

Coding Supplement

Introduction to coding activities for students

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Coding and Astronomy

Astronomy is a huge subject with many topics that are hard to visualise with traditional activities. It is also one of the most data driven sciences, with telescopes and probes collecting an astronomical amount of data.

Coding is vital for all scientists especially for Astronomers. Their programming language of choice is Python. Python is easy to learn and the coding skills you gain in Python can be easily transferred to other programming languages.

Throughout this unit you will be working through interactive Python activities which you can access for free online. These are designed to last 1 - 2 hours and will have you analysing data from telescopes and modelling fundamental concepts in Astronomy.

Most of these activities will be guided. This means your instructor will lead you through the activity by modelling code on the board.

Not convinced? Find out how coding and analysing data is useful for Doctors [here](#) and biologists [here](#).

How to Start:

Your instructor will send you all the necessary files before the lesson. Make sure you download them somewhere safe.


You can run all the interactive files (which end in .ipynb) using Jupyter online. Go to jupyter.org/try.

You should see this:

Try Jupyter


You can try Jupyter out right now, without installing anything. Select an example below and you will get a temporary Jupyter server just for you, running on mybinder.org. If you like it, you can [install Jupyter](#) yourself.

Try Classic Notebook




A tutorial introducing basic features of Jupyter notebooks and the IPython kernel using the classic Jupyter Notebook interface.

Try JupyterLab



JupyterLab is the new interface for Jupyter notebooks and is ready for general use. Give it a try!

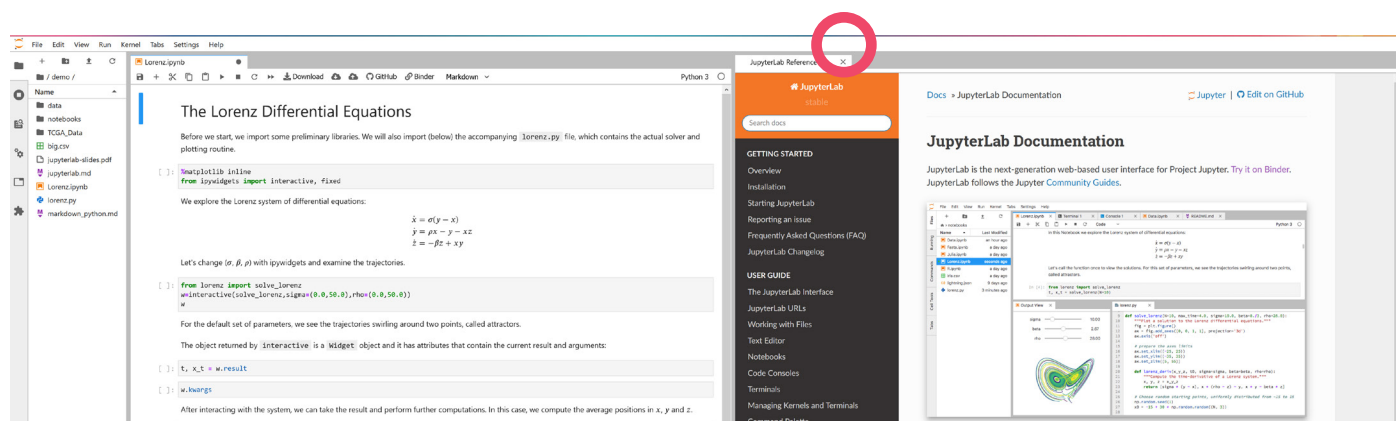
Try Jupyter with Julia



A basic example of using Jupyter with Julia.

Front Cover Image: The Sun in different wavelengths photographed by SDO. NASA/GSFC/Solar Dynamics Observatory, PIA22055, see more [here](#).

Click on the middle option - Try JupyterLab. This may take a minute to load. If it fails go back and try again. Once it loads you should see this:



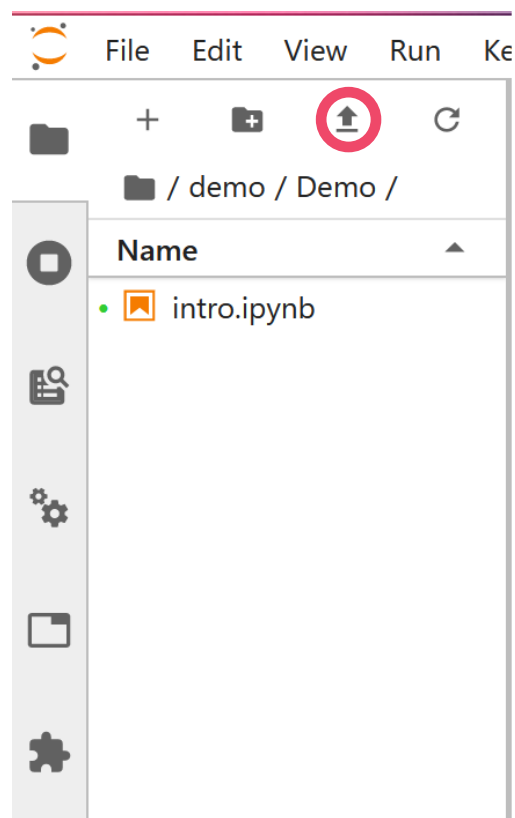
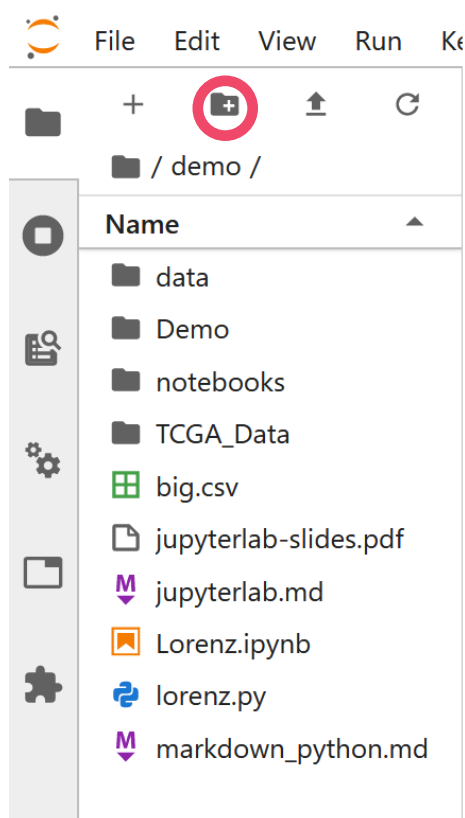
Press the x on the Reference tab (shown by the pink circle above), we won't need this.

