

Tutorial 1 – Week 1

We'll be starting at the 10 minute mark

Agenda

1. TA Introductions
2. Logistics
3. Install Anaconda Navigator and VS Code
4. Set up a Folder Structure for APS106
5. VSCode/Jupyter Notebook
6. UofT JupyterHub
7. Questions?

Introduction – TA



Ali Tohidifar

(TUT01, TUT07)

Current studies: 4th year PhD CIV Student

Research/other interests: Computer Vision, Basketball, Snowboard, Learning Guitar

Tutorial Logistics

- Tutorials are for your benefit – **no grading**
 - We will review previous weeks labs & lecture content
 - From Week 2, we will focus on **coding problems!**
- Be sure to **ask lots of questions** and have Python open.
We are here to help you!

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- Be sure to **ask lots of questions** and have Python open.
We are here to help you!
- Questions outside of tutorial time?
 - **Coffee Time** – drop-in hours for 1on1 help

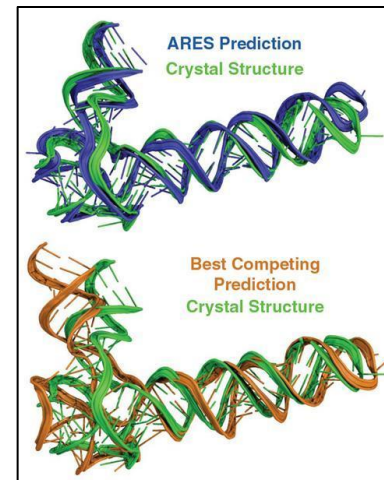
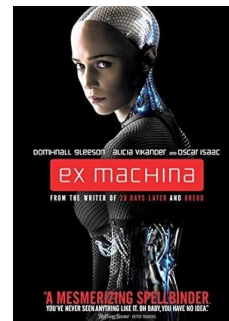
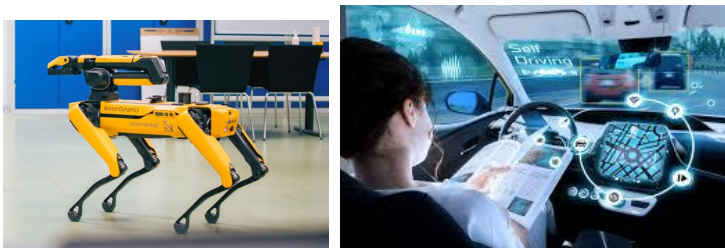
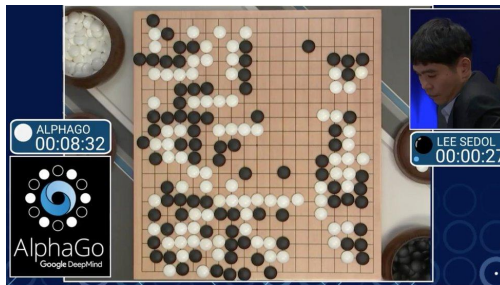
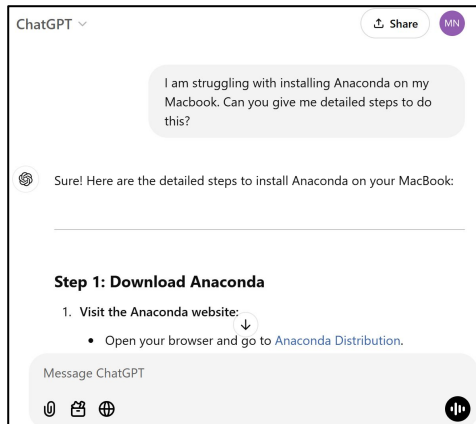
Online Tutorials/Office Hours Survey

- URL – <https://forms.office.com/r/n8e4k8seyK>



Why code?¹

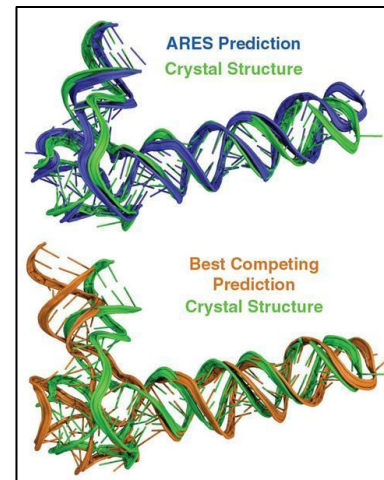
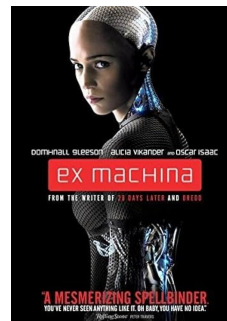
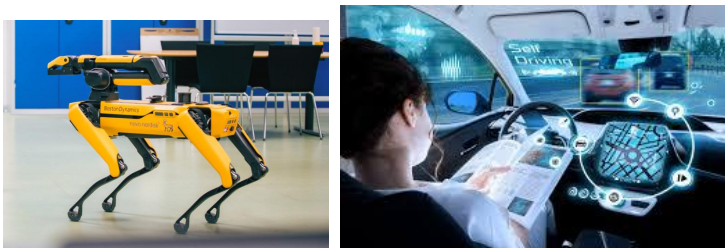
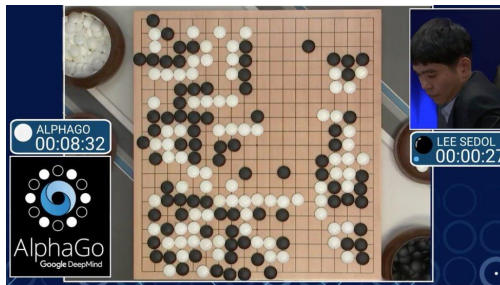
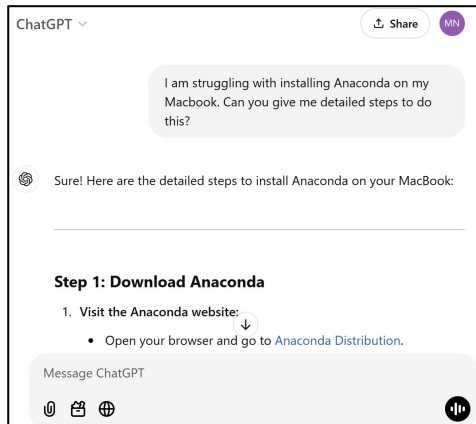
- Programming is awesome!
- Computers are everywhere, programming is a boundless opportunity
- Software engineering can be applied to almost any context in the world



