

## Component 2: Implementation

### Design, write, test and refine Python 3 code

Term	Definition
Functions	A function is a block of code which only runs when the function is called.
Objects	Python is an object-oriented programming language. Almost everything in Python is an object with its properties and methods.
Python libraries	A Python library is a reusable section of code that can be included in programs/projects.

### Required skills

You will need to be able to:

- create new and extend existing functions or methods
- create new and edit existing objects
- create new and extend existing Python 3 libraries

Term	Definition
Variables	Variables are containers for storing data values. Unlike other programming languages, Python has no command for declaring a variable. A variable is created the moment it is first assigned a value.
Data types	Variables can store data of different types, and different types can do different things.

You will need to be able to:

- use variables (labels), operators, inputs, outputs and assignment

- use a variety of data types, including:
  - o text type - str
  - o numeric types - integer (int), real (float)
  - o sequence type - list, tuple
  - o Boolean - TRUE or FALSE (bool)
- use programming constructs to control the flow of a program, including:
  - o iteration (condition and counter controlled loops)
  - o selection
  - o sequence
- use basic file handling, including:
  - o open a file
  - o read from a file into a variable
  - o read from a file into an array
  - o write to a file
  - o write to a file from an array
  - o close a file

The key function for working with files in Python is open () function. There are four different methods for opening a file:

- 'r' - Read - opens a file for reading and returns an error if the file does not exist
- 'a' - Append - opens a file to allow data to be added. Will create a file if the file does not exist.
- 'w' - Write - creates a file for data to be stored.
- 'x' - Create - creates the specified file and returns an error if the file already exists.

It is good practice to always close a file after the program has finished accessing it.

- create new and extend data structures and fixed length records to store data
- create new and extend lists, tuples and dictionaries (arrays)

Data structures are used to store a collection of related data. There are four built-in data structures in Python:

- list - a collection of data that is ordered and can be changed. A list allows duplicate values
- tuple - a collection of data that is ordered and unchangeable. A tuple allows duplicate values.
- set - a collection of data that is unordered and unindexed. A set cannot include duplicate values.
- dictionary - a collection of data, which is unordered, changeable and indexed. A dictionary cannot include duplicate values.

You will need to be able to:

- use string manipulation and slicing

Strings in Python are arrays of bytes representing characters. Python does not have a data type for a string, a single character is simply a string of length 1. Python uses square brackets to access a character in a string e.g. the code:

```
Message = 'Thank you'
print message ([2])
```

would return the character 'a' - remember that the first character, T, is in position 0.

A part of a string can be returned using slicing:

```
Message = "Thank you"
print (b[6:8])
```

would return 'yo', position 6 to 8 (not included)