Intro to Python

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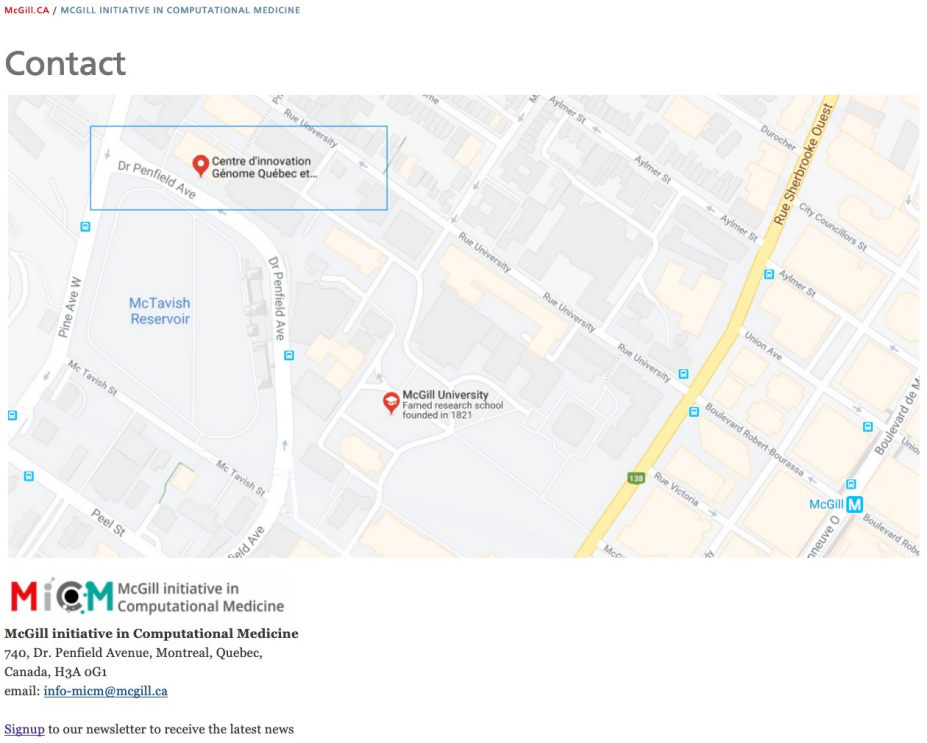
Mission : aims to deliver inter-disciplinary research programs and empower the use of data in health research and health care delivery



https://www.mcgill.ca/micm

About me

- BSc from McGill in Hon. CS/Bio, Minor Math
- Almost third-year PhD student in Quantitative Life Sciences (QLS)
- Research on trabecular bone structure in the Reznikov Lab, McGill Bioengineering
  - Using 3D image processing and analysis
  - Programming is an almost-daily task in my life.

https://github.com/bzrudski

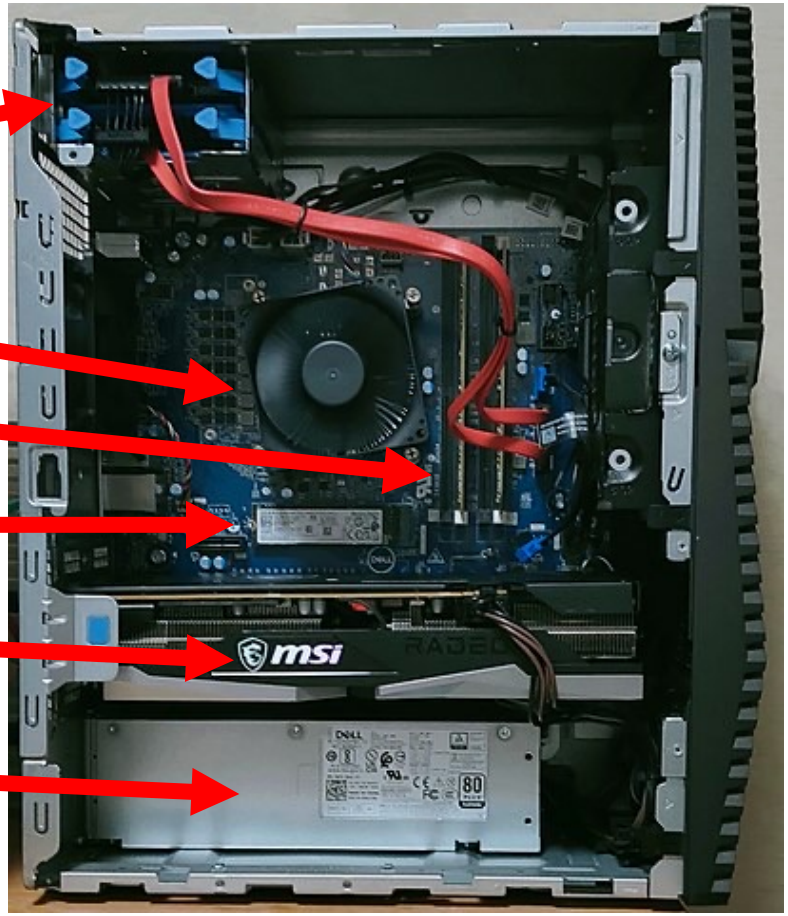
- Outline: (times are very approximate)
  1. **Module 1 – Introduction to Programming (30 minutes)**
     1. Basic Concepts and Definitions
     2. Welcome to Python
  2. **Module 2 – Python Basics (1 hour)**
     1. Foundations of Python
     2. Numbers and Comparisons
     3. Intro to Control Flow 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
     3. Sneak Peek: Object-Oriented Programming
  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?