Source: © Townshend et al, 2021 Science

Why code?²

- Regardless of background, coding is always an achievable skill
- Software engineering can be applied to almost any context in the world
- **NEVER THINK THAT YOU “CAN'T UNDERSTAND” CODING**

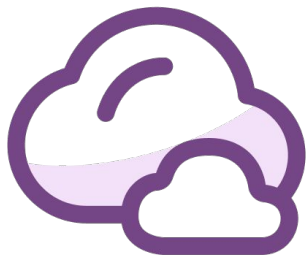


Source: © Townshend et al, 2021 Science



What would you want to ideally learn in this course?





Coding experience?



Presenting with animations, GIFs or speaker notes? Enable our [Chrome extension](#)

Install Anaconda Navigator

Anaconda

- Anaconda is a distribution of **Python** that includes tools and packages geared towards scientific computing (such as data science and machine learning)
- **Anaconda Navigator** is the graphical user interface (GUI) allowing users to install and manage their programming environment without command line (terminal) prompts



Install Anaconda

- You can install Anaconda from the following link:
 - <https://www.anaconda.com/download>

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Distribution

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For installation assistance, refer to [Troubleshooting](#).

Download Anaconda Distribution or [Miniconda](#) by choosing the proper installer for your machine. Learn the difference from our [Documentation](#).



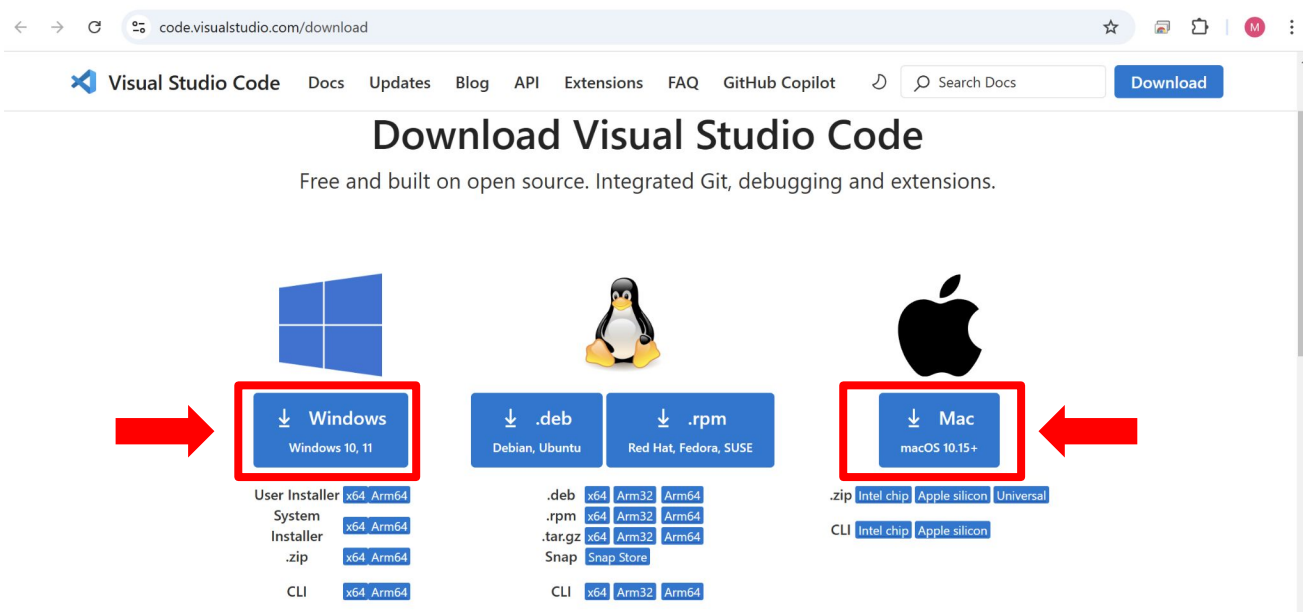
Anaconda Installers

 [Download](#)



Install VS Code¹

- You can install VS Code from the following link:
 - <https://code.visualstudio.com/download>

