Intro to Python (Part 1)

Workshop Lead: Benjamin Rudski

Facilitator: N/A

Registration link: https://involvement.mcgill.ca/event/257672

Approximate duration: 4 hours

Prerequisites:

- No prior programming knowledge or experience is required.

- 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 workshop, attendees will be introduced to the basics of programming in Python. Students will journey from the basics of the computer to writing clean, detailed code that can perform simple tasks. By the end of this workshop, attendees will be able to write simple programs in Python, understand existing code and use existing code from published modules and packages.

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

1. Use variables and collections to represent data in Python code.
2. Use control flow and loops to write powerful code.
3. Use functions from existing packages and modules.

Content:

1. **Module 1 – Introduction to Programming (30 minutes)**

    a. Basic Concepts and Definitions

        i. What is a Computer?

        ii. What is a Program?

        iii. What are Programming Languages?

    b. Welcome to Python

        i. What is Python?

        ii. How to Install Python

iii.   Tools for Using Python

2.   **Module 2 – 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

3.   **Module 3 – Strings and Collections: An Object Primer (1 hour)**

    a. Introducing the String!

        i.   String Slicing

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

        iii.   String Exercise: DNA Processing

    b. 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)

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

4.   **Module 4 – Modules and Packages (40 minutes)**

    a. Using Modules

        i.   What is a Module?

        ii.   Importing a Module

        iii.   Importing Specific Functions

    b. Package Management

        i.   What is a Package?

        ii.   Installing Packages using conda

        iii.   Installing Packages using pip

        iv.   Other Installation Tips

        v.   Reading Documentation

c. Exercise: importing a module from the standard library and using its functions.

5.   Module 5 – 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. Other cool programming topics (to mention, not to cover)

　　i. Writing packages

　　ii. Object-Oriented Programming

　　iii. Developing Graphical User Interfaces

　　iv. Hosting projects on GitHub