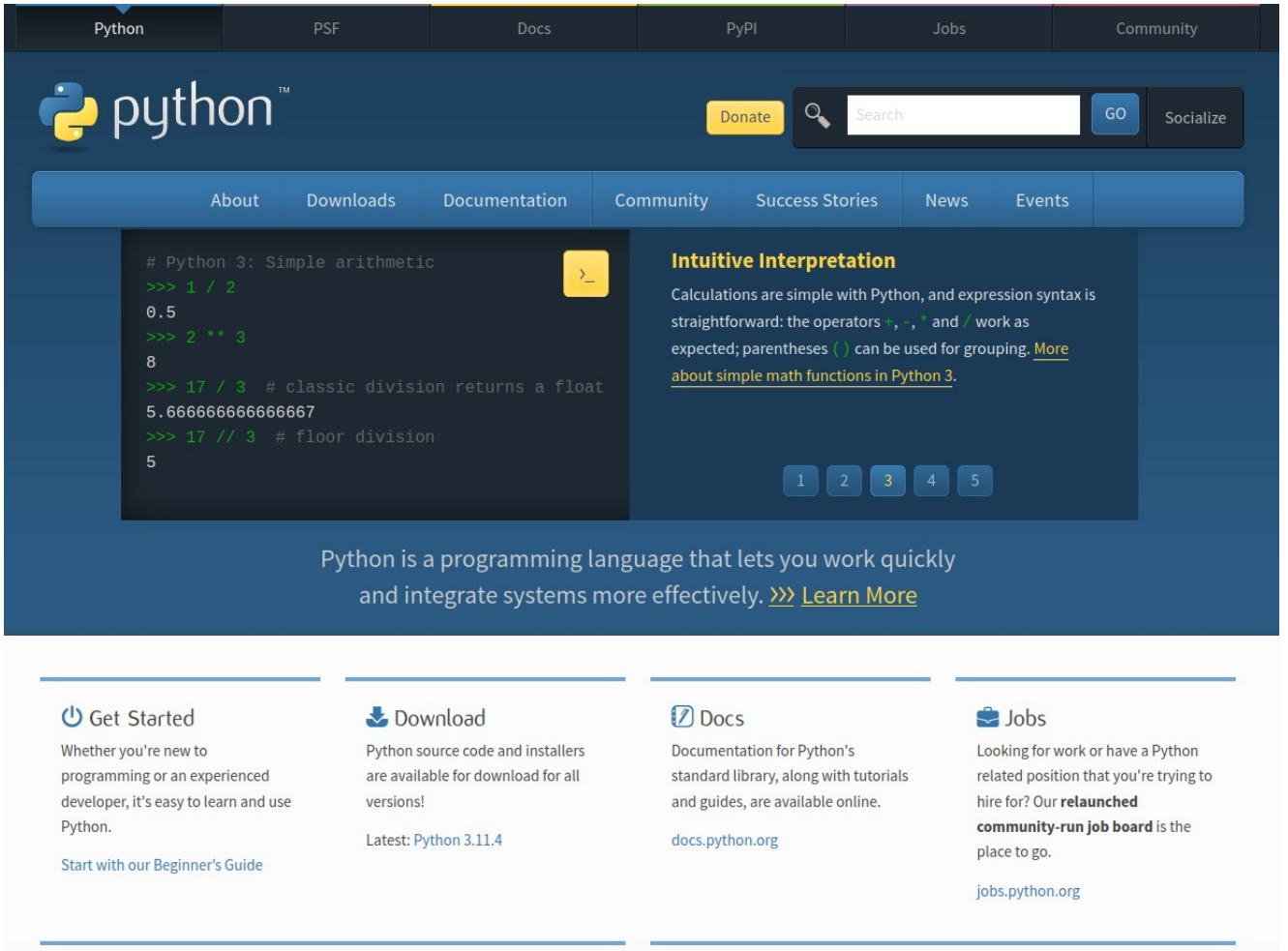
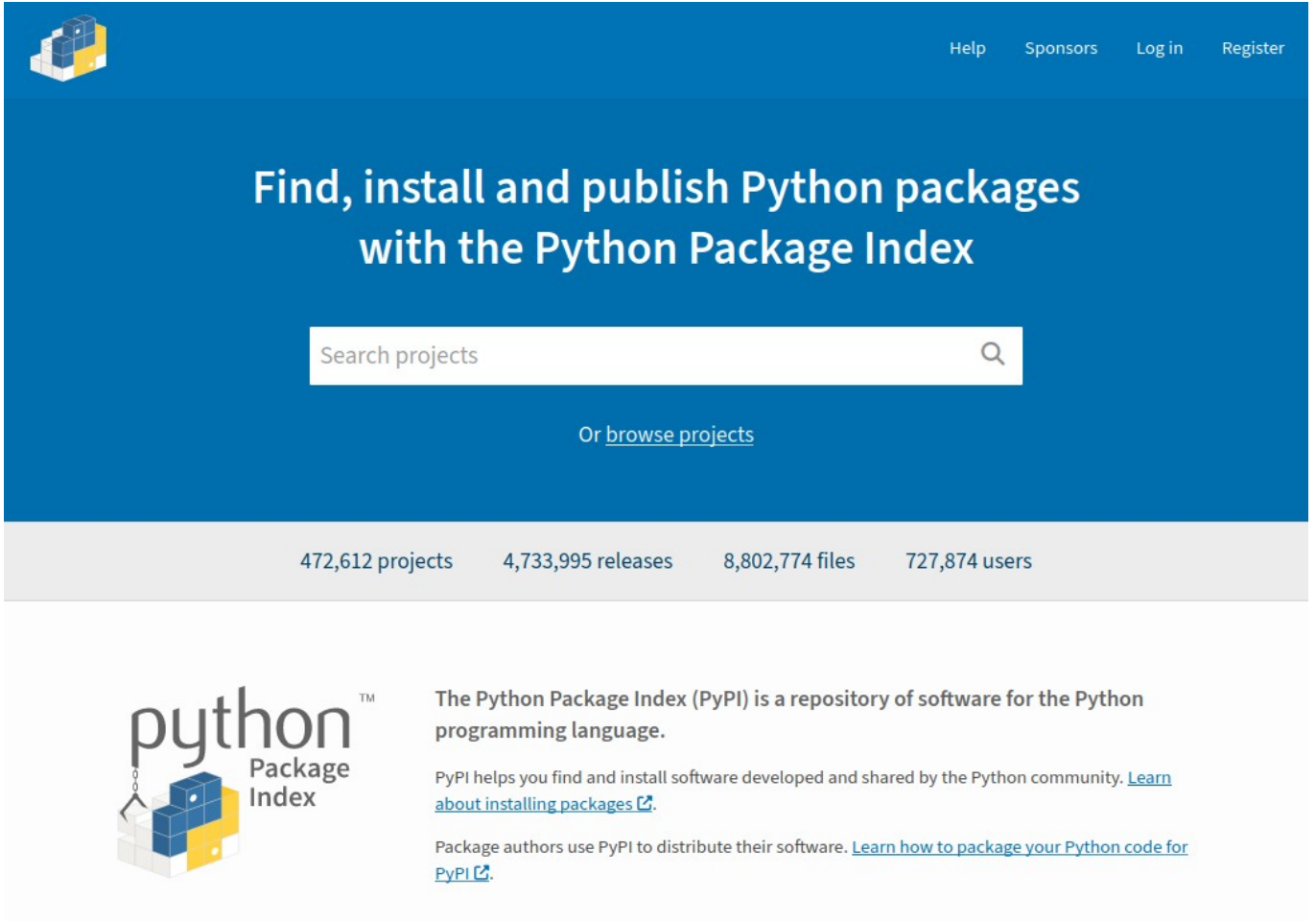
Statistics and Data Science for Engineers
E178 / ME276DS

