PNB 2A03: Python for PNB

Course Outline

Course Objectives:
In this course you will gain introductory experience programming in Python. We will cover topics including basic programming skills, data manipulation and analysis, plotting, and automating routine tasks. We will learn these tasks with reference to everyday problems we face in Psychology, Neuroscience, & Behaviour.

Instructor:
Dr. David Feinberg (feinberg@mcmaster.ca)
TA's: TBA
Online office hour: TBA

Schedule and Location:
Online location: TBA
Tues 15:30-16:20
Fri 10:30-12:20

Required reading:
There is no textbook or mandatory reading for this course. Students can supplement lectures with reading from:
https://problemsolvingwithpython.com/
and
https://jakevdp.github.io/PythonDataScienceHandbook/

Website:
https://avenue.mcmaster.ca

Assessments:
There are no tests in this course. Each student will program a set of Python scripts in a coding lab each week, and weekly take-home assignments, and one final assignment. These scripts will be directly relevant to research in Psychology, Neuroscience, & Behaviour. Students will be assessed on the functionality, coding style, and method of these scripts.

Schedule of topics (subject to change):
1. Introduction to Scientific Computing
   1. Introduction
   2. Tools
   3. Google Colab and Jupyter Notebooks
   4. Variables
   5. Operators
   6. Conditionals
2. Data Types, Loops, Conditionals, and Functions
   1. Data Types
   2. Loops
   3. Dictionaries
   4. Functional Programming
3. Debugging and Classes
   1. Object Oriented Programming
   2. Classes
   3. Objects
   4. Namespaces
4. Analyzing and Plotting Data
   1. NumPy
   2. Exploring data in Pandas
   3. Data analysis with SciPy & Statsmodels
5. Deep Dives
   1. Automated Voice Analysis
   2. Automated Face Analysis
6. Machine Learning
   1. Unsupervised learning
   2. Supervised learning

Lectures
Lectures will be shorter, pre-recorded videos. They will be posted ahead of time. Videos will be played during class time, and your instructor(s) will be online to help with questions and facilitate any discussion.

Labs
Labs will be live during scheduled times. Each coding lab will help develop skills learned in lectures. This year our coding lab will revolve around coding a stroop task, visualizing COVID-19 datasets, analyzing faces and voices, and a gentle introduction
into machine learning in scikit-learn. Students will first attempt to solve labs on their own. Your instructor(s) will help lead you through the exercises with live coding, and students can help each other figure out how to solve coding problems.

Assignments
Assignments further develop the skills learned in lecture and lab, and are to be done alone. Once we get to voice and face analysis, there will be no more assignments except for the final assignment.

Deadlines
The soft deadline for each assignment is 1 week after it is assigned. The hard deadline for all assignments and labs is 2 weeks after the final day of class. There is no penalty for handing in something after the soft deadline. Assignments and labs will not be accepted after the hard deadline.

Computer requirements
As long as you are able to access google on a device, you will be able to do the coding in this course. You can even do the coding on your phone (it will be a bit more difficult, but it’s totally possible). We will be using google colaboratory, and all of the processing will be done on google’s servers. You do not require a (fast) computer for the course. A phone or tablet will work also. If you think access to a device will stop you from taking the course, please email Dr. David Feinberg at feinberg@mcmaster.ca immediatly so we can make arrangements. Access to devices should not prevent you from learning to code.

Assessments:
Coding Labs: 1/3 of total grade
Assignments: 1/3 of total grade
Final Project: 1/3 of total grade

PsychoPy
Why are we not learning PsychoPy?
Because there is very little you need Python-wise to use PsychoPy. PsychoPy Builder is increadibly powerful. It is not worth our while to learn how to code PsychoPy experiments from scratch. You should be able to use PsychoPy Builder without coding knowledge. With the knowledge you gain in this course, you should be able to modify PsychoPy code.

R
R is great and I highly encourage you to learn it in addition to Python. It’s currently being offered in several other courses across campus.

McMaster University Statement on Inclusivity and Academic Integrity:
The University values integrity, inclusiveness and teamwork, and strives to support the personal and collective growth of the McMaster student community.

These values are foundational to ensuring campus environments – both in-person and virtual –are conducive to personal wellbeing and academic success.

Inclusivity and a Culture of Respect
As a McMaster student, you have the right to experience and the responsibility to demonstrate respectful and dignified interactions within all of our living, learning and working communities. Expectations are described in Code of Student Rights & Responsibilities.

It is essential that students be mindful of their interactions online, as the Code remains in effect in virtual learning environments. The Code applies to any interactions that adversely affect, disrupt, or interfere with reasonable participation in University activities. Student disruptions or behaviours that interfere with university functions on online platforms (e.g. use of Avenue 2 Learn, WebEx or Zoom for delivery), will be taken very seriously and will be investigated. Outcomes may include restriction or removal of the involved students' access to these
Academic Integrity and Honesty

As a McMaster student, you are expected to exhibit honesty and ethical behaviour in all aspects of the learning process. The academic credentials that you earn are rooted in the principles of honesty and academic integrity.

Academic dishonesty is to knowingly act or fail to act in a way that results or could result in unearned academic credit or advantage. This behaviour can result in serious consequences, (e.g., the grade of zero on an assignment, loss of credit with a notation on the transcript which reads: “Grade of F assigned for academic dishonesty”) and/or suspension of expulsion from the university).

It is your responsibility to understand what constitutes academic dishonesty. For information on the various types of academic dishonesty please refer to the Academic Integrity Policy.

Some helpful information can be found here