

## **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`
  - ii. Installing Packages using `pip`
  - iii. Other Installation Tips
  - iv. 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