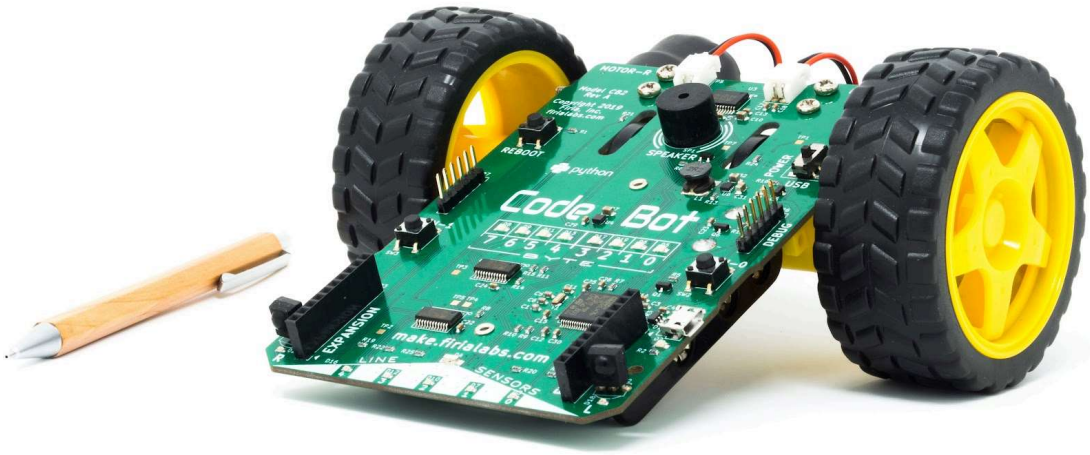
FIRIA LABS

# Curriculum Guide

## *PREVIEW*




# Mission Pack:

## Python with Robots

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# Python with Robots Overview


Designed as a Computer Science elective course for grades 8-12, this curriculum module covers the fundamentals of Python programming as students apply each new coding skill and concept to engaging projects with **CodeBot**. No prior coding experience is required! This 'bot puts the focus on coding, with built-in sensors and programmable controls for *endless* projects and learning opportunities.

## Pre-Mission Assignment (5-10 hours)

If your students come with no Computer Science background, it is important to start by building a foundation of computational thinking. Dedicate some time for students to learn basic terms, such as algorithm, program, and debug. See the Firia Labs collection of Unplugged Activities at https://learn.firialabs.com/curricula/cs-unplugged.

## Mission 1: Welcome

Take a tour of the CodeSpace Development Environment

## Mission 2: Introducing CodeBot

Get to know your friendly neighborhood CodeBot!

## Mission 3: Time and Motion

Power up the CodeBot. Get it moving in a square.

## Mission 4: Animatronics

Create an “Animatronic Robot Exhibition” by utilizing the ‘bot’s speakers.

## Mission 5: Fence Patrol

Stay between the lines to gain an in-depth understanding of CodeBot’s line sensors.

## Mission 6: Line Follower

Tune up your Line Sensors and hit the road on the biggest and baddest line-course around. Can your Python code master this challenge?

## Mission 7: Hot Pursuit

Go in-depth with the proximity sensors and write code to detect, pursue, and avoid objects.

## Mission 8: Navigation

Learn to navigate by moving a specific direction, distance, and speed from a known location using the CodeBot’s wheel encoders.

## Mission 9: All Systems Go!

Explore CodeBot’s internal sensor systems by creating a battery tester, temperature measurement tool, and alarm bot!

## Unit 1: Getting Started (7-14 hours)

Students will learn about the programming environment, the CodeBot, and basic commands for programming the CodeBot using Python. Students create their own program to move the 'bot in a simple shape, like a square and use button presses for input.

**Summary of Mission 1:**

Students start by completing the attitude survey. They create an account and join the class to access the curriculum. The mission will let them become familiar with CodeSpace.

**Summary of Mission 2:**

Then they learn about CodeBot, its peripherals, and proper care. Basic code, like importing a module and turning on an LED is introduced.

**Summary of Mission 3:**

Students learn several concepts and skills during this mission. First, the instructions go into depth about the LEDs and turning them on and off. There are three sets of LEDs on the 'bot that can be controlled. Binary is introduced and how to use it in code to turn on/off LEDS. Students also learn about variables and how to use them in code. Finally, students learn how to turn on the motors and move the wheels both forwards and backwards. The mission ends with conditions and determining if a button was pressed. Since this mission covers many terms, concepts and coding statements, three review Kahoots were created.

**Preparation and Materials:**

- Create a class on the teacher dashboard.
- Students need a computer / laptop with the Chrome web browser.
- Make sure the students can successfully login to http://make.firialabs.com,
- Students create a student account and join the class with the code.
- Each student (or pair) needs a CodeBot and connecting cable.
- A ruler for measuring the distance traveled by the 'bot.

**Assessment:**

| | | | |
|---|---|---|---|
| Mission 2 Review Kahoot | Mission 3 Obj. 1-6 Kahoot | Mission 3 Obj 7-9 Kahoot | Mission 3 Obj 10-11 Kahoot |
| U1 Vocab Review Kahoot | U1 Coding Review Kahoot | U1 Vocab Test (MS Form) | U1 Coding Test (MS Form) |

**Standards addressed in this unit:**

| CSTA Standards Grades 6-8 | CSTA Standards Grades 9-10 | CSTA Standards Grades 11-12 |
|---|---|---|
| • 2-CS-03<br>• 2-AP-10<br>• 2-AP-11<br>• 2-AP-13<br>• 2-AP-19 | • 3A-CS-03<br>• 3A-AP-13<br>• 3A-AP-16<br>• 3A-AP-19<br>• 3A-AP-21 | • 3B-AP-17 |

| **Mission 1:** Welcome | **Time Frame:** 1 hour |
|---|---|
| **Project Goal:** Students will learn about the CodeSpace learning environment.<br>**Learning Targets**<br>• I can **navigate CodeSpace**.<br>• Identify major parts of the Codespace interface: Mission Bar, Objective Panel, text editor, CodeTrek, Toolbox, and Lesson Navigation Controls | **Key Concepts**<br>• **Follow instructions** in the Lesson Panel carefully. There is a lot of important reading!<br>• Look for "**tool icons**" to collect tools in your Toolbox as you go. |
| **Assessment Opportunities**<br>• Checkpoint 1.3 (toolbox) can be used as an exit ticket.<br>• Quiz after Objective 4.<br>• Print a picture of CodeSpace and have students label the parts. | **Success Criteria**<br>☐ Navigate CodeSpace<br>☐ Identify major features of the CodeSpace interface: Editor panel, Lesson panel, Toolbox, CodeTrek, Hints |
| **Vocabulary**<br>• **Browser**: Software that displays web pages<br>• **Cloud:** A place to save files and data through the Internet<br>• **Objective:** The steps in the mission; has a goal to accomplish<br>• **Text editor:** Where you type the code<br>• **Code:** Instructions to the computer<br>• **Toolbox:** A place in CodeSpace to keep information you learn about programming concepts so you can use it later when you need the information<br>• **Simulation:** A 3D environment that lets you see the robot move and interact in a virtual world | |
| **New Python Code** | |
| **Real World Applications**<br>Programmers need to use some type of text editor to create their code. CodeSpace is an IDE, or integrated development environment. It is patterned after other popular IDEs. | |
| **Teacher Notes:**<br>• This lesson is the first lesson in all the mission packs. If your students have completed other mission packs with other physical devices, they will already know the information. You can choose to have them complete the mission as a review and refresher, or you can unlock the next mission. | **Extensions / Cross-Curricular** |