builds a positive digital footprint. How does the post build a positive digital footprint? Give an example of a social media post that builds a negative digital footprint. How does the post build a negative digital footprint? Thinking about your digital footprint, are you going to make any changes in what you post on social media? How about what you write to share in a group message? Why or why not?
	• Internet Safety
	  ○ *Scenario: School Stranger:* You begin to receive direct messages on Instagram from a person you don't recognize. They claim to go to your school, and they know a lot of information about your classes and teachers. They also follow a lot of your classmates, so you believe them. After a bit, they start asking questions about you and your friends. What steps should you take to respond to this situation?
	• Information Literacy
	  ○ *Evaluate the Source 1:* Take a look at this resource, and consider the following questions: What evidence do you see that this source is credible? What evidence do you see that makes you question the source's credibility? Is this a credible source?

Module 6: Art with Code (10 hours)

Students explore the intersection of art and technology by creating art programs using p5.js.

Browse the full content of this unit at https://codehs.com/course/26384/explore/module/37296

Objectives / Topics Covered	• p5.js • Variables • Loops • Color Transitions • Shape Transformations • Direction • Keyboard Data

Example Assignments / Labs	• Creative Coding
	  ○ Learn what creative coding is and how you can use it to create cool art!
	• MouseX and MouseY
	  ○ Let's practice using the mouseX and mouseY together by recreating the following sketch.
	• Grayscale to Color
	  ○ Let's recreate an animation where the color of the shapes transitions from grayscale to color.