Setting up a working environment

Introduction to Python Programming for Economics & Finance

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Contents

This guide gives you some hints on how to set up a working Python environment

Python environments — Feature matrix

There are multiple ways to run the course material:

	Local install ANACONDA.	Jupyter Lite try lite now	Binder launch binder	Google Colab Open in Colab
Runs on **your** computer	✓	✓		
Runs in the cloud			✓	✓
Requires installation	✓			
Runs in browser	✓	✓	✓	✓
Other editors (PyCharm, VS Code)	✓			
Supports all packages	✓		✓	
Account/login required				✓
Saves changes between sessions	✓	✓		✓

Running in the cloud

Running in the cloud

The course is based on interactive notebooks which you can run directly in your browser (with some limitations)

Two cloud-based options:

1. Google Colab (https://colab.research.google.com)
2. Binder (https://mybinder.org/)

Running notebooks in Google Colab

How to run a notebook in Google Colab:

1. Go to https://github.com/richardfoltyn/python-intro-PGR
2. Click on the button 

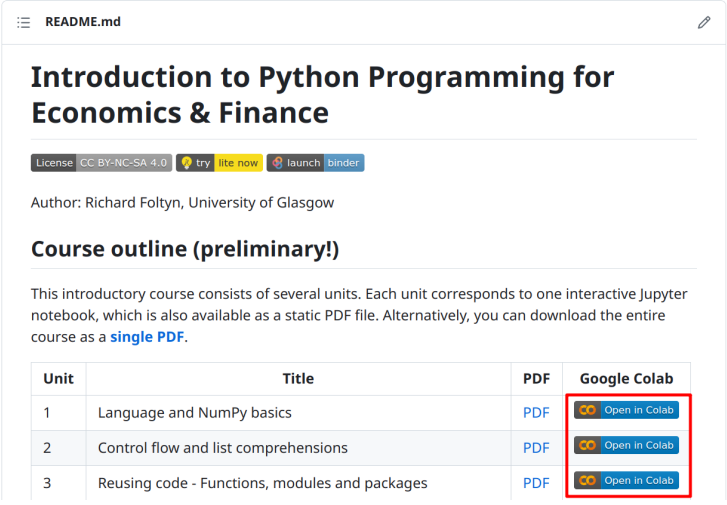
next to a notebook you want to run (shown on the next slide)

Limitations:

- The environment is somewhat restricted (not trivial to import custom modules or local data files)
- It is possible to access data stored in Google Drive (but details go beyond this tutorial)
- Requires Google login to run anything

Running notebooks in Google Colab

Launching notebooks from GitHub repository



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Author: Richard Foltyn, University of Glasgow

Course outline (preliminary!)

This introductory course consists of several units. Each unit corresponds to one interactive Jupyter notebook, which is also available as a static PDF file. Alternatively, you can download the entire course as a **single PDF**.

Unit	Title	PDF	Google Colab
1	Language and NumPy basics	PDF	Open in Colab
2	Control flow and list comprehensions	PDF	Open in Colab
3	Reusing code - Functions, modules and packages	PDF	Open in Colab

Running in Binder (mybinder.org)

How to run a notebook in Binder:

1. Go to https://github.com/richardfoltyn/python-intro-PGR
2. Click on the button 

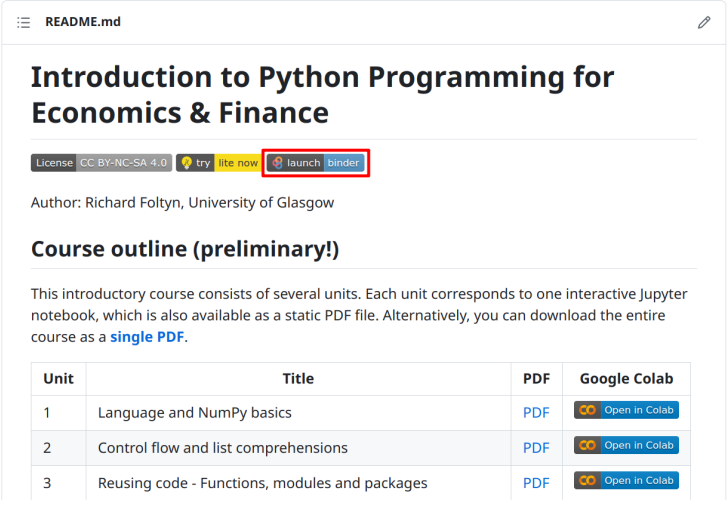
(shown on the next slide)
3. Once the Binder instance is started, it will take you to an overview page from which you can access all notebooks

