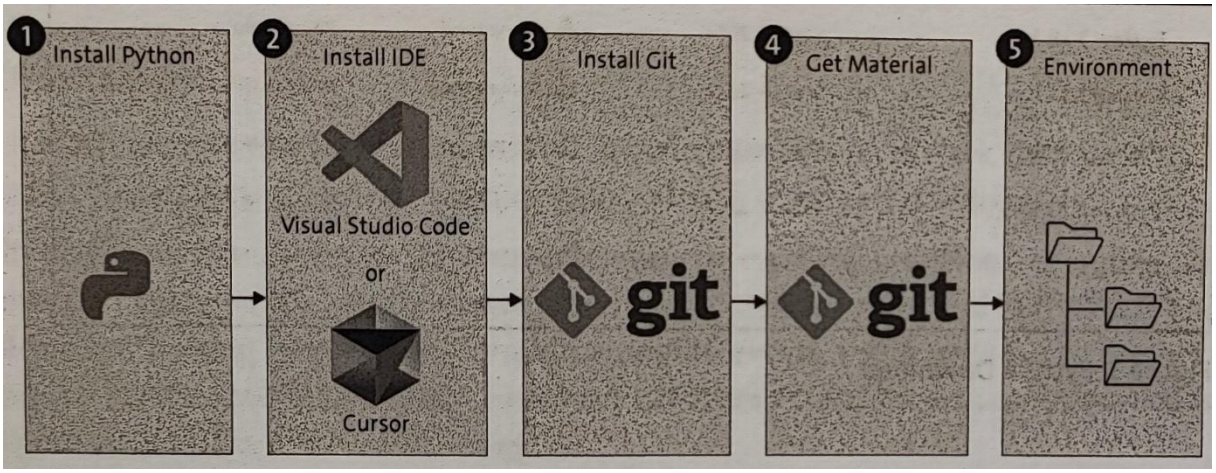
Programming with Python for Beginners

Contents

The figure below shows the steps for setting up your system so you can work with the coding material and run it on your local system.

By following these steps, the Python scripts and notebooks can be run on your local computer. This preparation might seem like a lot but consider that this is a one-time effort and shouldn't take more than 30 minutes. The steps are as follows:



1. Python installation
2. Integrated development environment (IDE) installation
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Python Installation

The Python installation step is straightforward and can be accomplished through multiple methods. We recommend downloading Python from the official website at https://www.python.org/downloads. If you scroll down the download page, you'll find multiple different versions.

The scripts and code in this course were developed on Python version 3.12.11. To avoid any issues, you should stick to the same version. Click the Download button and follow the installation instructions. Nothing specific needs to be considered, so you can go with the default settings.

IDE Installation

An IDE (Interactive Development Environment) is essential for efficiently writing and managing code in Python projects. Some popular choices for Python include Visual Studio Code, Pycharm and Cursor. I recommend going with Visual Studio Code (or VSCode) for this training. This lightweight and highly customizable IDE supports many different programming languages, which is one reason why it is a favorite. VS Code is open source and free at https://code.visualstudio.com. Its large community provides thousands of extensions. Install it with the download button and follow the instructions.

Git Installation

Git is an essential tool for version control, allowing developers to track changes in their code, collaborate with others, and maintain a history of project development. Git helps you manage your codebase efficiently by enabling branching, merging, and reverting changes. Git integrates seamlessly with platforms like GitHub, GitLab, and Bitbucket, making remote collaboration straightforward. You'll need Git in the next step to get the course's material. Download Git from https://git-scm.com/downloads. Select the download corresponding to your operating system. Many choices are available, but you can go with the default settings during installation.