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?
  - (a) The computer
  - (b) The programmer
  - (c) Nobody… it's a useless waste of time!
- Let's see why…

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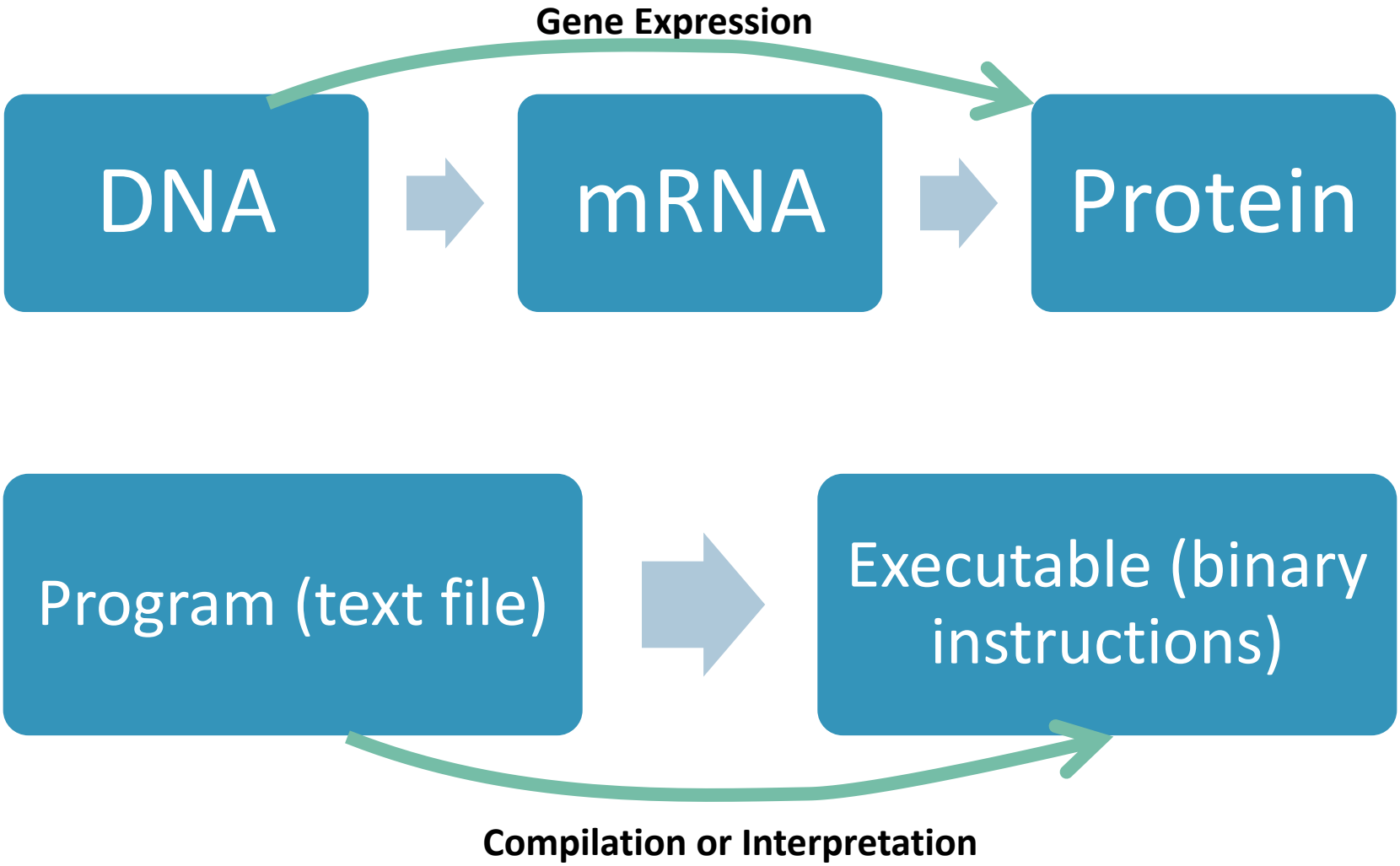
Basic Concepts and Definitions



Welcome to the Python Programming Language!

- For more history: https://en.wikipedia.org/wiki/History_of_Python
- Introduced in 1991 by Guido van Rossum
- Features:
  - Free and Open Source
  - Interpreted
  - Object-Oriented
- https://python.org

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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

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Acknowledgements

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- 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).