Now perform the following steps:

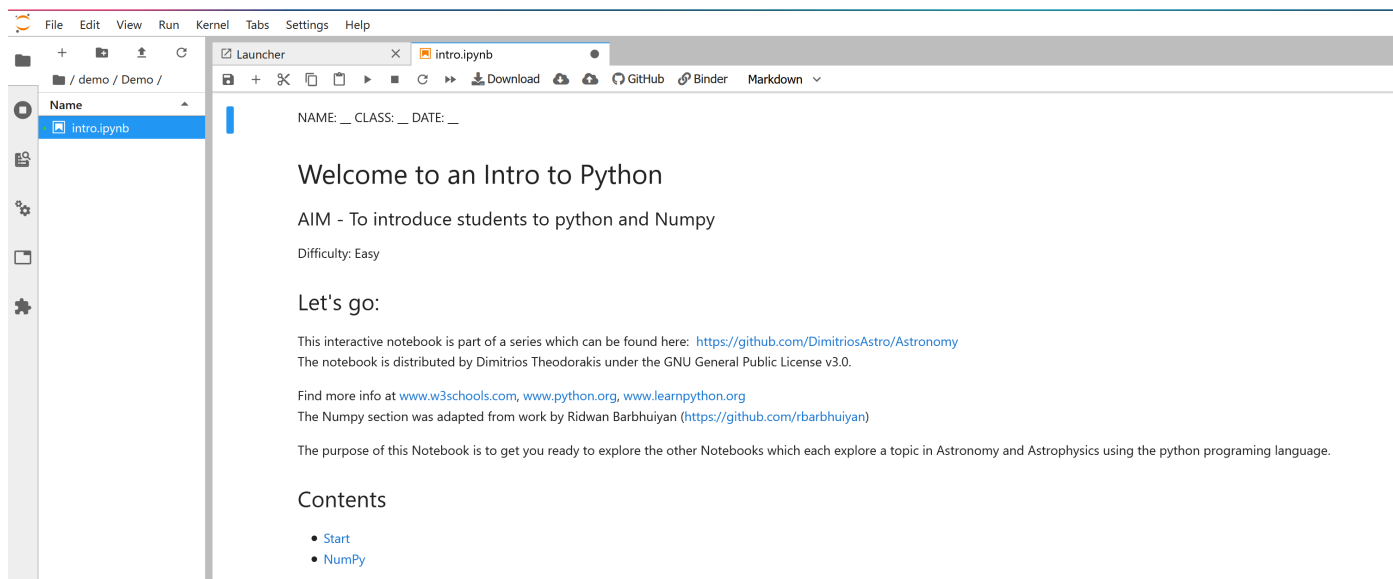
1. Make a new folder (name doesn't matter)
2. Go into the folder
3. Upload the files from your instructor
4. Double Click on the .ipynb file (it should have an orange symbol)

The image on the bottom left highlights the New Folder button.

The image on the bottom right highlights the Upload button.



After you've clicked on the .ipynb file it should look something like this:



To save your work for later use the save icon or go to File --> Save.
Then download the file using the download icon or go to File --> Download.

You can also export your notebook so that you have a copy as a pdf that you can open on your computer (but can't edit).

Make sure to download any figures, images, and the main .ipynb file that you have worked on before closing the tab. If you don't save your work periodically or you lose internet connection your work will be gone forever!

Useful Websites:

[Jupyter.org](https://jupyter.org) - we are using Jupyter to run our code online
[StackOverflow.com](https://stackoverflow.com) is a form where you can ask coding related questions
w3schools.com has excellent tutorials and references for Python
learnpython.org - more Python tutorials
[The Hitchhiker's Guide to Python](https://www.dbooks.org) - even more Python tutorials

[NumPy](https://numpy.org) - numerical Python package docs
[Matplotlib](https://matplotlib.org) - Python plotting library
[Pandas](https://pandas.pydata.org) - data analysis library
[Astropy](https://astropy.org) - astronomy library

[Anaconda](https://www.anaconda.com) - a local version of Python
[Visual Studio Code](https://code.visualstudio.com) - free code editor

And finally the Python Docs can be found [here](https://docs.python.org).