



Intro to Programming 5-6 Syllabus

Course Goals

1 Learn Programming Basics

Students learn programming concepts such as variables, loops, and functions using the intuitive and beginner-friendly language Python.

2 Develop Problem Solving Skills

Students learn to use programming as a tool to solve problems that would be difficult otherwise, such as creating tables of results.

3 Programming Games

Students use Python to discover how some simple games are programmed. They use this information to modify and add on to them to create their own personalized versions.

4 Prepare for More Advanced Programming

Students practice basic concepts of programming that they can go on to apply to other programming languages and environments, giving them a head start in future courses.

Course Topics

1 Introduction to Programming

Students learn about how programming works and are introduced to the Python programming language. Students learn about basic components of Python syntax, such as Python key words and indentation.

2 Interactive Mode

Students experiment with the “interactive” or single instruction mode of Python which allows them to easily test out some basic commands.

3 Variables

Students learn about how computer memory works using intuitive analogies. Different types of variables such as strings and integers are discussed and applied in student-created programs.

4 Computer Math

Students learn about how computers do math and how order of operations applies to computer programs by writing a temperature conversion program.

5 Input and Output

Students learn how to take user input and transform their program’s output accordingly. Students also learn how to use both text and numerical input to modify some of their existing programs to be more interactive.

6 Graphical User Interface

Students learn about how to make graphical user interfaces, or GUIs, using an easy tool called easygui. Students use these GUIs to add different ways of receiving input from users to their programs.

7 Logic and Decisions

Students learn about the comparisons and how to use them in an if statement to make decisions. Students learn about ways to combine multiple conditions and create alternatives.

8 Loops

Students learn about how to make sections of their code repeat a certain number of times using loops, giving them greater control over repetitive tasks, such as summing up numbers.

9 Introduction to Graphics

Students learn to use the pygame module to draw elements, such as boxes, lines, and text, on the screen in a graphics program.

10 Skier Game

Students work with the Skier game, an example of a graphical game. Students are given a shell and are expected to type in some of the missing code to get a feel for how some of the concepts they've been taught come together to make a game.

11 Bouncing Ball

Students are shown code for a program that simply bounces a ball around the screen. Pieces of the code are explained bit by bit, and students get the opportunity to modify the code and make their own changes.

12 Mouse and Keyboard Input

Students learn how to use mouse and keyboard events to control what happens on the screen, which they can then use in their final projects.

Course Schedule

Day 1

Introduction and Icebreaker

Students introduce themselves to each other and the instructor, then they learn about the class.

Using Interactive Mode

Students type different instructions into the interactive Python console with their teacher's direction to get a feel for what different types of instructions there are.

First Steps

Students create their first real programs using Python.

Day 2

Working with Variables

Students learn about variables, how computers remember them, and how to use them to make programs dynamic.

MadLibs

Students use their new knowledge of variables to create funny fill-in-the-blank stories.

Variable Search Activity

Students practice what they have learned about variables to test their classmates. They use variables to write simple mathematical expressions for their classmates to solve.

Day 3

Using Computers for Math

Students learn about how computers do math, including order of operations and the tricky distinction between whole numbers and decimals.

Computers for Math Extension

Students practice what they have learned with how Python evaluates mathematical expressions.

Unit Conversions

Using what they've learned about computer math, students convert Fahrenheit into Celsius and learn about some other useful formulas.

Day 4

Changing Types

Students learn about three types of variables: floats, ints, and strings, how to turn one type into another, and what each is used for.

User Input

Students learn about text input in Python and how to use it to make their programs interactive.

Entering Numbers

Students learn how to use the input tool with numbers in order to enhance their calculation programs from earlier and create new ones. Students also confront a formidable enemy: the run-time error.

Day 5

Intro to GUIs

Students learn about importing GUIs and send a secret message using message boxes.

Intro to GUIs Extension

Students explore more varieties of GUI input.

Getting Interactive with GUIs

Students learn how to use GUIs to interact with the user instead of having to use a text console.

Day 6

If and Else: Logic

Students learn about the powerful tools that are if and else statements and how to use them to make much more complicated interactions in their programs.

And Or: Logical Conjunctions!

Students delve further into logic with the use of conjunctions.

Day 7

The Power of Loops

Students learn about and use one of the most powerful concepts in computer programming: loops.

Drawing Things with Graphics

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Day 8

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Skier Game

Students investigate the skier game and learn about the event loop in order to learn how more complicated games are made.

Bouncing Ball Game

Students encounter a completely different game, the bouncing ball game. There are some interesting possibilities for changing it into a different type of game such as pong or breakout.

Day 9

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PyPong

Students learn about PyPong, a remake of a classic, and start thinking about what they want to do for a final project.

Day 10

Final Project

Students combine everything they've learned about Python and game structure to create their own project, which can be a game or other interactive program.

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