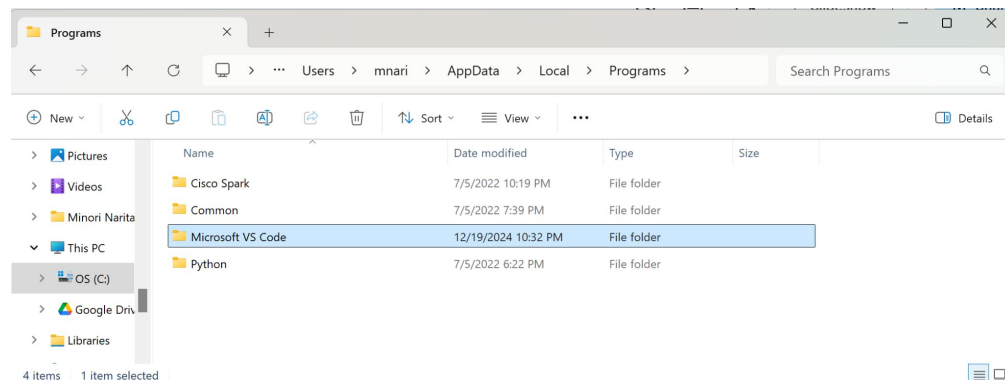


Install VS Code² (Windows)

- Open the .exe file (e.g., VSCodeUserSetup-x64-1.96.2.exe) and install VS Code
- Go to Anaconda-Navigator → File → Preferences → Configure Navigator → Change the following lines of code

```
[home]
vscode_enable = True
[applications]
vscode_path = C:\Users\{USERNAME}\AppData\Local\Programs\Microsoft VS Code
```
- Restart Anaconda Navigator

(If you don't see AppData, click on
View → Show → Hidden items)



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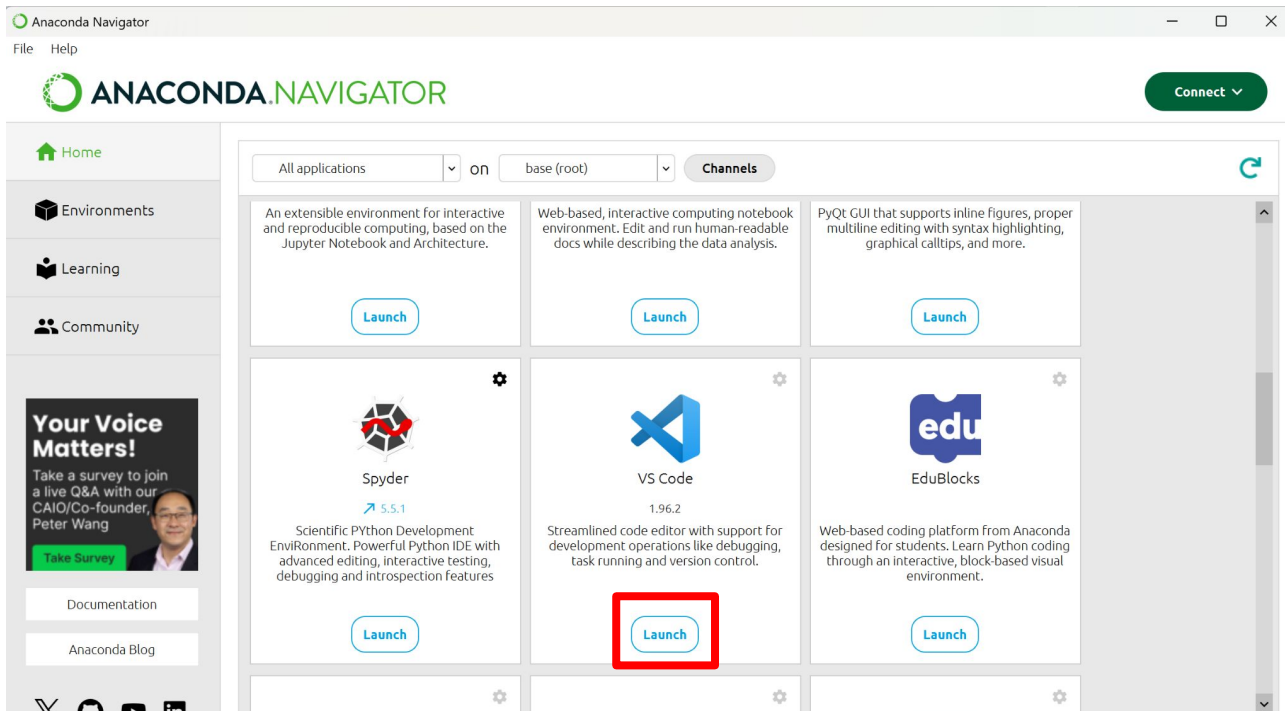
Microsoft VS Code might be under C:\Program Files (x86) - if so, vscode_path should be
C:\Program Files (x86)\Microsoft VS Code
instead

Install VS Code² (MacOS)

- If archive, extract the archive contents (e.g., VSCode-darwin-universal.zip).
- Drag **Visual Studio Code.app** to the **Applications** folder
- Double click the VS Code icon from the Applications folder
- Open **Anaconda Navigator** and see if you can find **VS Code** in **Home**. If not:
 - Open **Terminal** (from **Finder**, open the Applications/Utilities folder and double-click Terminal) and type in the following command and press Enter:
 - `conda config --set vscode /usr/local/bin/code`