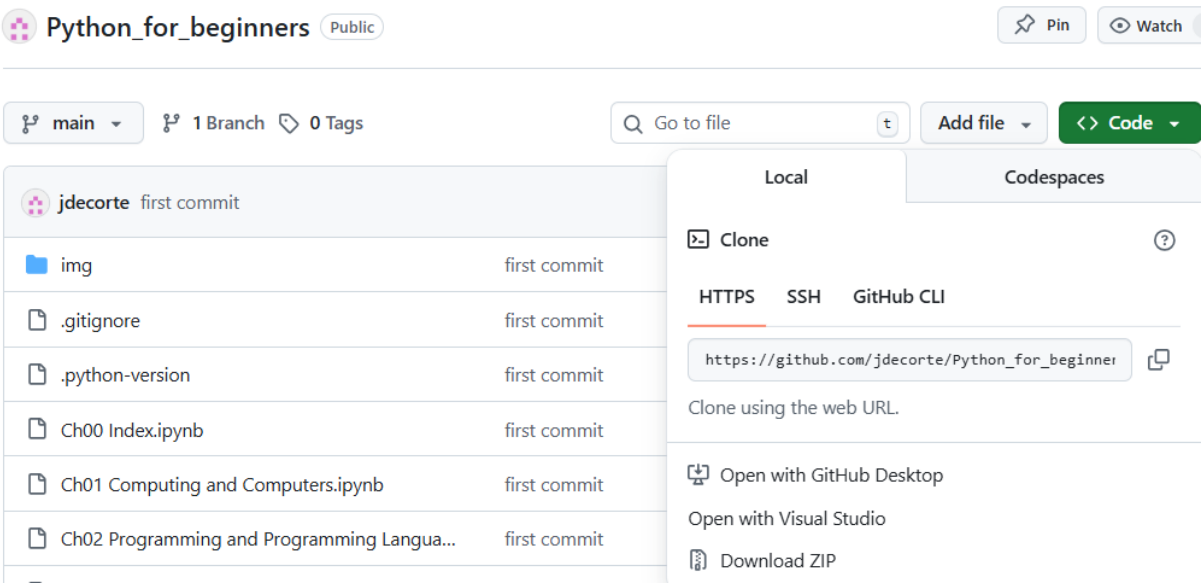
Getting the Source Material

The notebooks (python code with text) and images for this course are hosted on GitHub. You can find the material at the following link:

https://github.com/jdecorte/Python_for_beginners

When you navigate to this page, you should see all the material, as shown in the figure below. You can get the code in two ways by clicking the green Code button.

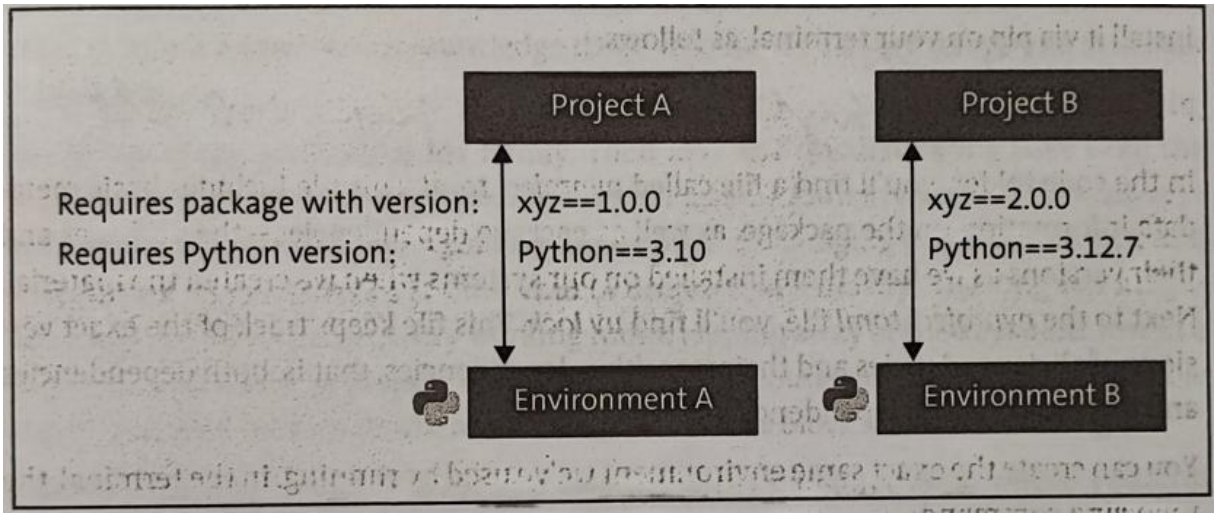
- Clone using the web URL
- Download as ZIP



As a beginner, it's best you go with the ZIP option. Download the ZIP file and extract it to a folder of your choice on your computer.

Setting up Your Local Environment

A Python environment is an isolated workspace where you can install and manage dependencies for a specific project. This environment acts as a sandbox, ensuring that the libraries and tools used in one project don't interfere with others on your system.



While Project A requires a specific package xyz version 1.0.0 and Python version 3.10 (packages are modules for specific tasks in Python), you might also need to work on a different project with completely different requirements.

Let's say, for instance, that Project B requires the same package xyz, but in the newer version 2.0.0, and a different Python version, maybe 3.12.7 instead. If you've only set up a single environment for all your projects, you would run into issues because of the incompatibility between the two projects.

The gold standard is to set up an environment for each project you work on. This approach consumes more space on your hard disk, but you'll be on the safe side and avoid negative side effects between your projects. Different tools for managing your Python environments exist but we go for the modern uv.

uv is a less popular but emerging tool, it focuses on creating ultralight virtual environments. Due to its implementation in Rust, it is blazing fast compared to other environmental tools.

