

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. Integers and Floating-Point Numbers
 - iii. 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