Limitations:

- Binder **does not** save your changes between sessions: you need to download any modified notebooks and upload them later (see instructions below)
- Can take a long time to start
- **Note:** mybinder.org has become very unreliable (as of May 2023) and may not work at all

Running notebooks in Binder

Launching notebooks from GitHub repository



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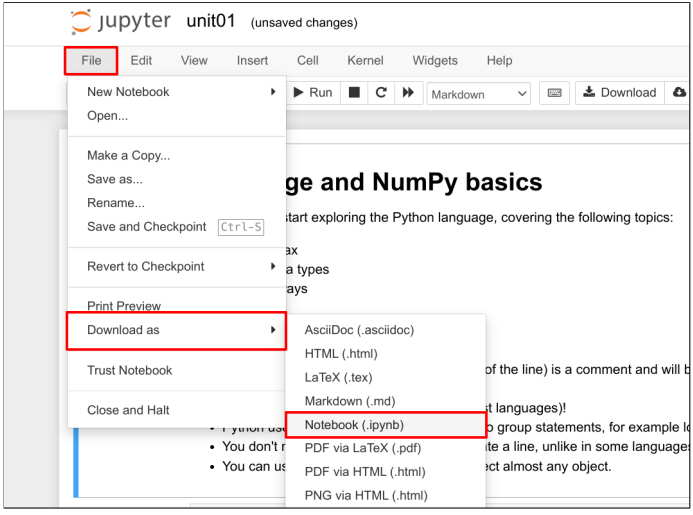
Saving and opening notebooks

- **Important:** Notebooks launched in binder are not saved and will eventually disappear
- You need to manually save and restore notebooks:
  1. Before you stop working on a notebook, make sure to download it to your computer
  2. When you want to continue working on an existing notebook, upload it to binder first and then open it

  See following slides for instructions!

