

Session Title: Data Types and Variables

Session No: 1

Learning Objectives:

By the end of this session students will be able to:

- Understand the differences and uses of Python files and the Python console
- Recognise the integer, float and string data types
- Identify different math operations and their effects
- Locate key information on error messages
- Explain what a variable is and how they are used
- Demonstrate basic problem solving

Session Outline

Intro & Framing 5 mins

This session provides a gentle introduction to the fundamentals of Python. Students will learn about:

- Python files and the Python console
- Data types (integers, floats, and strings)
- Maths operations
- Error messages
- Variables

Before the start of the session the students are expected to have installed PyCharm and Python 3. A small amount of time should be available at the start of the session to support students that were unsuccessful with installation.

Block #1: Introduction to the Course Time: 5-10 minutes

In this block you will give an overview of the course. You'll also explain what a programming language and why Python is a good choice for beginners.

When explaining what a programming language is, explain that human languages are used by people to communicate things to other people, while programming languages are used by people to communicate instructions to a computer.

One suggested teaching method to help instructors with larger classes is the use of post-it notes during exercises. A red/pink post-it note on the back of the student's laptop means the student would like instructor support, whereas a green post-it note means they do not need additional support. You do not need to use this system if you do not want to.

Block #2: Your First Python Program
5 minutes

At the start of the session the instructor walks the class through creating a new Python file and running it in PyCharm. The students should follow each step as the instructor demonstrates it.

Relevant Exercise(s):

Exercise 1.1: 4 minutes

- This exercise gives the students a chance to explore their first program
- Use this time to support students that were unable to run their first program
- Briefly question the students that changed the program and ask them to share what happened

Block #3: Number Data Types and Operators
2 minutes

This block introduces the integer and float data types along with maths operators.

The Python console is used in this exercise. The instructor should walk students through the locating the Python console and executing a Python statement.

Relevant Exercise(s):

Exercise 1.2: 3-5 minutes

- The students will explore different maths operators using the Python shell
- They should be able to identify the purpose of each operator
- Ask different students to share with the rest of the class what each operator does after they have completed the exercise

Block #4: The Python Console
3 minutes

This block is a brief explanation of when it is appropriate to use the Python console and when it is appropriate to use files.

Block #5:
5 minutes

In this block students are introduced to the string data type along with common mistakes when using strings.

Refer to the example error message and explains it. This will help students better understand errors when debugging their own programs. Instructors should bring attention to:

1. The line number
2. The error type (e.g. `NameError`)
3. The error message (e.g. `"name 'hello' is not defined"`)

Throughout the course when assisting students with error messages one-to-one, get the student to identify these three things to help them explain the problem.

Relevant Exercise(s):

Exercise 1.3: 5 minutes

- Students will explore different methods and operations with strings
- Get the students to share what each line does, first with a partner, then as a pair with the rest of the group
- Students that make more progress should try to identify why the error message occurred

Block #6: Variables

5 minutes

Variables are introduced in this block. Students are also given their first exercise to write a more complex program that combines integers, maths operations, strings and variables.

Relevant Exercise(s):

Exercise 1.4: 10-15 minutes

- Students need to create a program that calculates how many cans of cat food are needed to feed 10 cats
- The exercise combines all of the things that they have learned up to this point
- Students can refer back to the oranges calculator example on the previous slide
- Extension: students should modify the program to calculate how many cans are needed for seven days

Block #7: String Formatting

5 minutes

This block focuses on string formatting using Python's `.format()` method. Comments are also mentioned.

Relevant Exercise(s):

Exercise 1.5: 5-8 minutes

- Students will modify their cat food calculator's output to use the `.format()` method
- Hint: Students can refer back to the previous slide for guidance

Time: 5 mins

Recap questions:

Question 1:

What are the names of the maths operators?

Answer:

add, subtract, divide, modulo/remainder, power/exponent

Question 2:

In what situation should you use a Python file and when should you use the Python Console?

Answer:

Python files are used when I want to run the program multiple times and the Python console when I want to explore code and get immediate feedback

Question 3:

What is the output of this code?

days = 31

```
hours = "24"
```

```
total_hours = days * hours
```

```
msg = "There are {} in {} days".format(total_hours, days)
```

```
print(msg)
```

Answer:

[illegible]

Homework Tasks

Learning Task:

Session 1 homework questions in the student guide

Guide for Instructors

General comments