

Intro to Python

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PhD Student

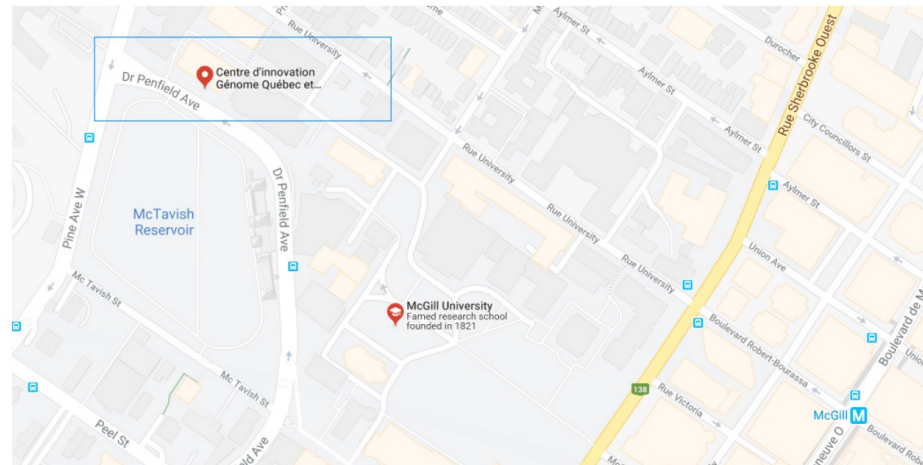
Quantitative Life Sciences, McGill University

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Mission : aims to deliver inter-disciplinary research programs and empower the use of data in health research and health care delivery

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National Day for Truth and Reconciliation

National Day **for Truth and Reconciliation**



Government
of Canada

Gouvernement
du Canada

Canada

<https://www.canada.ca/en/canadian-heritage/campaigns/national-day-truth-reconciliation.html>

About me

- BSc from McGill in Hon. CS/Bio, Minor Math
- Second-year PhD student in Quantitative Life Sciences (QLS)
- Research on trabecular bone structure in the Reznikov Lab, McGill Bioengineering

<https://github.com/bzrudski>

- Outline: (times are very approximate)
 - 1. Module 1 – Introduction to Programming (30 minutes)**
 1. Basic Concepts and Definitions
 2. Welcome to Python
 - 2. Module 2 – Python Basics (1 hour)**
 1. Foundations of Python
 2. Numbers and Comparisons
 3. Intro to Control Flow and Loops
 4. Exercise: Numbers and Loops
 - 3. Module 3 – Strings (40 minutes)**
 1. String slicing
 2. String Operations and Methods
 3. Iteration and the for loop
 4. Exercise: DNA transcription and mRNA processing

- Outline (continued):

- 4. Module 4 - Collection Types (45 minutes)**

- 1. Tuples
 - 2. Lists
 - 3. Dictionaries
 - 4. Exercise: Translation from mRNA to protein

- 5. Module 5 – Functions (35 minutes)**

- 1. Intro to Functions
 - 2. Exercise: Write a function to perform transcription and translation

- 6. Module 6 – Modules and Packages**

- 1. Using modules
 - 2. Package management

- 7. Where to go from here (10 minutes)**

- 1. Where to go for help
 - 2. Closing remarks

Module 1

Introduction to Programming

Basic Concepts and Definitions

- What is a computer?