Anaconda Navigator

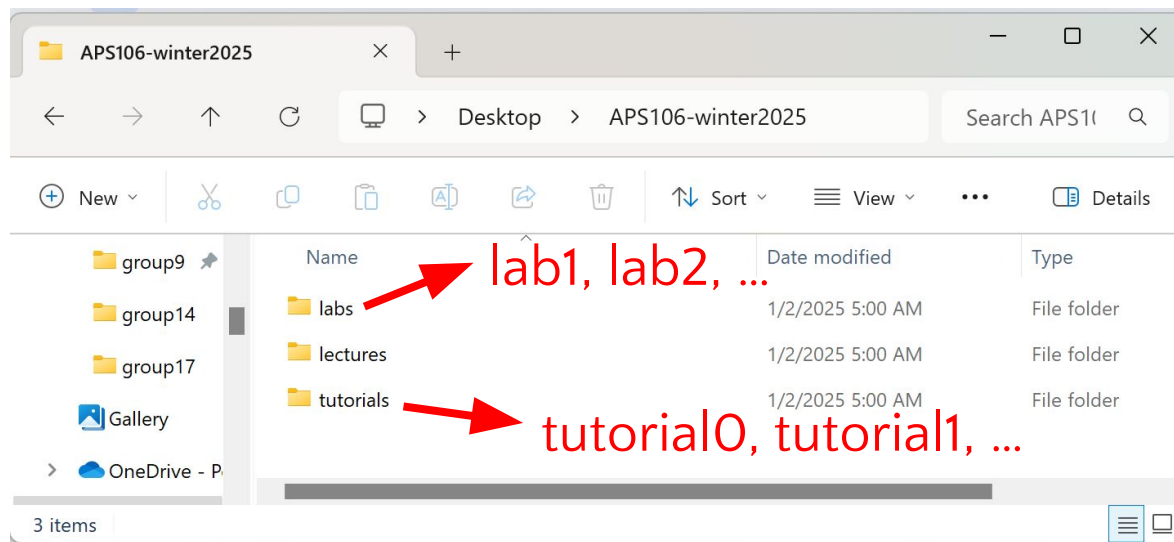
- We will be mainly using “**VS Code**” in this course. Let’s click on “Launch”!



Set up a Folder Structure for APS106

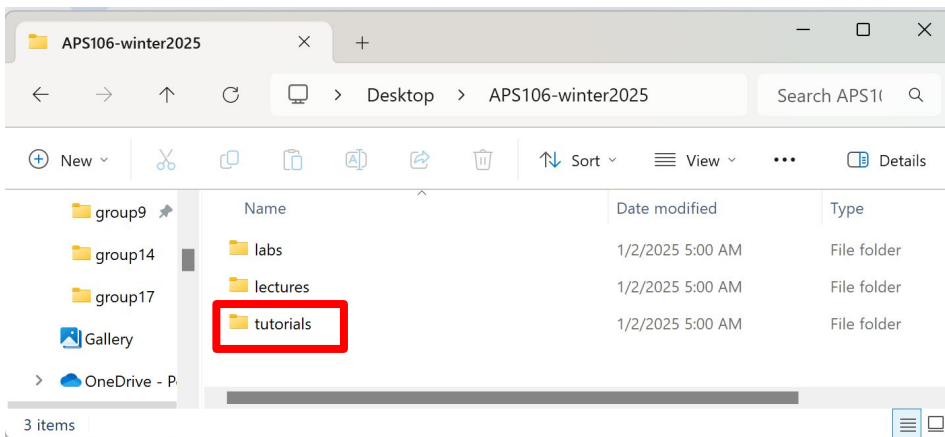
Stay Organized, Stay Efficient

- It's not a good idea to store all your files in the Downloads folder!
- Let's create a folder for APS106 (e.g., on Desktop) and organize your files there



Let's download files from Quercus!

- Go to Quercus → Modules → **Tutorial Homepage**
 - Click on **Tutorial 0 – Setting Up A Development Environment** in week1
 - Download “**tutorial0.zip**”
 - Unzip the zip file and move it in your folder for APS106



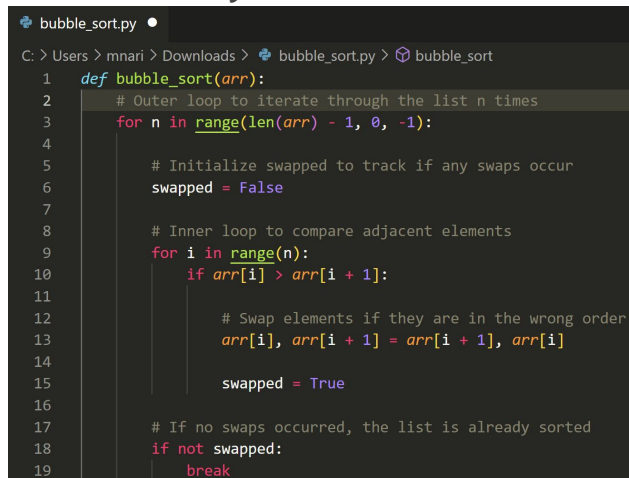
VSCode/Jupyter Notebook

VSCode is an IDE

- Integrated Development Environments (IDEs) are programs that provides tools and features to programmers in a unified environment
- IDEs often include:
 - **A code editor**
 - A place to type and edit code, usually with colour-coded syntax highlighting to improve readability
 - **Code compilers or interpreters**
 - Turns the readable Python code into something the machine can understand
 - **Debuggers**
 - Pause the code at pre-determined locations and go line-by-line through your code
- So IDEs basically contain **everything** you need to code!

