Contents

1 Installing Python

This course aims to teach you the fundamentals of Python - but before we can even start, we have to install Python on your computer.

You are free to install Python in any way you want, and use any editor that you wish, but you will be responsible for your own technical support, which may include:

- installing Python;
- configuring Python to run properly;
- installing any packages you may need for this course;
- troubleshooting any problems you may encounter.

If you know what you are doing, go ahead. If you are new to Python or programming in general, we recommend following the steps below, so that you can follow along with the course closely.

2 Installing Miniconda (small Anaconda)

There are many ways to install Python, but in this course, we will focus on using Miniconda. You may have heard about Anaconda as a way to install Python, but installing Anaconda is much bigger (Anaconda starts at ~4.5GB, Miniconda starts at ~400MB), and includes a lot of functionality that we will not be using in this course. Miniconda is a cut-down version of Anaconda that allows us to pick and choose what functionality we need. We will install some additional packages for this course, which will increase the storage used to ~4GB.

Installation instructions and links are provided in the sections below. If the installation instructions below fails, you can view installation instructions for Miniconda here. Once installed, make sure to open the relevant application mentioned in the sections below.

2.1 Windows

Download and run the installer (link). Follow the prompts, taking note of the option to "Create shortcuts". **Ensure this option is ticked.** If you face any issues during installation, check the known issues section.

After installation, open your start menu and search for "Anaconda Prompt", and open it.

2.2 macOS

Download and run the installer appropriate for your machine, depending on whether your computer runs on Apple Silicon (installer link) or Intel (installer link). If your computer was manufactured/bought in/after 2020, it is likely it runs on Apple Silicon. You may check the known issues section to verify whether you are on Intel or Apple Silicon. Follow the prompts and finish the installation.

After installation, open a Terminal window, which you can start with Spotlight (Cmd+Space) and searching for Terminal.

3 Setting up Miniconda and Spyder

After finishing installation and opening the relevant application, you should see a window similar to the below:

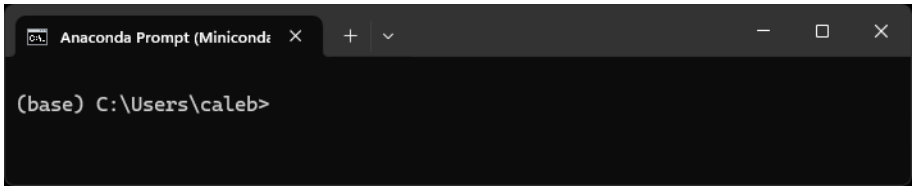

Figure 1: On both Windows and macOS/Linux, you should see something like this. The line should be prefixed with '`(base)`' on both Windows and macOS/Linux.

This is a **command-line interface** (CLI), and is one method of interacting with your computer. In this course, we'll use this mainly to interact with and set up Python. To begin with, type `python` into the window, and hit enter.

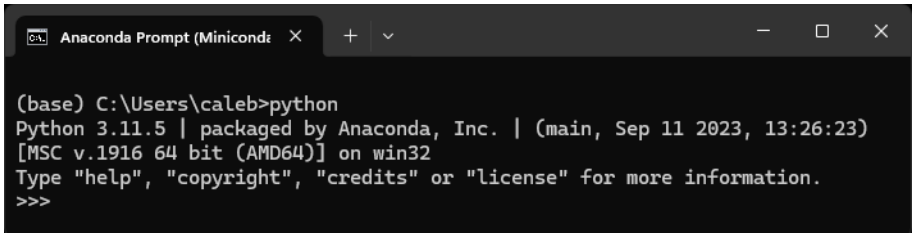

Figure 2: Something similar to this should appear. The specific version of Python may be different, but make sure that the first number is a 3. The line should be prefixed with '`>>>`'.

We just opened a Python *console*, which allows us to interact directly with Python. Try typing the following lines into the console, and observe what is printed back to you.

```
14 * 9
121 / (2 * 3 + 5)
```

The computer should have shown `126` and `11.0` in response - the mathematical results of each operation. Now, type `exit()` in, and we should leave the Python console (fig. 3). Don't close the window yet!