You can find many different options to install uv on the developer page `https://docs.astral.sh/uv/getting-started/installation/#standalone-installer`. You can install it via pip on your terminal (open a terminal window from within your code folder using the right-click menu), as follows:

`pip install uv` (or `python -m pip install uv` if that doesn't work).

In the code folder of the repository, you'll find a file called `pyproject.toml`. This file includes basic meta-data information on the packages, as well as package dependencies for the packages and their versions as I have them installed on my system when I created the material.

Next to the `pyproject.toml` file, you'll find `uv.lock`. This file keeps track of the exact versions of all dependencies and their transitive dependencies, that is, both dependencies and dependencies of dependencies.

You can create the exact same environment I've used by running, in the terminal, the following command:

```
uv sync
```

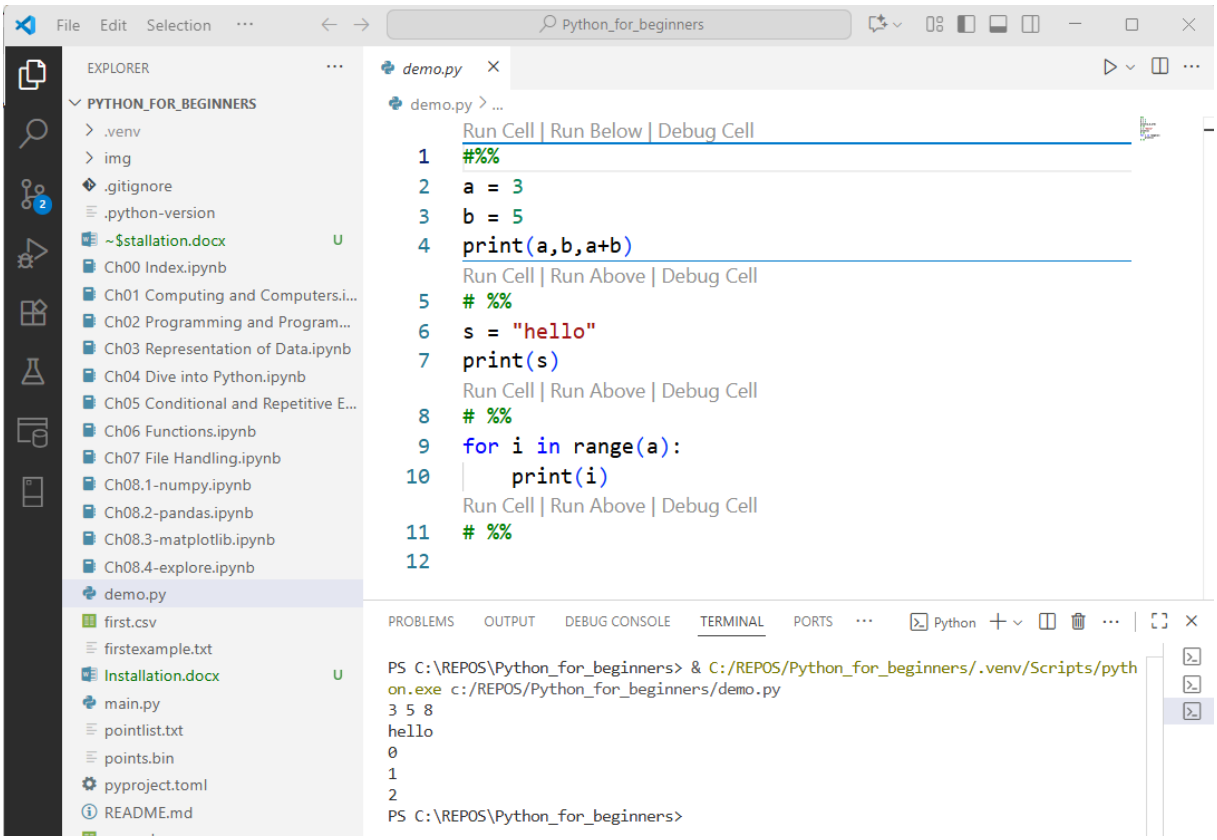
This command will download (from the internet) and install all dependencies into a subfolder named .venv, all at once. If for whatever reason it does not work on your computer, don't worry. Open the `pyproject.toml`, look for the section on dependencies, and install the packages manually. You can install these packages by running

```
uv add packagename
```

Test your environment

You can now open your `Python_for_beginners` folder in Visual Studio Code. Navigate to the file `demo.py` and click the arrow button in the upper right corner.

You should get the same output as in the figure below (see the terminal pane below for the output).



Any problems that you experience while executing these instructions can be discussed during the workshop.