VSCoDe is an IDE

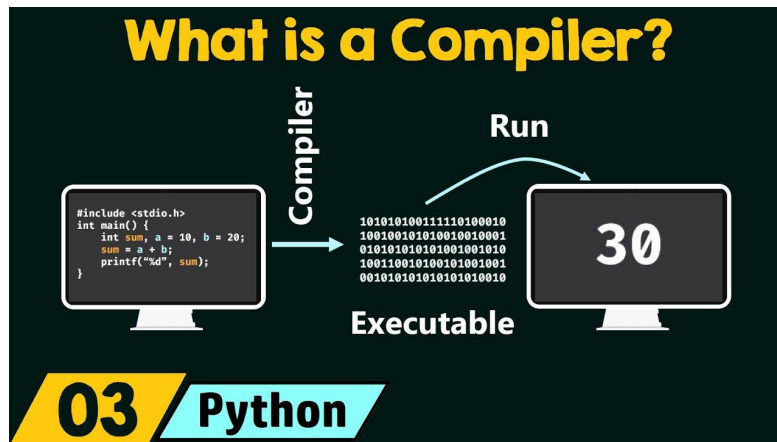
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```
bubble_sort.py •
C: > Users > mnari > Downloads > bubble_sort.py > bubble_sort
1  def bubble_sort(arr):
2      # Outer loop to iterate through the list n times
3      for n in range(len(arr) - 1, 0, -1):
4
5          # Initialize swapped to track if any swaps occur
6          swapped = False
7
8          # Inner loop to compare adjacent elements
9          for i in range(n):
10             if arr[i] > arr[i + 1]:
11
12                 # Swap elements if they are in the wrong order
13                 arr[i], arr[i + 1] = arr[i + 1], arr[i]
14
15                 swapped = True
16
17             # If no swaps occurred, the list is already sorted
18             if not swapped:
19                 break
```

VSCode is an IDE

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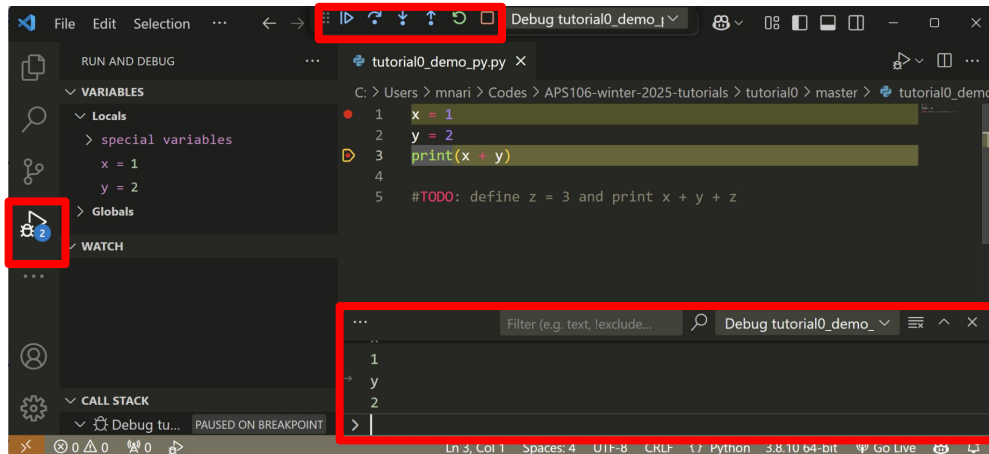