While the Python console is useful for short and simple computations,other programs are better suited for coding longer programs and for interacting with Python. In this course, we'll use Spyder as our application to interface with Python. We'll also install another useful tool for Spyder, enabling more interactivity.

To install Spyder, type into the prompt the following line, give it a few seconds to load, and install it (fig. 4). It may take a while.

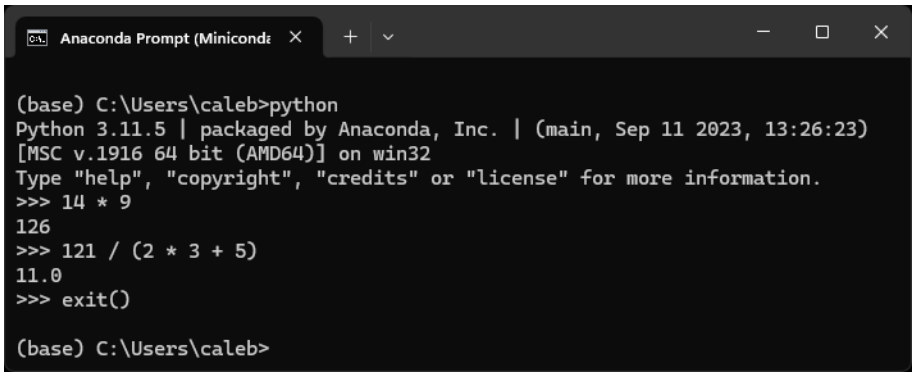

Figure 3: Your terminal should look like this, back to the '`(base)`' prefix.

```
conda install -c conda-forge spyder=6
```

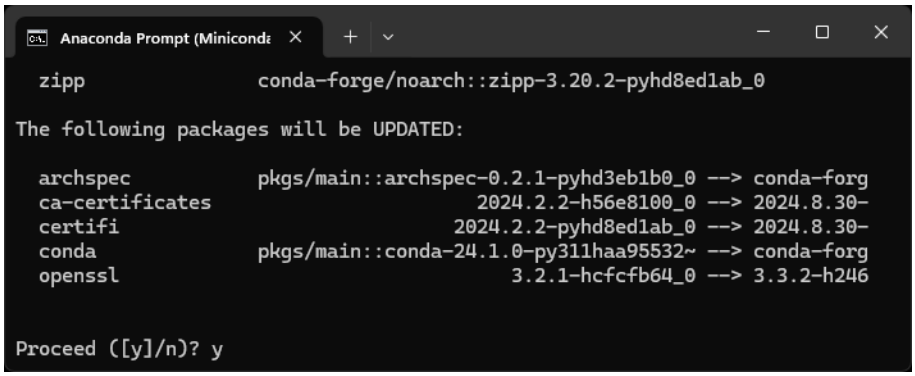

Figure 4: Proceed with the installation by entering '`y`'.

Once installed, some application shortcuts should have been added - try searching for "Spyder" again through the start menu (for Windows) or Spotlight (for macOS, using Cmd+Space). Alternatively, you can start Spyder by entering `spyder` into the prompt.

3.1 Setting up Spyder

There are many applications in which you can develop Python programs in, but this course will focus on using Spyder. Spyder is an application meant to ease Python development. In a single application (Spyder), you can edit a program, run it, and debug it.

Before moving on, let's make sure we all have the same interface. Use the *menu bar* to navigate to View > Window layouts > Default layout.

4 Online Python interpreters

Finally, you can also use online Python interpreters if needed. No installation is required, you only need to visit a webpage. You can use any search engine to find them, searching for 'online Python interpreter'.

