

	Name of Course Intro Robotics https://www.doe.mass.edu/frameworks/scitech/2016-04.pdf Syllabus https://docs.google.com/document/d/1RNSwEie7PPUckXYvdH6MCJHSwdY-WxilR8sTA4q-VWA/edit?usp=sharing	
	Unit One: Introduction to Robotics	
Essential Questions	What is a robot? How is a robot different from other technologies? What disciplines does the study of robotics involve? What constitutes the physical makeup of a robot? How do you program a robot? How do programmers break down problems into tasks robots can perform?	
Science Standards	<i>MA Framework for Digital Literacy and Computer Science - Computing Systems (CS)</i> 9-12.CS.a.1 Examine how the components of computing devices are controlled by and react to programmed commands. <i>MA Framework Science and Technology/Engineering - Engineering Design</i> HS-ETS1-2. Break a complex real-world problem into smaller, more manageable problems that each can be solved using scientific and engineering principles	
Concepts and skills	• A robot is a programmable machine. • A robot is autonomous. • A robot is made up of mechanical and electronic components.	Science and Engineering Practices S1. Asking questions (for science) and defining problems (for engineering). S2. Developing and using models. S5. Using mathematics and computational thinking. S6. Constructing explanations (for science) and designing solutions (for engineering). Common Core Reading Standards TBD Common Core Math Standards TBD
Content Objectives "I can Statements"	I can control electronic components using code. I can break down a complex problem into actions a robot can perform. I can describe the behavior of a robot.	

Assessments, products, vocabulary, practice	<u>Vocabulary</u> Robot Hardware Software Program Command Pseudocode Practice: Make it move without wheels: https://makecode.mindstorms.com/design-engineering/make-it-move Assessment: <table border="1"> <thead> <tr> <th data-bbox="396 581 892 610">OBJECTIVE</th><th data-bbox="892 581 1795 610">ASSIGNMENT</th></tr> </thead> <tbody> <tr> <td data-bbox="396 610 892 1024"> To learn basic robot building and programming techniques. 1 point each </td><td data-bbox="892 610 1795 1024"> Challenge #1 - Robot Drive 6' Construct an autonomous motorized robot that will travel forward for a distance of 6 feet then come to a stop. Challenge #2 - 6' and Back Robot Construct and program a robot that will travel forward for a distance of 6', stop and return to the starting point. Challenge #3 - Right Turn Robot Construct and program a robot that will travel forward in a straight line for a distance of 6 feet, right turn 90-deg., travel forward 2 feet and come to a complete stop. Challenge #4 – Running in Circles Create a robot that can turn in a complete circle. </td></tr> </tbody> </table>	OBJECTIVE	ASSIGNMENT	To learn basic robot building and programming techniques. 1 point each	Challenge #1 - Robot Drive 6' Construct an autonomous motorized robot that will travel forward for a distance of 6 feet then come to a stop. Challenge #2 - 6' and Back Robot Construct and program a robot that will travel forward for a distance of 6', stop and return to the starting point. Challenge #3 - Right Turn Robot Construct and program a robot that will travel forward in a straight line for a distance of 6 feet, right turn 90-deg., travel forward 2 feet and come to a complete stop. Challenge #4 – Running in Circles Create a robot that can turn in a complete circle.
OBJECTIVE	ASSIGNMENT				
To learn basic robot building and programming techniques. 1 point each	Challenge #1 - Robot Drive 6' Construct an autonomous motorized robot that will travel forward for a distance of 6 feet then come to a stop. Challenge #2 - 6' and Back Robot Construct and program a robot that will travel forward for a distance of 6', stop and return to the starting point. Challenge #3 - Right Turn Robot Construct and program a robot that will travel forward in a straight line for a distance of 6 feet, right turn 90-deg., travel forward 2 feet and come to a complete stop. Challenge #4 – Running in Circles Create a robot that can turn in a complete circle.				
Text, Materials, and Resources					

	Name of Course Intro Robotics https://www.doe.mass.edu/frameworks/scitech/2016-04.pdf Syllabus
--	--

	https://docs.google.com/document/d/1RNSwEie7PPUckXYvdH6MCJHSwdY-WxiiR8sTA4q-VWA/edit?usp=sharing	
	Unit Two: Creating Apps with Devices - Circuit Playground https://studio.code.org/s/focus-on-coding4a-2023/resources	
Essential Questions	• What inputs and outputs are available on a physical device? • What inputs and outputs are available on an app? • How can we create apps that use a physical device to control a digital app? • How can a physical device use sensors to react to a physical environment? • How can simple hardware be used to develop innovative new products?	
Science Standards	CSTA K-12 Computer Science Standards (2017) AP - Algorithms & Programming 2-AP-10 - Use flowcharts and/or pseudocode to address complex problems as algorithms. 2-AP-11 - Create clearly named variables that represent different data types and perform operations on their values. 2-AP-14 - Create procedures with parameters to organize code and make it easier to reuse. 2-AP-19 - Document programs in order to make them easier to follow, test, and debug. CS - Computing Systems 2-CS-02 - Design projects that combine hardware and software components to collect and exchange data. 2-CS-03 - Systematically identify and fix problems with computing devices and their components. IC - Impacts of Computing 2-IC-21 - Discuss issues of bias and accessibility in the design of existing technologies.	
Concepts and skills	Description: This unit emphasizes the interactions between inputs and outputs on the circuit playground and an app screen. On their circuit playground, students learn to control inputs like buttons or toggle switches and outputs like the buzzer or LED. Students also interact with inputs and outputs in App Lab, such as buttons and text inputs and dropdowns. By the end of the chapter, students will be able to create an app that controls a device, similar to many "smart" hardware they may experience in their day-to-day lives. Goals:	

	● Design and build a physical computing device that integrates physical inputs and outputs with digital apps. ● Create app prototypes that use a physical device to control a digital app. Description: In this chapter, students focus on how their physical device can interact with the outside world. They learn how to use sensors and the accelerometer to react to the physical environment. They learn to attach external LEDs and buttons that extend the types of devices they can make. Throughout the unit, students use physical materials like paper or cardboard to extend the functionality of their devices. By the end of the unit, students will have created an interactive art project and developed a prototype for a physical device that solves a problem. Goals: ● Design and build a physical computing device that integrates sensors with digital apps. ● Create app prototypes that use a physical device to solve real-world problems. ● Use physical computing to solve problems in fun and innovative ways.	
--	---	--

Content Objectives "I can Statements"	I can program electronic hardware. I can design and prototype
Assessments, products, vocabulary, practice	<u>Vocabulary</u> Output - the information computers give to users, devices, or other computers Input - the information computers get from users, devices, or other computers Circuit - A device that provides a path for an electric current to flow, often modifying that current. In computers, circuits allow for simple logical and mathematical operations using electricity. Prototype - A first or early model of a product that allows you to test assumptions before developing a final version. Practice: Mini-Project: Field Collector App https://studio.code.org/s/focus-on-coding4a-2023/lessons/7 Assessment: Prototype an innovation https://studio.code.org/s/focus-on-coding4a-2023/lessons/19
Text, Materials, and Resources	