[Source](#)

VSCoDe is an IDE

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- IDEs often include:
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Continue, step over, step in/out, restart, stop

Run and Debug



Debug console

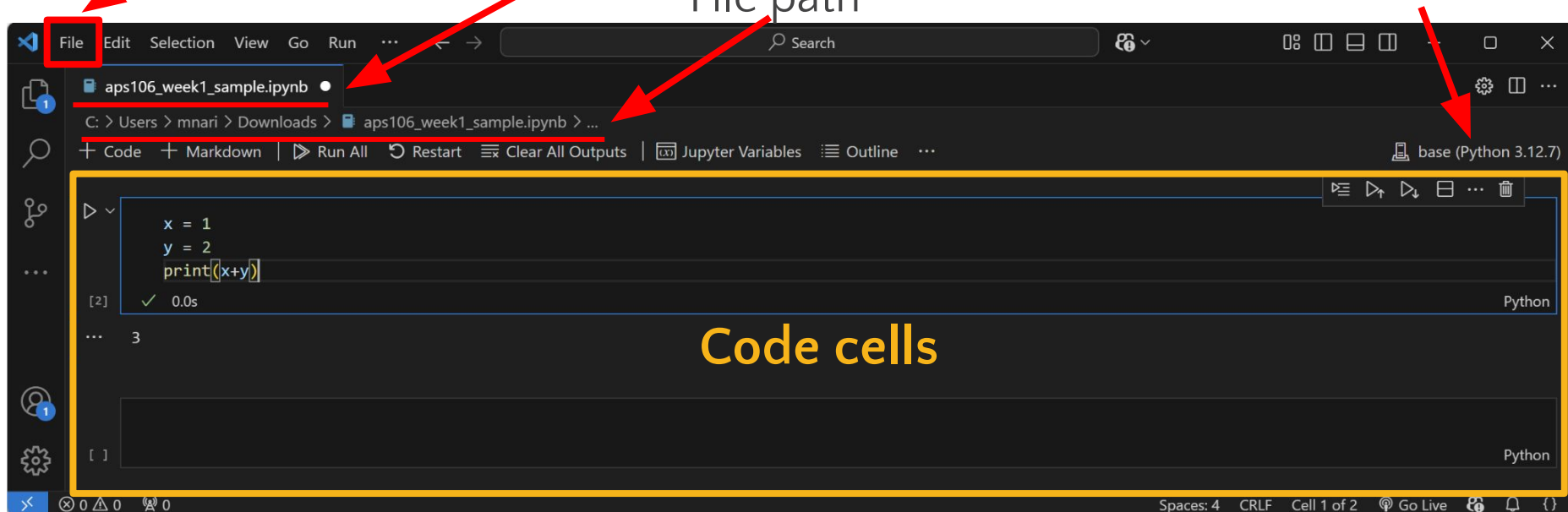
VS Code (Jupyter Notebook)

Open/Save files

Filename

File path

Kernel
(Python engine)

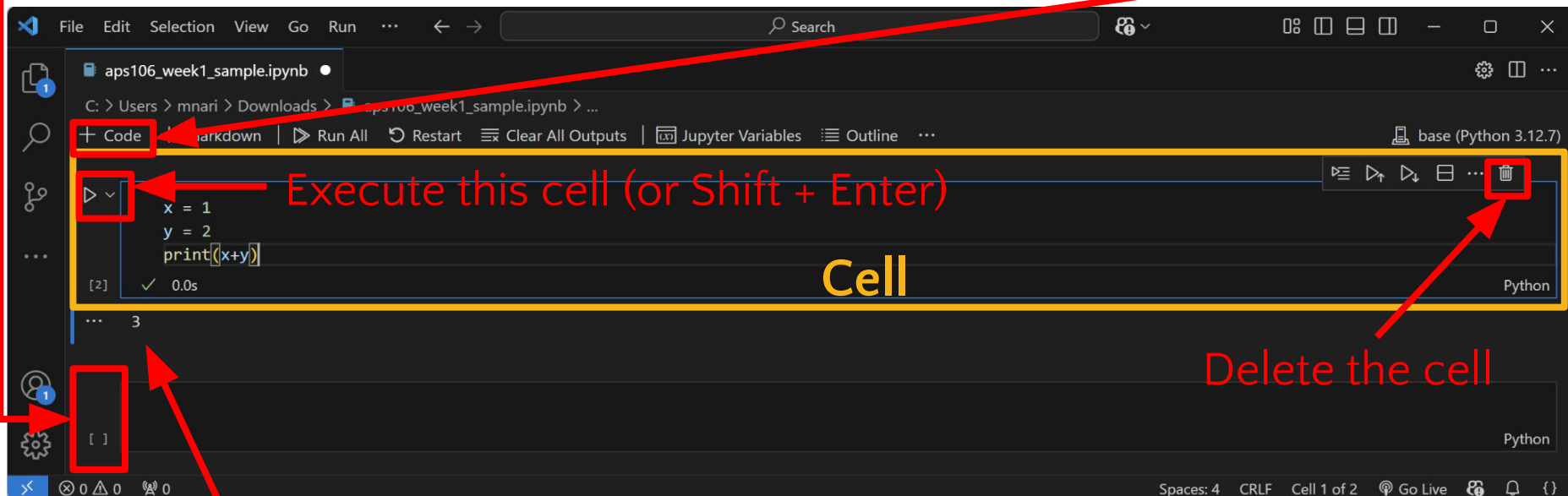


VS Code (Jupyter Notebook)

(drag&drop or Alt + ↑ / Alt + ↓)

Move up/down the cell

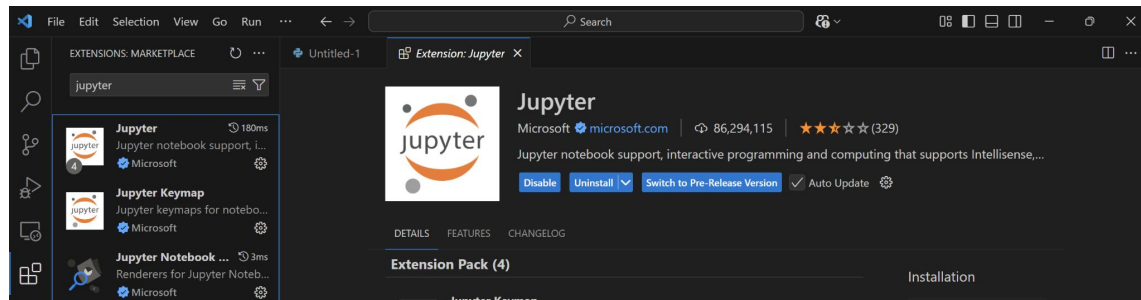
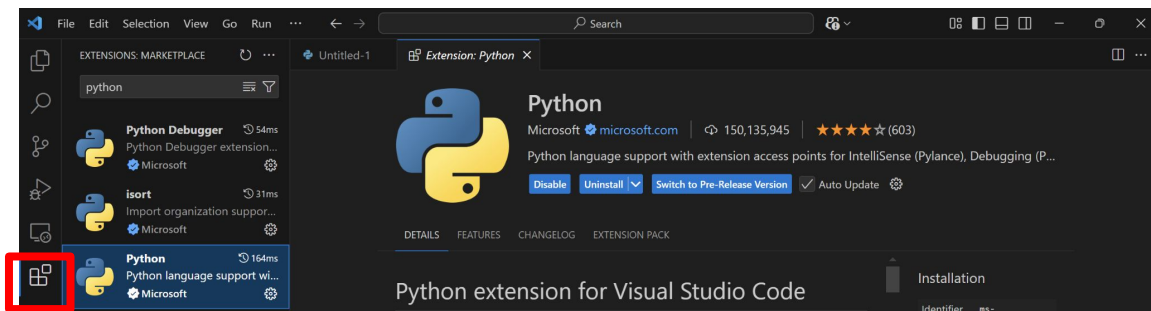
Create a new cell under the current one



Cell output

VS Code (Jupyter Notebook)

- Make sure you have “Python” and “Jupyter” extensions installed!

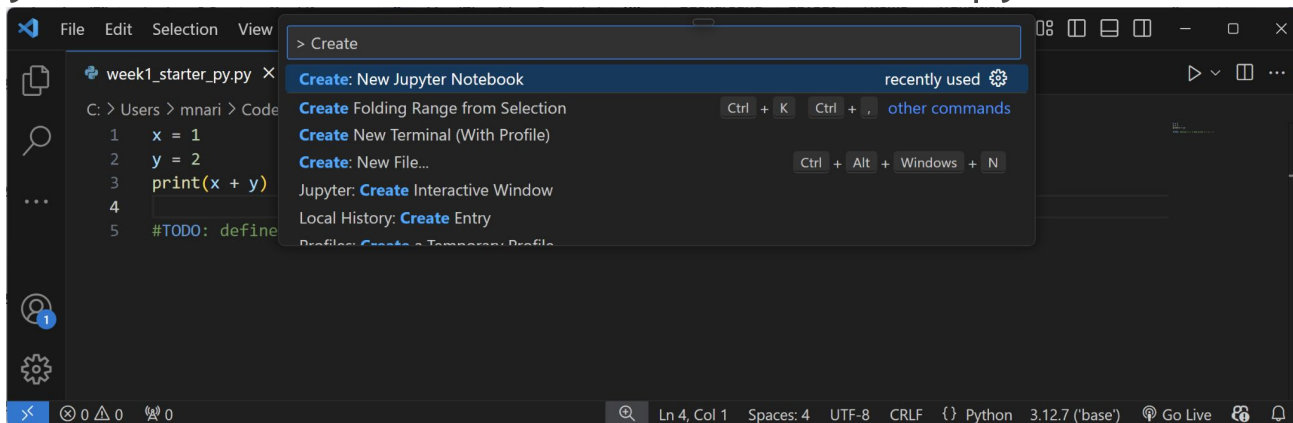


Let's practice!¹

- Let's open **tutorial0_demo_jupyter.ipynb**, write our first program, and save it!
- Steps:
 1. Launch VS Code through Anaconda Navigator
 2. File -> Open File -> Go to the APS106 folder and select **tutorial0_demo_jupyter.ipynb**
 3. In the first code cell, write
print("Hello World!")
 4. Execute the cell (if asked, select "base (Python 3.12.7)")
 5. File -> Save as -> save it as **"tutorial0_demo_jupyter.ipynb"**

Create a new Jupyter Notebook

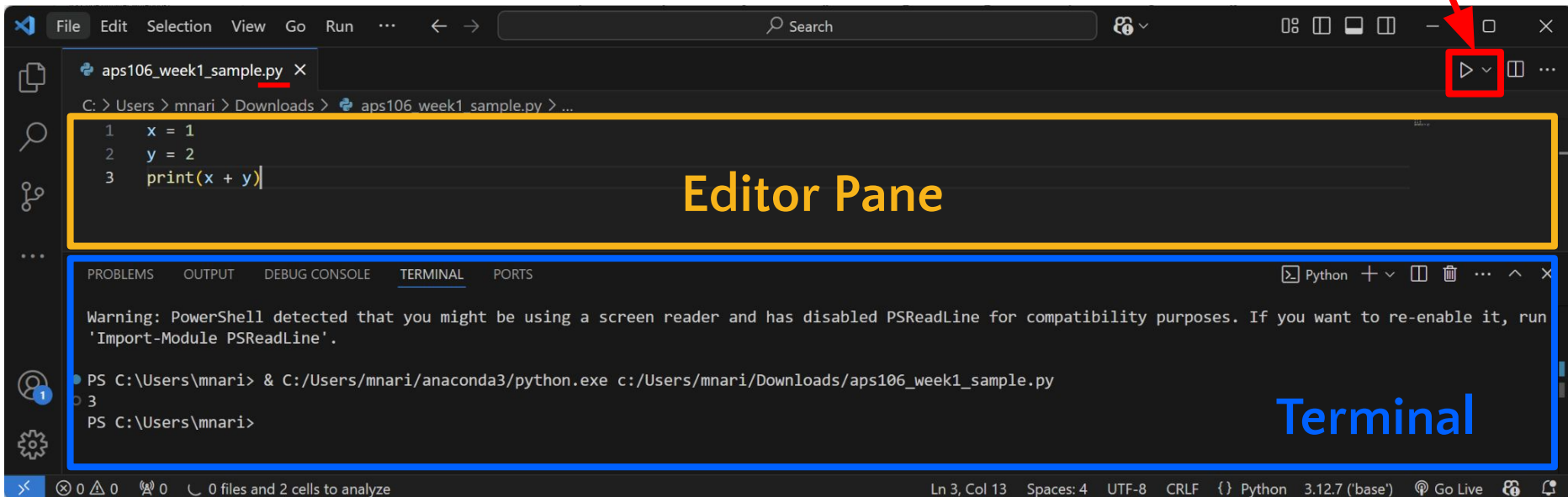
- You can create a new notebook on VS Code too!
- Steps:
 1. Launch VS Code through Anaconda Navigator
 2. In the command palette (“Search” on top), type in “> **create new jupyter notebook**” and select “Create: New Jupyter Notebook”



VS Code (Python script)

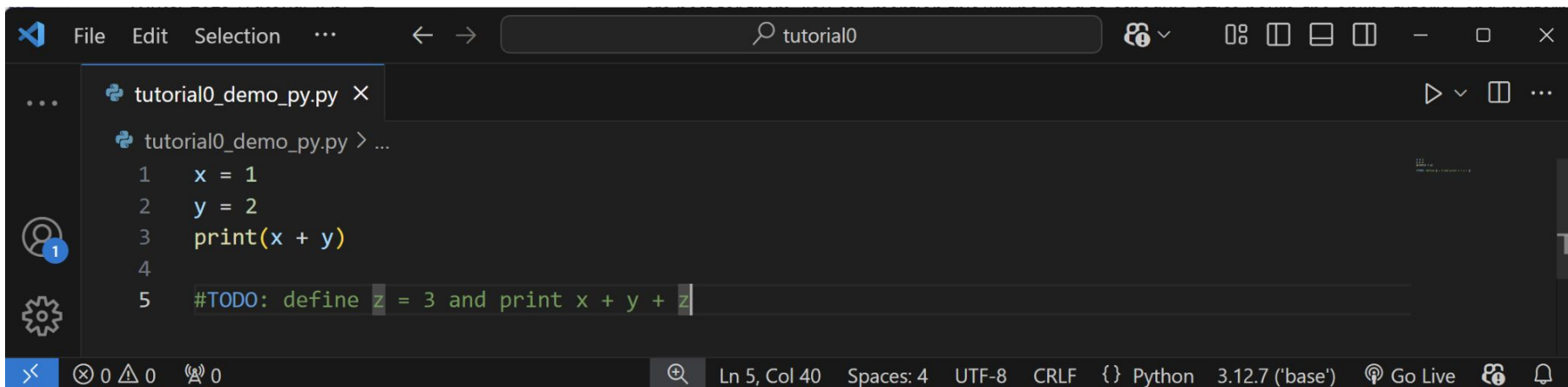
- When you open a `.py` file, an editor with a different layout appears

Execute the Python script



Let's practice!²

- Let's open **tutorial0_demo_py.py** in VS Code, modify the code based on the instruction, and run it!