Hard drive

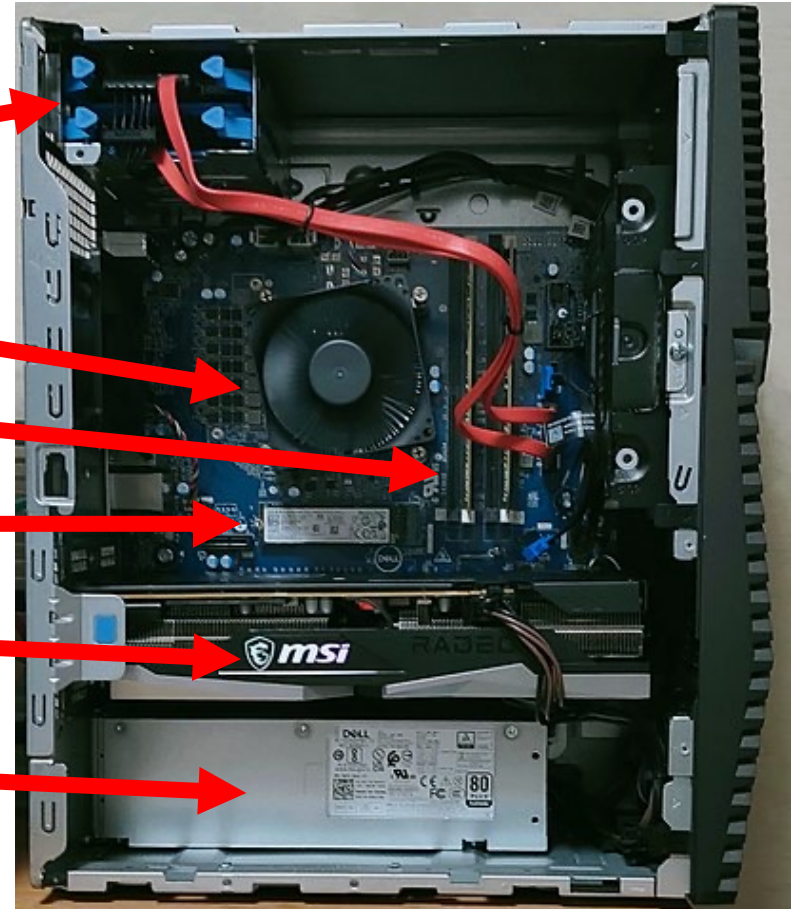
CPU

RAM

Motherboard

Graphics Card

Power Supply



[Dell G5 5000 motherboard.jpg](#), by [Project Kei](#), licensed under the Creative Commons [Attribution-Share Alike 4.0 International](#) license.

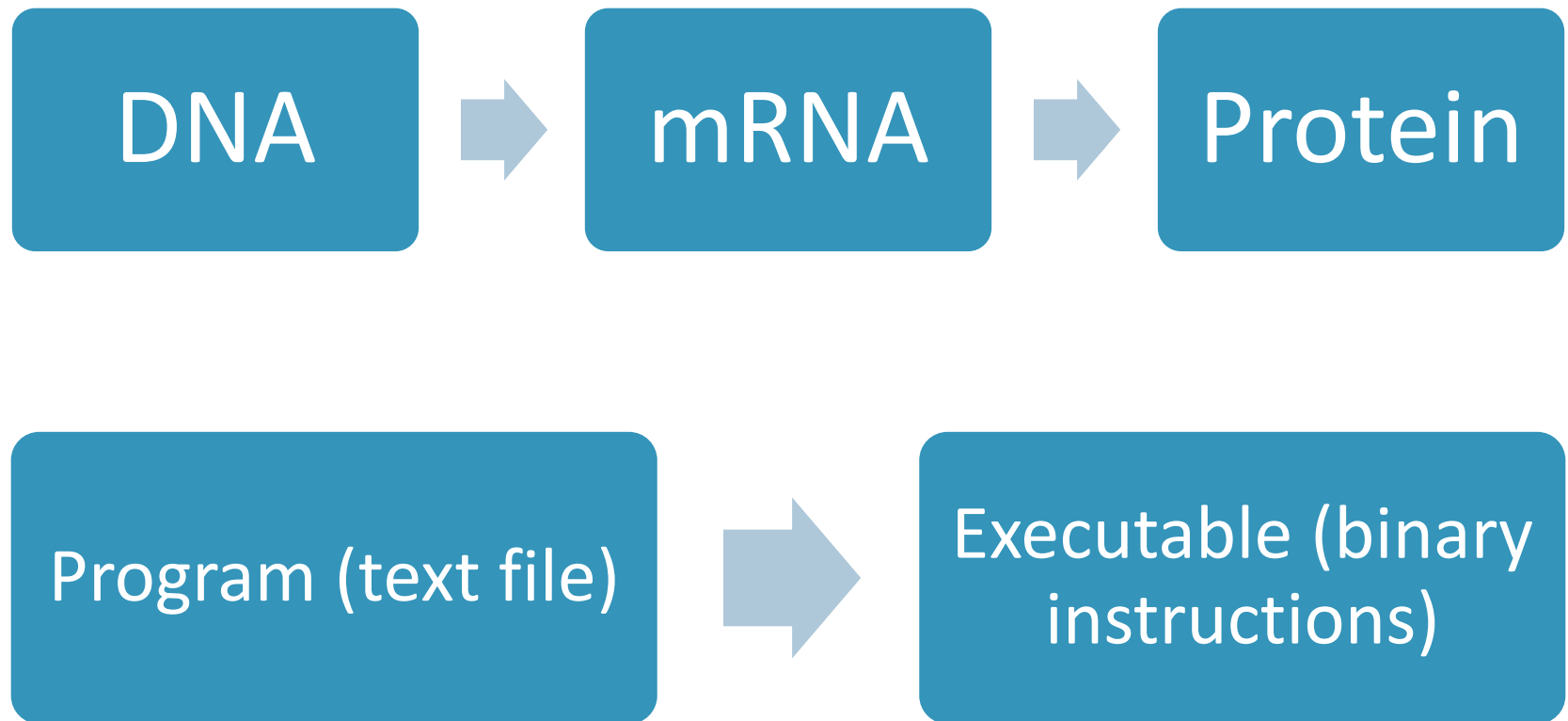
Basic Concepts and Definitions

- What is a computer?
 - RAM: memory – store data
 - CPU: processor – perform operations on data
- How do we tell it what operations to do on what data?...
 - **Programming!**
- Program is a **text file** that contains instructions:
 - What operations to do
 - On what data

Basic Concepts and Definitions

- What is a program? – Instructions
- How do we write a program?
 - Using a **programming language**
- **Poll:** Who does the programming language help?