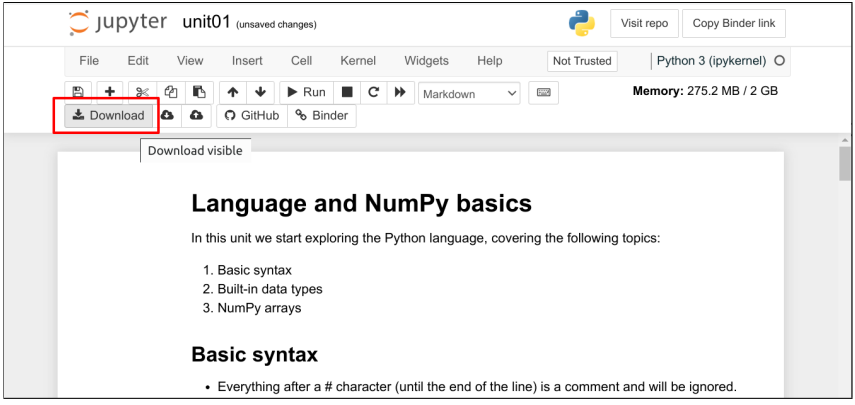
Saving (downloading) notebooks

Select **File ▸ Download as ▸ Notebook (.ipynb)**



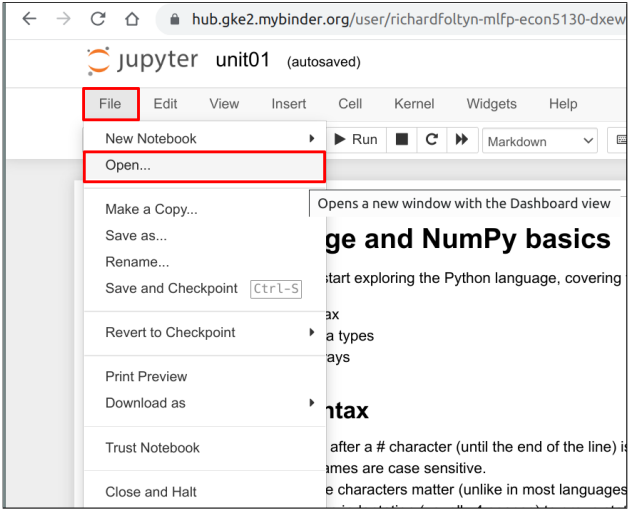
Saving (downloading) notebooks

Alternatively, you can click on **Download** in the tool bar.



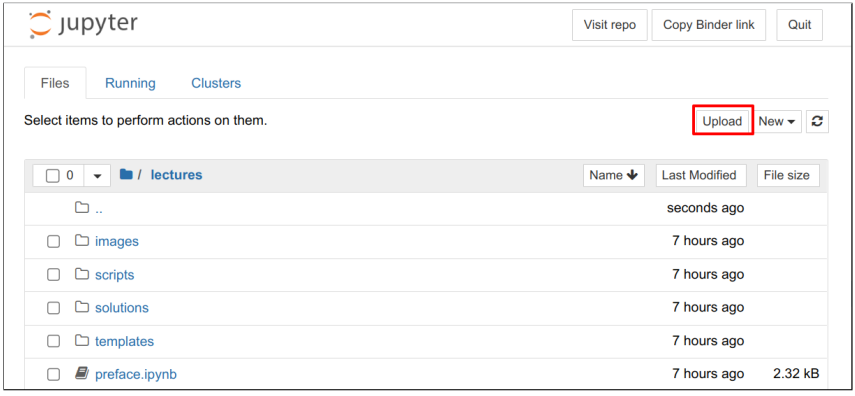
Opening (uploading) notebooks: step 1

Select **File** ▸ **Open**. This brings up a file explorer page (see next slide)



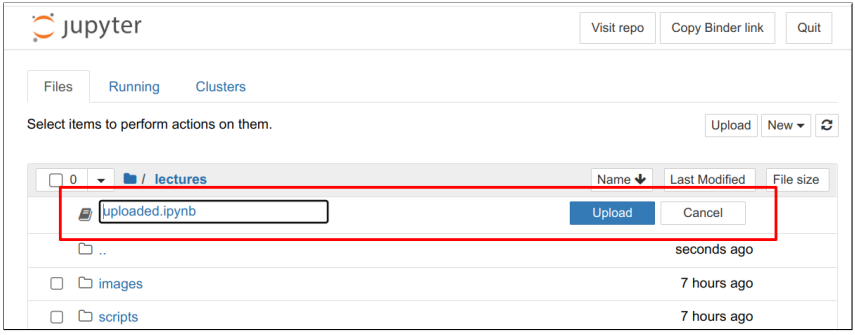
Opening (uploading) notebooks: step 2

Click on **Upload**. You will be prompted to select a file on your computer.



Opening (uploading) notebooks: step 3

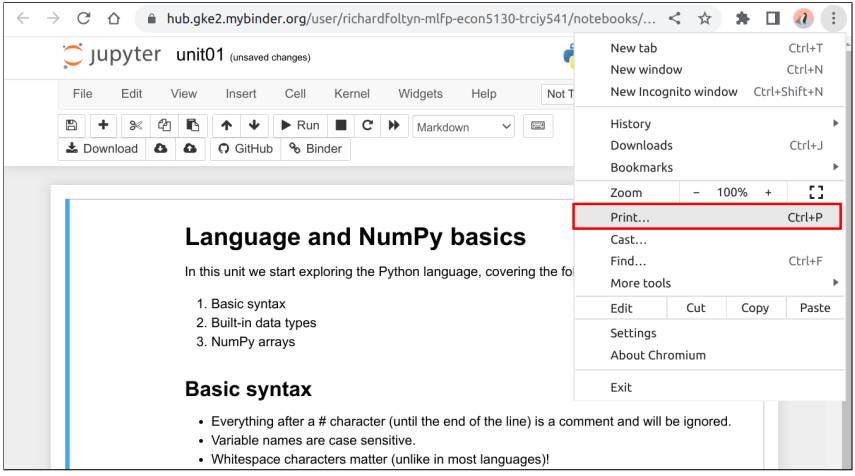
The selected file is displayed on top. Select **Upload** one more time.



