Intro to Python (Part 1)

Workshop Lead: Benjamin Rudski

Facilitator: N/A

Registration link: https://involvement.mcgill.ca/event/288033

Approximate duration: 4 hours

Prerequisites:

- Basic computer science knowledge of data types and control structures.

- No prior programming experience is required, but knowing another language may help.

- To be able to participate in the exercises, participants must either:

    - Have a local installation of Python and Jupyter notebooks. Microsoft Visual Studio Code with the Python extension installed can also be used to run the Notebook.

    - Have a Google Account (to run in-browser as a Colab notebook)

Summary: (2-3 sentences summarizing the workshop)

In this 4-hour workshop, participants will be introduced to the basics of programming in Python. Students will journey from the beginnings of creating variables and performing simple mathematical operations to writing code that can perform fundamental tasks and wrapping this code into functions. Participants will learn how to write the important building blocks that make up complex programs.

Learning Objectives: (List 3-5 learning objectives participants will learn upon completion of this workshop)

1. Store data in variables and collections.
2. Perform basic operations on these data.
3. Use control flow and loops to write powerful code.
4. Define functions to create repeatable units of behaviour.

Content:

1. **Module 1 – Python Basics (1 hour 15 minutes)**
    a. Foundations of Python - A Brief Overview of Types and Variables
        i. Primitive Data Types (int, float, bool, string)

      ii.   Variables

      iii.   Collection Data Types (tuples, lists, dictionaries)

      iv.   Introduction to Functions (Function as a Machine)

  b. Numbers and Comparisons

      i.   Mathematical Operations

      ii.   Booleans

  c. Intro to Control Flow and Loops (if, while and for)

      i.   Control Flow: the if Statement

      ii.   while Loops

      iii.   Iteration with for Loops

  d. Exercise: Numbers and Loops for Unit Conversion

2. **Module 2 – Strings and Collections: An Object Primer (1 hour)**

  a. Introducing Objects

      i.   What is an Object?

  b. Introducing the String!

      i.   String Slicing

      ii.   String Methods (concatenation and string formatting, converting strings to numbers, find and replace)

  c. Introduction to Tuples, Lists and Dictionaries

      i.   Tuples and Tuple Unpacking

      ii.   Lists and List Methods (adding, removing, slicing)

      iii.   Dictionaries (Key-Value storage, accessing, adding, removing)

  d. Exercise: Working with Strings and Collections for DNA and Protein Processing

3. **Module 3 – Introduction to Functions (45 minutes)**

  a. Function Overview

      i.   What is a function?

  b. Writing Custom Functions

      i.   Basic function definitions

      ii.   Passing inputs: Defining parameters

      iii.   Producing outputs: Return values

  c. Documenting Functions

      i.   Defining function docstrings

  d. **Exercise:** Writing functions for biological sequences.

4. **Module 4 – Where to go from here (10 minutes)**

  a. What to learn next? How?

  b. How to get help and how not to get help

      i.   Your code editor

       ii.   Documentation

      iii.   Books

      iv.   Tutorials

       v.   Stack Overflow (and pitfalls)

      vi.   ChatGPT (and pitfalls)

  c.   Glimpse of other cool programming topics