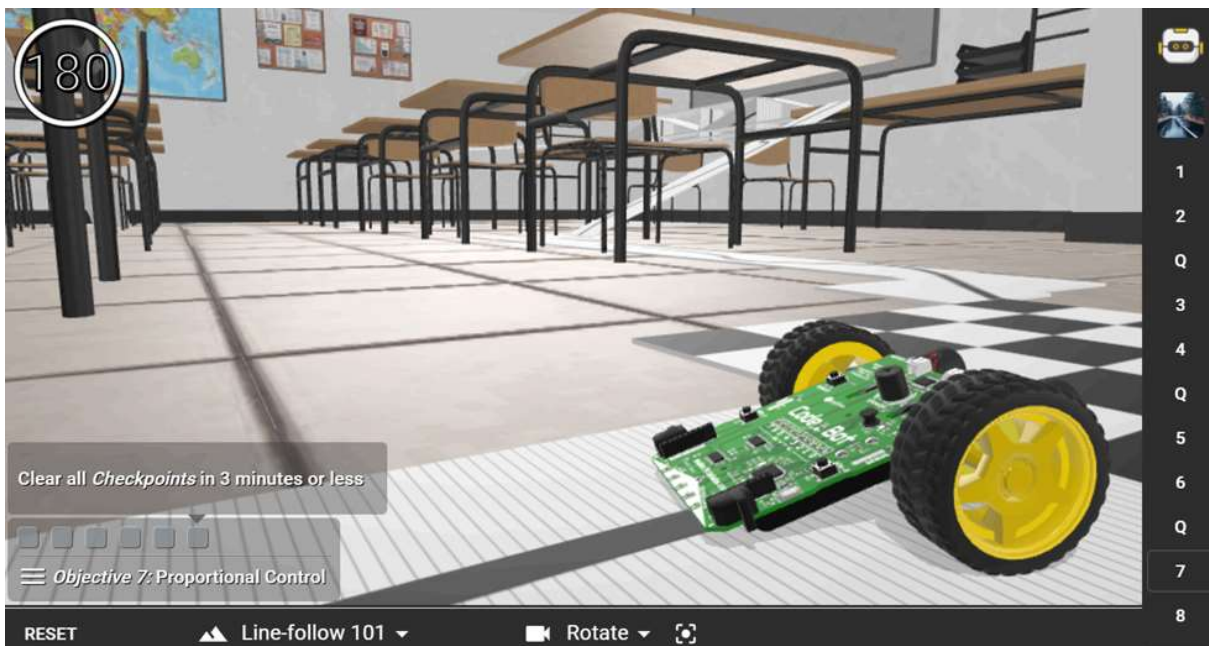


FIRIA LABS

Curriculum Guide *Preview*



Mission Pack: Level-1 Python with Virtual Robotics



Table of Contents

Level-1 Python with Virtual Robotics Overview	2
Unit 1 Overview	4
Mission 1: Welcome	5
Not included in the Preview:	
Mission 2: Introducing CodeBot	6
Mission 3: Light the Way	7
Mission 4: Get Moving!	9
Unit 1 Remix Project and Exam	11
Unit 2 Overview	12
Mission 5: Dance Bot	13
Mission 6: Robot Metronome	16
Unit 2 Remix Project and Exam	18
Unit 3 Overview	19
Mission 7: Line Sensors	20
Mission 8: Boundary Patrol	22
Mission 9: Line Following	24
Unit 3 Remix Project and Exam	26
Unit 4 Overview	27
Mission 10: Fido Fetch	28
Mission 11: Airfield Ops	30
Unit 4 Remix Project and Exam	32
Unit 5 Overview	33
Mission 12: King of the Hill	34
Mission 13: Going the Distance	36
Unit 5 Remix Project and Exam	38
Unit 6 Overview	39
Mission 14: Music Box	40
Mission 15: Cyber Storm	42
Unit 6 Remix Project and Exam	44
Final Project	45
Appendix A: Required Resources	46
Appendix B: Our Approach	47
Appendix C: Teacher Resources	48
Appendix D: Assessing Student Projects	50
Appendix E: Python Certification	51
Appendix F: Links to Teacher Materials	52



Level-1 Python with Virtual Robotics Overview



Designed as an advanced Computer Science elective for students in grades 10-12, this course introduces the fundamentals of Python programming through immersive virtual robotics simulations. Students will write code to control their virtual robot and see immediate results, enhancing their understanding of programming concepts in a realistic, engaging environment. Featuring virtual sensors and actuators modeled on real components, the skills learned are directly transferable to physical CodeBots. Through challenging missions, students explore key computer science concepts and engage in meaningful, interactive learning. This curriculum not only prepares students for Python certification but also bridges the gap between virtual and real-world robotics.

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. Learn how to use the text editor, hints, CodeTrek and tools.

Mission 2: Introducing CodeBot



Get to know your friendly neighborhood Virtual Robot! Locate the motors, LEDs and buttons on the 'bot.