The uploaded file should now be visible in the list. Click on it to open the notebook.

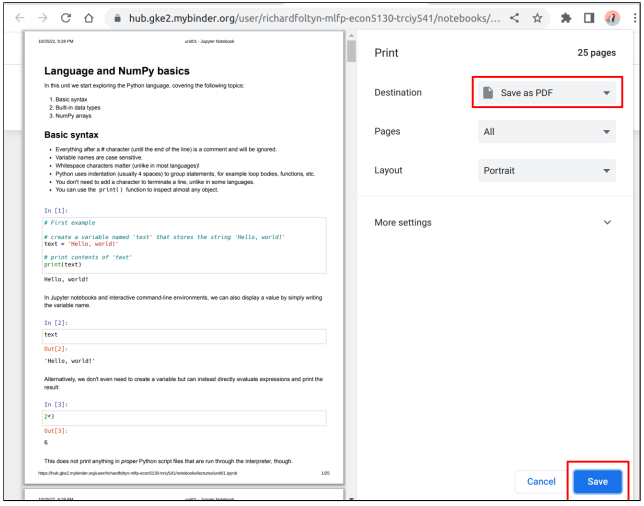
Saving as PDF: step 1

Downloading the notebook as PDF will most likely not work.
Instead, use your browser's print function.



Saving as PDF: step 2

Select **Save as PDF**.



Running locally on your computer

Running locally

Interactive notebooks can be also run locally on your computer

Two options:

1. Running in the browser with Jupyter lite (no installation required)
2. Installing a local Python environment

Simple method: Running locally in browser (Jupyter lite)

How to run a notebook in Jupyter lite:

1. Go to https://github.com/richardfoltyn/python-intro-PGR
2. Click on the button 

(shown on the next slide)
3. You will be presented with a list of notebooks that can be run directly in the browser (locally, not in the cloud!)

Limitations:

- Not all Python packages work in Jupyter lite, in particular those covered in unit 7 (`pandas_datareader`, `yfinance`, `fredapi`, `openpyxl`, `nasdaqdatalink`) cannot be loaded
- Jupyter lite is experimental, so other things might not work

Running notebooks locally in your browser

Launching notebooks from GitHub repository

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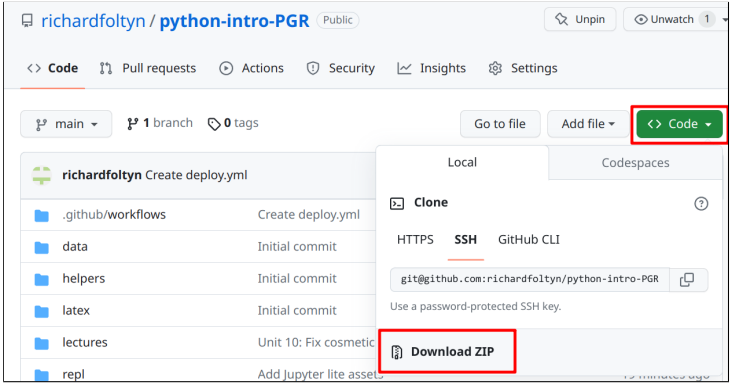
Advanced method: install a Python environment

Getting Python

- **Python versions**
  - Current version of Python is 3.10, but earlier version such as 3.9 and 3.8 probably work as well
  - Do **not** use Python 2.7, it's no longer supported!
- **Python distribution**
  - The core Python language / runtime directly from the Python project (https://www.python.org/) is **not** particularly useful for statistics / data analysis / quantitative work
  - Instead use distribution that allows you to easily install required packages
  - Most popular distribution for scientific computing is Anaconda (https://www.anaconda.com/products/distribution)
    - For Windows, download 64-bit variant
    - For Linux, download 64-bit (x86) variant
    - For Mac there is only one option

