**Introduction to Python**

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**Registration link:** <https://forms.gle/4gX1jJ1Lr3v5Ct3K7>

**Hours of instruction:** Friday, September 30, 2022, 10:00 to 14:00 (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 object-oriented programming (OOP) and 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:**

1. **Module 1 – Introduction to Programming (30 minutes)**
   1. Basic Concepts and Definitions
      1. What is a Computer?
      2. What is a Program?
      3. What are Programming Languages?
   2. Welcome to Python
      1. What is Python?
      2. How to Install Python
      3. Tools for Using Python
2. **Module 2 – Python Basics (1 hour)**
   1. Foundations of Python
      1. Mathematical Operations
      2. Variables
   2. Numbers and Comparisons
      1. Integers and Floating-Point Numbers
      2. Booleans
   3. Intro to Control Flow and Loops
      1. Control Flow: the if Statement
      2. while Loops
      3. Basic for Loops
   4. **Exercise:** Numbers and Loops
3. **Module 3 – Strings (40 minutes)**
   1. String slicing
      1. Accessing Individual Characters
      2. Accessing Substrings
   2. String Operations and Methods
      1. Concatenation
      2. Converting Strings to Numbers
      3. Finding a Substring
      4. Replacing Characters
   3. String Iteration and the for Loop
   4. **Exercise:** DNA transcription and mRNA processing
4. **Module 4 - Collection Types (45 minutes)**
   1. Tuples
      1. Accessing Elements
      2. Tuple Unpacking
   2. Lists
      1. Length of a List
      2. List Slicing
      3. Adding Elements
      4. Removing Elements
      5. List Iteration
   3. Dictionaries
      1. Key-Value Storage
      2. Accessing Elements
      3. Adding Keys
      4. Removing Keys
      5. Dictionary Iteration
   4. **Exercise:** Translation from mRNA to protein
5. **Module 5 – Functions (35 minutes)**
   1. Intro to Functions
      1. What is a Function?
      2. Function Parameters
      3. Return Values
      4. Documentation
   2. **Exercise:** Write a function to perform transcription and translation
6. **Module 6 – Modules and Packages**
   1. Using Modules
      1. Importing a Module
      2. Importing Specific Functions
   2. Package Management
      1. Installing Packages using conda (and possibly bioconda)
      2. Installing Packages from pip
      3. Other Installation Tips
      4. Reading Documentation
7. **Where to go from here (10 minutes)**
   1. Where to go for help
   2. Closing remarks
      1. Really important: **Documentation**
      2. Other important skills to learn: packages, markdown, GitHub
8. **Extra Topics if Time Permits**
   1. Reading and Writing files
   2. Recursive Functions