```
File Edit Selection ... < > tutorial0
```

```
... tutorial0_demo_py.py X
```

```
... tutorial0_demo_py.py > ...
```

```
1 x = 1
```

```
2 y = 2
```

```
3 print(x + y)
```

```
4
```

```
5 #TODO: define z = 3 and print x + y + z
```

```
< 0 0 0 Ln 5, Col 40 Spaces: 4 UTF-8 CRLF {} Python 3.12.7 ('base') Go Live
```

We'll switch from .ipynb to .py files later

- Jupyter Notebooks (.ipynb) are interactive and beginner-friendly
- Python scripts (.py) are **the standard format** for Python programs and are suited for building and running **larger projects**
- We'll switch to .py files in **lab5!**

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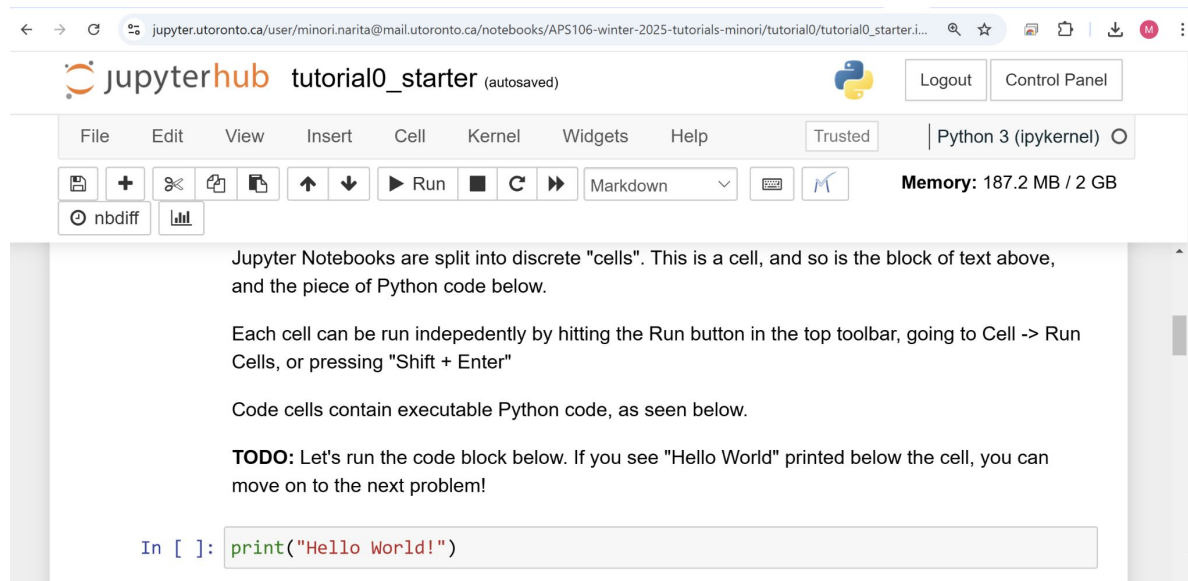
UofT JupyterHub

What is UofT JupyterHub?

- Access at [UofT Jupyter Hub](#)
- Cloud-based Jupyter Notebook service that allows us to run Jupyter Notebooks (.ipynb files) directly from a web browser
 - Don't need to install anything
- Linked to your UofT account, all lecture notes are stored as a copy in JupyterHub!

Let's try UofT JupyterHub!

- Go to **Tutorial Homepage** in APS106 Modules on Quercus
 - Click on **Tutorial 0 – Setting Up A Development Environment** in week1
 - Click on **JupyterHub Starter Link**



Jupyter Notebook interface showing the tutorial0_starter notebook. The interface includes a menu bar (File, Edit, View, Insert, Cell, Kernel, Widgets, Help) and a toolbar with icons for saving, adding, opening, and running cells. The main content area displays text explaining Jupyter notebooks and a code cell with the command `print("Hello World!")`.