Getting the course material

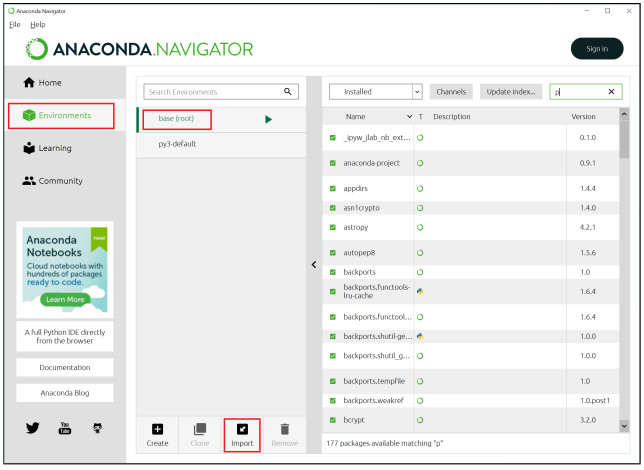
- You need to download all the content from https://github.com/richardfoltyn/python-intro-PGR
- For example, to download as a ZIP file:



- Alternatively, you can clone the repository if you are familiar with git.

Setting up Anaconda: Microsoft Windows

Once you installed Anaconda, open the Anaconda Navigator application:



Initially, you'll have a single Python environment called **base (root)**

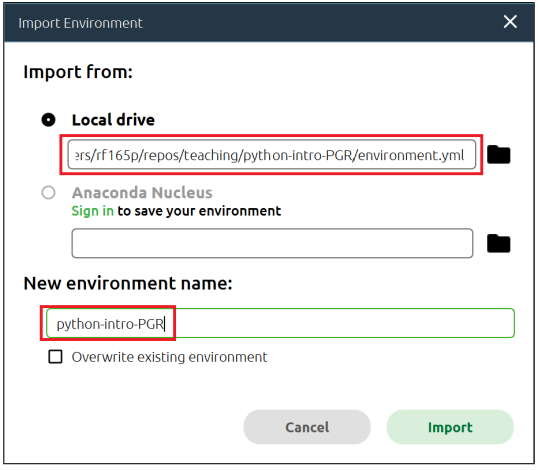
Setting up Anaconda: Microsoft Windows and Mac

To make sure you have compatible versions of Python and of various packages, it is best to create a new environment.

1. Download the environment definition file environment.yml from the GitHub repository and save it locally.
   This file defines the packages and their exact versions required for this course.
2. In Anacoda Navigator, select **Import** (see previous slide) and enter the path to the environment file you just downloaded.
3. Call the new environment **python-intro-PGR**, see screenshot on next slide.

This will create a Python environment with all packages required for this course.

Setting up Anaconda: Microsoft Windows and Mac



Setting up Anaconda: Microsoft Windows and Mac

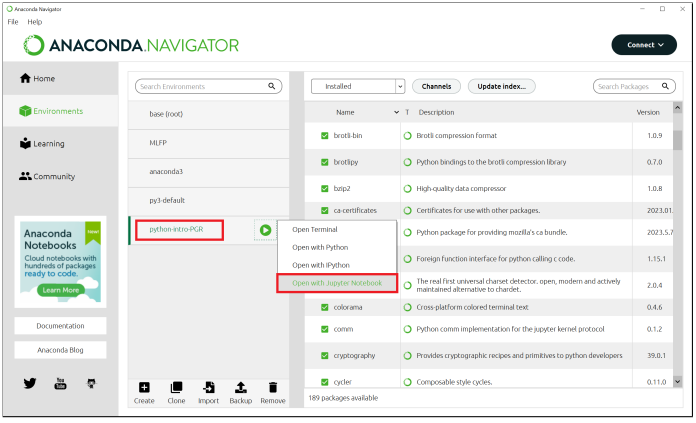
To start a browser-based Jupyter notebook that is running *locally* on your computer, use either of the following methods (see screenshots on next slide):