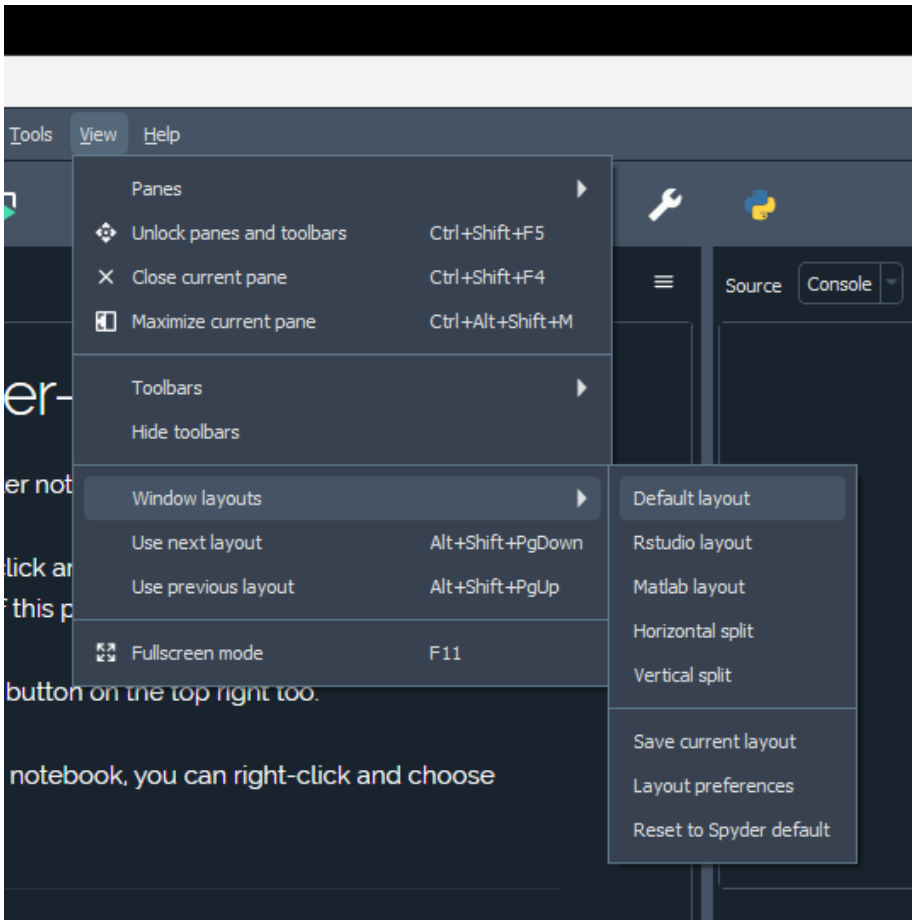

Figure 5: This top bar with ‘View’ and ‘Help’ is known as the menu bar.

As compared to Spyder and other desktop applications, its functionalities are limited. You may use it for a quick script when no other interface is available.

5 Spyder and Miniconda issues

These instructions are for Spyder installations performed as above. **Do not use these if you installed Spyder via the standalone Spyder installer, i.e. not through Miniconda.**

5.1 Updating Spyder

Occasionally, when opening Spyder, a prompt may pop up informing you that a new update is available. You can untick the box to check for updates, but **do not update it through that window!** You may ignore most updates, but if you want to update it, you can open Anaconda Prompt and enter the following:

```
conda update spyder
```

This will update Spyder to the latest available version. Alternatively, if you want to install a specific version, you can use specify the version number with `conda install spyder=<version>`, for example:

```
conda install spyder=6.0.5
```

5.2 Uninstalling Spyder

To uninstall Spyder, enter the following into Anaconda Prompt:

```
conda remove spyder
```

This will leave Miniconda and your Python installation intact.

5.3 Uninstalling Miniconda

Uninstalling Miniconda will remove your Python installation and any packages installed with it. This includes Spyder, and the notebook extension installed earlier.

As far as possible, you should refer to the latest instructions on Miniconda's website, but the instructions below may help.

5.3.1 Windows

Navigate to the installation directory of Miniconda, typically `C:\Users\<your username>\miniconda3`. There should be a file `Uninstall-Miniconda3.exe` in the folder. Run it, and follow the prompts.

5.3.2 macOS (and Linux)

Open a new Terminal window, and enter the following line:

```
conda deactivate
```

`(base)` should no longer appear in your Terminal prompt. Then, enter the following line:

```
~/miniconda3/uninstall.sh
```

If the above line does not work, check where Miniconda was installed on your computer..