Mission 3: Light the Way



Light up those LEDs and get CodeBot flashing. Learn about bits and binary while creating a light show.

Mission 4: Get Moving



Get your motors running... Head out on the Virtual Highway! Use the motors to move the 'bot around the 3D environment, and play notes along the way.

Mission 5: Dance Bot



Does CodeBot have what it takes to win a dance competition? Combine movement with sweeping LEDs to dance CodeBot around the floor. Use loops and functions and a button press.

Mission 6: Robot Metronome



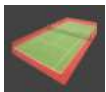
Write code to make a time-keeping Python Maestro! Learn about dictionaries and files while turning CodeBot into a jukebox.

Mission 7: Line Sensors



Use the line sensors to navigate your robot. Use a matrix to document a compass position and surface color to point the 'bot in the right direction.

Mission 8: Boundary Patrol



Program your CodeBot to roam a fenced area, using line sensors. Use sensor data to make smart decisions on which way to turn.

Mission 9: Line Following



Tune up your Line Sensors and hit the road on the biggest line-course around. Use sensor data to make turns and accelerate autonomously.



Mission 10: Fido Fetch



Train your CodeBot to fetch using a dictionary of commands! Type input to the console and play with your robot dog.

Mission 11: Airfield Ops



Learn some unique programming concepts to help with airfield runway operations! Combine math operations with line sensor data for a useful application.

Mission 12: King of the Hill



Harness the CodeBot's accelerometer to climb to the top of a mountain! Unpack a tuple of sensor data to control the 'bot autonomously over rough terrain.

Mission 13: Going the Distance



Learn all the details of CodeBot's wheel encoders. Use the sensor data to drive a specified distance or maintain a specific speed.

Mission 14: Music Box



Turn the CodeBot into a jukebox while learning about Python file operations. Review CodeBot's speaker capabilities.

Mission 15: Cyber Storm



Help protect an email server by using file operations! Review file operations from the last mission, and learn some more in this useful application.



Unit 1: Introductory Missions (5-8 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 turn on and off CodeBot's LEDs while learning about bits and binary.

Summary of Mission 1:

Students start by becoming familiar with CodeSpace. They learn about the Mission Objectives, the text editor, CodeTrek, the Toolbox, and the camera simulation controls.

Summary of Mission 2:

Students learn about CodeBot and its peripherals. They identify parts of CodeBot by clicking on the item in the virtual environment.

Summary of Mission 3:

Students learn basic Python code, like importing a module and turning on an LED. They learn about delaying code using a sleep() function and using binary patterns to control the LEDs.

Summary of Mission 4:

Students get the motors running on CodeBot and play short tones using the speaker. They learn to move the 'bot in a spin, and also move forward with varying speeds.

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.

Standards addressed in this unit:

CSTA Standards Grades 9-10	CSTA Standards Grades 11-12
<ul style="list-style-type: none"> ● 3A-CS-03 ● 3A-DA-09 ● 3A-AP-16 ● 3A-AP-19 ● 3A-AP-21 ● 3-AP-22 ● 3-AP-23 	<ul style="list-style-type: none"> ● 3B-CS-02 ● 3B-AP-17 ● 3B-AP-22



<p>Mission 1: Welcome</p>	<p>Time Frame: ½ hour</p>
<p>Project Goal: Students will learn about the CodeSpace learning environment.</p> <p>Learning Targets</p> <ul style="list-style-type: none"> ● I can navigate CodeSpace. ● Identify major parts of the Codespace interface: Mission Bar, Objective Panel, text editor, CodeTrek, Toolbox, and Lesson Navigation Controls 	<p>Key Concepts</p> <ul style="list-style-type: none"> ● Follow instructions in the Lesson Panel carefully. There is a lot of important reading! ● Look for “tool icons” to collect tools in your Toolbox as you go.
<p>Assessment Opportunities</p> <ul style="list-style-type: none"> ● Adding a tool to the toolbox (Obj. 1.3) ● Quiz after Objective 4 ● Print a picture of CodeSpace and have students label the parts (teacher resources) 	<p>Success Criteria</p> <ul style="list-style-type: none"> <input type="checkbox"/> Navigate CodeSpace <input type="checkbox"/> Identify major features of the CodeSpace interface: Editor panel, Lesson panel, Toolbox, CodeTrek, Hints
<p>Vocabulary</p> <ul style="list-style-type: none"> ● Objective: The steps in the mission; has a goal to accomplish ● Text editor: Where you type the code ● Code: Instructions to the computer ● Debugging: The process of understanding what the computer is actually doing and then changing the code to do what you want it to do ● Toolbox: A place in CodeSpace to keep information you learn about programming concepts so you can use it later when you need the information ● Simulation: A 3D environment that lets you see the robot move and interact in a virtual world 	
<p>New Python Code</p>	
<p>Real World Applications</p> <p>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.</p>	
<p>Teacher Notes:</p> <ul style="list-style-type: none"> ● 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. ● A worksheet with a picture of CodeSpace to label is available at learn.firialabs.com. 	<p>Extensions / Cross-Curricular</p>