Introduction to Python

General Information

Description

This course teaches students how to code by using the Python programming language. Python, a high-level language used to build websites such as YouTube and Dropbox, is a staple of the coding community and is often used to teach introductory level programming. Students will learn about variables, operators, control flow structures, computer graphics, and object- oriented programming concepts such as classes and objects. Computation thinking is emphasized throughout the course.

Expectations and Outcomes

By learning Python, students are opening an avenue for much deeper exploration into computer science and the areas of software development. Once the basics have been mastered, students can go deeper with Python by learning how to build games, build graphics, and take steps towards data science and artificial intelligence, which are all done using the Python programming language. Here are some additional outcomes:

- Students can plan and develop algorithms to solve problems.
- Students can utilize a programming language to create solutions to relevant topics in their lives.
- Students understand good programming practices and paradigms.
- Students can recognize the impact and importance of technology in their daily lives.
- Students can work collaboratively to create solutions for problems.
- Students will become knowledgeable about programming and explore further opportunities that programming provides.

Course Materials

Prerequisites

- None
- Algebra I may be preferred but not necessary.

Device Requirements

Any device with an Internet connection is sufficient.

Additional Information and Resources

Course Length	Delivery Method	Recommended Age Group
90 hours / 1 Semester	**Online / Classroom**	**Middle - High School (Ages 12+)**

Certifications Offered	Pathway Alignment	Standards Aligned

PCEP – OpenEDG Python Institute Certification	SOFTWARE DEVELOPMENT PATHWAY	**CSTA** **ISTE** **K-12 Framework** **Common Core**	

Attention to Equity and Diversity

Rex Academy is dedicated to bringing this course to all interested students, regardless of their backgrounds or the zip code which they reside in.

As such, special attention has been given to the curriculum in the following manner:

1. Rex Academy's Python content can run on any device (Chromebooks, tablets, phones, PCs, etc). The Internet connection needs to be minimal. We are determined to remove all obstacles for access.
2. The compiler and the code editor are also entirely online based, removing the need for any hardware or software configuration.
3. The course can be absorbed in a direct classroom setting or in an after-school environment. Students can learn in groups or individually.
4. Instruction and assessment are performed in various ways, thus accommodating various learning styles.

Interdisciplinary Instruction

Rex Academy combines technology instructional materials with common core alignment to infuse other disciplines into the curriculum.

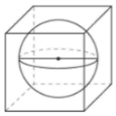
In the case of Python, here is Lab 3 from Chapter 2.

The area of a circle can be calculated with the equation: $A = \pi r^2$

The volume of a sphere is $V = \frac{4}{3}\pi r^3$

Ask the user to enter values for a radius. Now show the area of the circle and the volume of the sphere that the input radius would create.

What is the volume of the smallest cube the given sphere can be inscribed within? The volume of a cube is s^3



As you can see, Rex has built in geometry standards into this programming lab.

Course Syllabus

Unit Number	Topic	Brief Description
Lesson 1	Input, Output, and Variables	Students understand what Python is and what it can do. Students understand the nature of a variable and how it works. Students can get input and output into numbers and Strings from the console terminal.
Lesson 2	Mathematical Operations	Students can perform mathematical operations on numbers. They understand the nature of PEMDAS. Students can use the various math functions from the math library. Students can generate random numbers of a specific range and utilize them.
Lesson 3	Strings	Students know how to use the string data type, for both input and output. Students can concatenate and slice strings for desired results. Students can use some of the built-in functions for strings to accomplish desired goals
Lesson 4	Boolean and Branching	Students will learn Boolean values, logical operators, and logical operands. Students can use ‘if’ statements to write logical tests for data. Students can use ‘if-elif-else’ chain statements to write complicated conditionals.
Lesson 5	Iteration	Students will learn to use the ‘for’ loop along with different iteration schemes

Unit Number	Topic	Brief Description
		Students will learn to use the 'while' loop along with different iteration schemes
Lesson 6	Project 1 - Hangman	Students will program the Hangman game as described in their program function.
Lesson 7	Sets, Lists, and Tuples	**Students will learn to use lists, tuples, and sets of data structures.** **Students must understand how to iterate through these data structures.** **Students will need to know the different methods that are used to accomplish tasks in using lists.**
Lesson 8	Dictionaries	**Students will learn to use dictionaries in Python.** **Students understand when a proper time is to use a dictionary structure.**
Lesson 9	Project 2 – Memory Test Game	In this project, students will program a game where contestants try to "remember" the indexes of a list and match them up.
Lesson 10	**Functions**	**Students will create their own functions in Python.** **Students understand the core philosophy behind breaking the program up into subtasks with each function serving some specific purpose.** **Students will need to understand terminologies such as methods, return type, and parameters.**
Lesson 11	**Classes**	**Students understand the nature of object-oriented programming.** **Students understand how to create objects and how they behave.**

Unit Number	Topic	Brief Description
		Students can use objects to solve problems.
Lesson 12	**Project 3 - Blackjack**	For the final project, students will implement the game of blackjack. As an added bonus, they can incorporate Python graphics if they wish.
Lesson 13	**File Systems**	**Students understand how to read and write data to text files.** **Students can troubleshoot errors with try, except, finally, and raise statements** **Students can use the datetime, io, sys, and OS libraries**
Lesson 14	**Exam Preparation**	A practice exam and additional materials are provided to prepare for the certification exam.