5.4 Jupyter Notebook in Spyder

Jupyter Notebook will not be used in this course.

If you want to use Jupyter Notebook in Spyder, you can install it with this line in the Anaconda Prompt:

```
conda install -c conda-forge spyder-notebook
```

Once installed, this will add a new Notebook tab in the editor. If it does not appear, try using the menu bar to navigate to View > Window layouts > Default layout.

6 Known issues

If the below does not help, one general solution is to install Spyder directly (link).

6.1 Windows: Username contains a space character

On Windows, the installation path of Miniconda includes a space character. e.g. `C:\Users\Caleb Tay\miniconda3`

This causes issues during the installation.

Solution: We must create an installation path that does not include a space character, with appropriate permissions.

1. Open **Command Prompt as an administrator**. The window name should be "Administrator: Command Prompt".
2. Enter these exact commands, pressing enter after each line:

```
mkdir C:\miniconda3
takeown /f C:\miniconda3 /r /d y
icacls C:\miniconda3 /grant:r %USERNAME%:(OI)(CI)F /t
```

3. Close the command prompt, and follow the installation instructions again, **changing the install path to** `C:\miniconda3` at the relevant step.

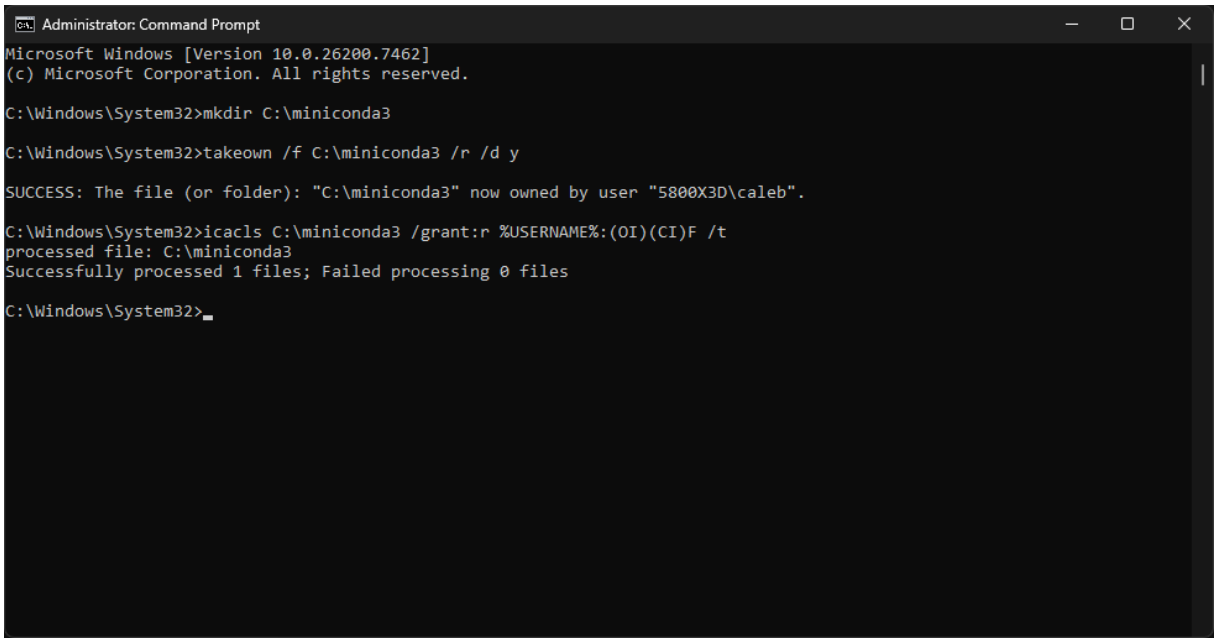

Figure 6: The command prompt should look similar to above, with your username showing up instead of `"5800X3D/caleb"`.

6.2 Mac: Wrong installer is used

If you are using an older MacBook, you may be using the wrong installer, i.e. Intel vs Apple Silicon.

Solution: You may follow Apple's instructions to check what processor your computer uses.

If the above link does not work, a search for "macos check intel or apple silicon" should be helpful.