Introduction to Python

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Registration link: https://forms.gle/K7nGnMtqvhcJDgfQA

Hours of instruction: Tuesday, August 1, 2023, 9:00 to 13:00 (4 hours)

Prerequisites:

- No prior programming experience required.

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

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

    ○ 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.

Summary:

In this workshop, you will be introduced to the basics of programming in Python. We will journey from a basic understanding of a computer into the world of functions and even some basics of packages. By the end of this workshop, you will be able to write simple programs in Python, understand existing code and learn how to use new libraries.

Contents:

I. **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
II. **Module 2 – Python Basics (1 hour)**
   a. Foundations of Python
      i. Mathematical Operations
      ii. Variables
   b. Numbers and Comparisons
      i. Integers and Floating-Point Numbers

      ii.   Booleans

  c. Intro to Control Flow and Loops

      i.   Control Flow: the `if` Statement

      ii.   `while` Loops

      iii.   Basic `for` Loops

  d. **Exercise:** Numbers and Loops

III.   Module 3 – Strings (40 minutes)

  a. String slicing

  b. String Operations and Methods

      i.   Concatenation

      ii.   Converting Strings to Numbers

      iii.   Finding a Substring

      iv.   Replacing Characters

  c. String Iteration and the `for` Loop

  d. **Exercise:** DNA transcription and mRNA processing

IV.   Module 4 - Collection Types (45 minutes)

  a. Tuples

      i.   Accessing Elements

      ii.   Tuple Unpacking

  b. Lists

      i.   Length of a List

      ii.   List Slicing

      iii.   Adding Elements

      iv.   Removing Elements

      v.   List Iteration

      vi.   List Exercise

  c. Dictionaries

      i.   Key-Value Storage

      ii.   Accessing Elements

      iii.   Adding Keys

      iv.   Removing Keys

      v.   Dictionary Iteration

  d. **Exercise:** Translation from mRNA to protein

V.   Module 5 – Functions (35 minutes)

  a. Intro to Functions

      i.   What is a Function?

      ii.   Function Parameters and Return Values

      iii.   Documentation

  b. **Exercise:** Write a function to perform transcription and translation

  c. Sneak Peek at Object Oriented Programming

      i.   Quick introduction to classes and objects

VI. **Module 6 – Modules and Packages (20 minutes)**
   a. Using Modules
      i. Importing a Module
      ii. Importing Specific Functions
   b. Package Management
      i. Installing Packages using `conda` and `pip`
      ii. Other Installation Tips
      iii. Reading Documentation

VII. **Where to go from here (5 minutes)**
   a. Where to go for help
   b. Closing remarks
      i. Really important: **Documentation**
      ii. Other important skills to learn: packages, markdown, GitHub