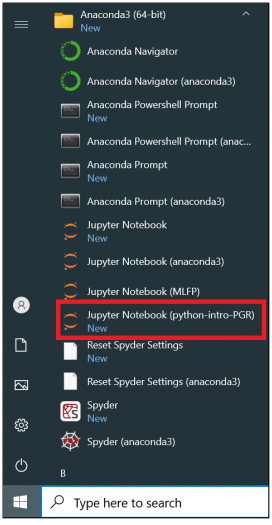
1. In Anaconda Nagivator, select the **python-intro-PGR** environment, and from the context menu pick **Open with Jupyter Notebook**
2. In the Windows Start Menu, search for and run the entry **Jupyter Notebook (python-intro-PGR)**

- Either alternative will launch your browser and open the Jupyter Notebook file manager.
- Navigate to the folder where you unzipped the git repository contents, and select a notebook from the `lectures` folder, or the overview notebook `index.ipynb`.

Setting up Anaconda: Microsoft Windows and Mac

Launching a browser-based Jupyter Notebook





Setting up Anaconda: Linux

1. Once you have installed Anaconda, you need to set up an environment that contains all the packages required to run the code.
2. Use environment specification in `environment.yml` from the git repository:

```
conda env create -f environment.yml
```

3. Active the virtual environment you just created (by default it will be called `python-intro-PGR`):

```
conda activate python-intro-PGR
```

4. Launch a local Jupyter instance:

```
cd /path/to/repository
jupyter notebook index.ipynb
```

Editors

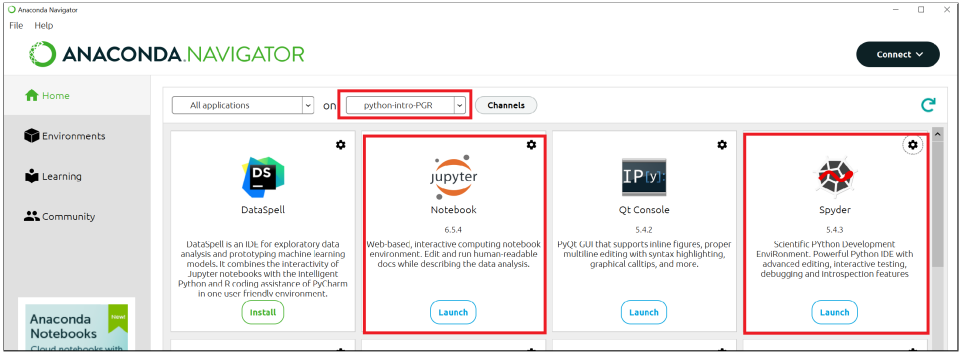
- The course material is provided as interactive notebooks within your browser
- For more serious programming, use local Python files and an editor!
- Python source files (`*.py`) are plain-text files, so in principle you can use any editor you want

Editors: Recommendations

- Visual Studio Code (https://code.visualstudio.com)
  - Flexible code editor with good support for Python
  - Free and open source
  - Official tutorial for Python programming with VS Code: https://code.visualstudio.com/docs/python/python-tutorial
  - VS Code also has excellent Jupyter Notebook support: https://code.visualstudio.com/docs/datascience/jupyter-notebooks
  - Data science tutorial with Python and VS Code: https://code.visualstudio.com/docs/datascience/data-science-tutorial
- PyCharm (https://www.jetbrains.com/pycharm/)
  - Most sophisticated integrated development environment (IDE) for Python
  - Proprietary, but has free community edition; professional edition is free for educational purposes
  - Use only if you are an experienced programmer, or willing to invest some time
- Spyder (https://www.spyder-ide.org)
  - Free and open source Python IDE
  - Default editor that comes with full Anaconda installation

Editors: Installing from Anaconda

- On Windows, you can directly install these editors from the Anaconda navigator
- When doing so, make sure to select the correct environment (**python-intro-PGR** for this course)
- Once installed, you can launch the editor from the Anaconda Navigator



Editors: Launching from Start menu

- If you installed an editor via Anaconda, it will also show up in the Windows Start menu (again select the correct environment)
- If you installed an editor independently of Anaconda, it will not be explicitly linked with an environment