Intro to Python

Workshop Leader Crib Sheet

Version 1 - Nov 2022

Session 1

## Links

* [Attendance sheet](https://docs.google.com/spreadsheets/d/1dRZJRNnPCtOv_JgfW_oMYqc2M3fma0kChzQ-dYQqPY4/edit#gid=0)
* [Question sheet](https://docs.google.com/document/d/1iiIr4KO7kFxVD5ixiqOgSVW6SVOIvrsD9n_-1WfaGnQ/edit?usp=sharing)
* Teams information
  + Meeting ID: 345 898 584 104
  + Passcode: rpNenH

## 10:00 - Welcome

* Introductions and attendance
* Background, format, session numbers, post-its
* Code of conduct
* Open Jupyter Notebook, explain what is going on
* Installation check: import this

## 10:30 - Initial discussion

* Why learn to code?
* Python: General programming language, used for everything. Strongly typed, dynamically typed, and has garbage collection. Written with a syntax that is human-readable.

## 10:40 - Fundamentals

* Calculator: get everyone writing an equation
* Errors: get everyone making an error
* Variables: used to store information. Smallest
* Types: int, float, string. Determines characteristics of the data stored, what operations can be performed, what happens.
* Built-in functions: print(), type()

## 11:00 - Lists

* Data structures hold multiple pieces of data in an organised way
* Lists are one of these: we can store multiple elements in one go
* Access list elements via the element’s index. Count backwards and forwards
* Lists are mutable. Change elements by specifying a new element at the index
* Lists can hold other lists
* Lists have some special features: append() and pop(). Methods tied to every list type. We can also reverse() a list.
* We can slice a list, and use a step size to take every nth value
* Overloading. Try out some mathematical operators on lists: see what happens.

## 11:20 - Break

* 10 mins

## 11:30 - Dictionaries

* Dictionaries are indexed key, value pairs. This is like a library. Every book has an ISBN number. Provide this, and you get the book.
* Construct a dictionary
* Access a dictionary value using its key
* Change a dictionary. Take a book out the library, peel the ISBN number off, stick it on another book, and return this
* dict.keys(), .values(), .items()

## 12:00 - Control Flow

* Tell Python to take different actions, based on a condition
* If, elif, else
* Use of comparison operators. >, <, <=
* Combine these with and, or, not
* True and False: booleans
* Truthiness. Lots of things have truthiness

## 12:30 - Loops

* Often we want to repeat complex operations. We can use for loops.
* Lists have an index. We can run many operations based just on the index value.
* This isnt a good approach. Use a for loop to perform an action for each index
* Built in function called enumerate
* Anything with a length can be iterated over. strings are a good one to practice on

## Session 2

## Before we start:

* Check everyone has the link to the course notes:   
  <https://uniexeterrse.github.io/intro-to-python/index.html>
* Check everyone has access to the worksheets

## 10:00 – Recap and exercise

* Car example for recap
* FizzBuzz for exercise

## 10:30 – Functions and exercises

* Built in

## 11:00 – Imports and Python libraries

* Importing a module from the standard library
* Using a module
* Exercise: generate random numbers
* Some common packages used for research
* Installing things manually

## 11:20 – Break

## 11:30 – Data analysis task intro

* Create a project folder, create a data folder.
* Get the data, download it, place it in the data folder

## 11:40 – Data analysis task 1

* Loading data into Python using numpy
* Numpy arrays
* Slicing numpy arrays

## 12:10 – Data analysis task 2

* Visualisation of data
* Grouping plots

## 12:30 – Data analysis task 3

* Processing multiple files with glob