Basic Concepts and Definitions



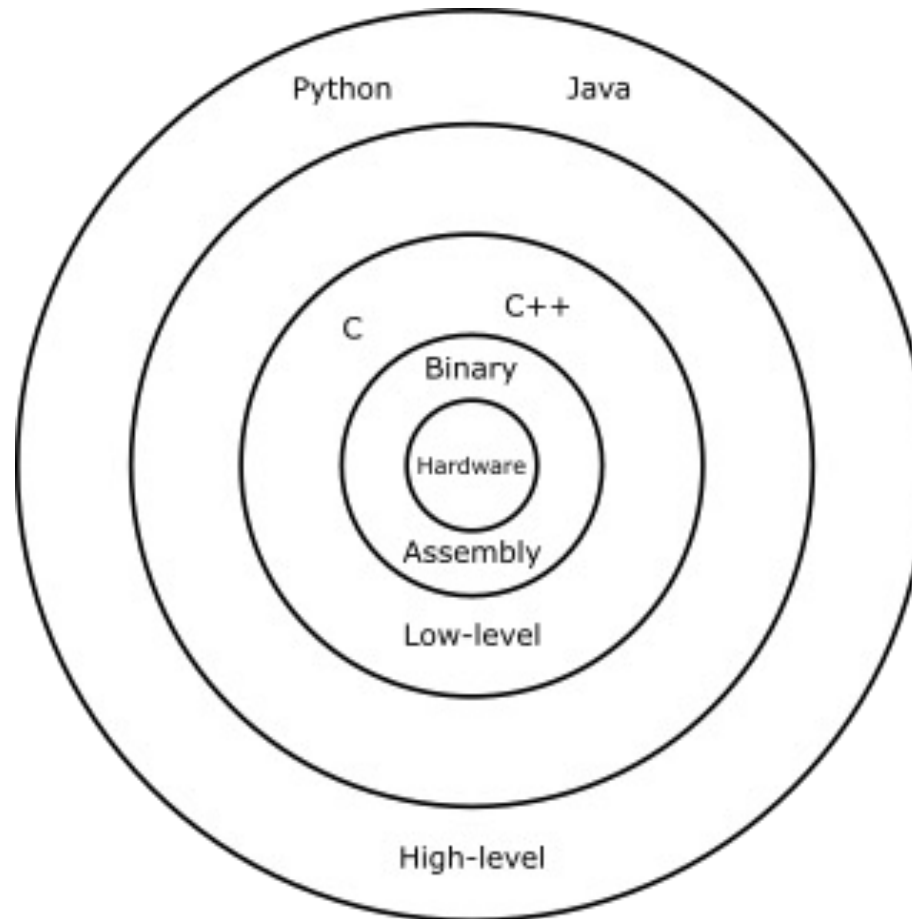
Basic Concepts and Definitions

- **What's with all those different languages????**
- **Poll:** Let's see how many of you know Shrek...

Programming languages are
like onions...

LAYERS!

Basic Concepts and Definitions



Welcome to the Python Programming Language!



- For more history:
 - https://en.wikipedia.org/wiki/History_of_Python
 - <https://www.geeksforgeeks.org/history-of-python/>
 - <https://docs.python.org/3/faq/general.html>
- Introduced in 1991 by Guido van Rossum
- Features:
 - Free and Open Source
 - Interpreted
 - Object-Oriented
- <https://python.org>

Welcome to the Python Programming Language!

- Free and Open Source
 - Anyone can download, use, **modify and distribute** the Python programming language.
- Interpreted
 - Python scripts are run line-by-line
 - Can easily launch it from the command line and have access to **interactive shell**
- Object-Oriented
 - “Objects” – collections of data and manipulations that make it easier to represent the real world

Interactive Workshop!

- That's pretty much all that will be in the slides... For the rest, we'll go to a Jupyter Notebook:

Go to Jupyter Notebook

https://github.com/bzrudski/micm_intro_to_python_fall_2022

Acknowledgements

- Thank you to MiCM for giving me this opportunity and for helping me along the way.
- Thank you to the professors from the McGill School of Computer Science for helping me along my programming journey and for inspiring me to share my programming experience with others.
- Thank you to Professor Mathieu Blanchette, whose COMP 204 course helped to introduce me to Python (back in Fall 2018).
- Diagrams in Jupyter Notebook made using Inkscape (<https://inkscape.org>).