Lab 1:
Configuring a programming environment

Note:
- This lab is not graded and attendance is optional.
- Warning: This slide deck is not printer-friendly.



https://www.python.org/



https://pypi.org/

NumPy

matplotlib

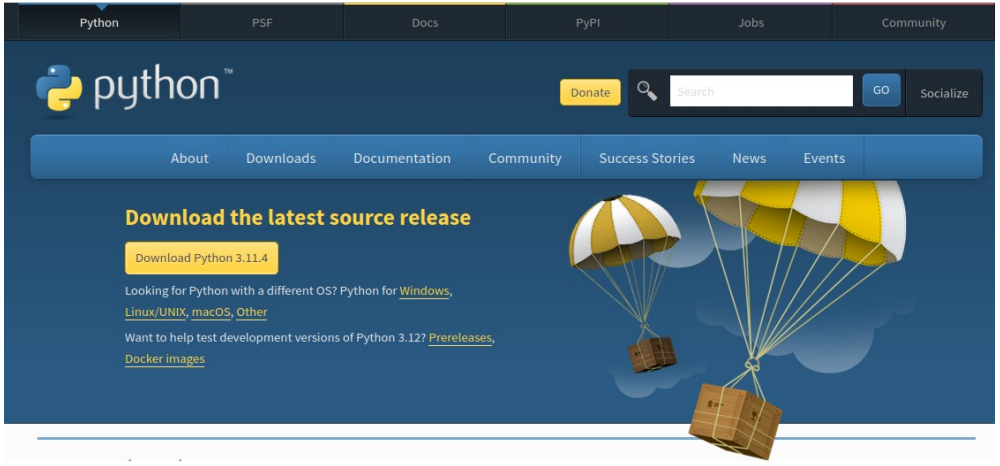
SciPy

Install or update Python

Check whether you have Python already:

python3 --version (in the terminal or command line)

Update it if the version is 3.9 or less.



Your first Python program

```
>> print(“Hello, World!”)
```

- Execute from the Python interpreter.
- Execute a file from the command line.

Two types of Python files

Raw Python files

- Extension **`.py`**
- Human editable
- Contain only code

Jupyter notebooks

- Extension **`.ipynb`**
- Not human editable
- Contains code and state

Integrated Development Environments (IDEs)

Text editors


Simple IDEs


IDLE

Project Jupyter

Jupyter Lab
Jupyter Notebook
Jupyter Hub

Cloud-based IDEs


Google Colab

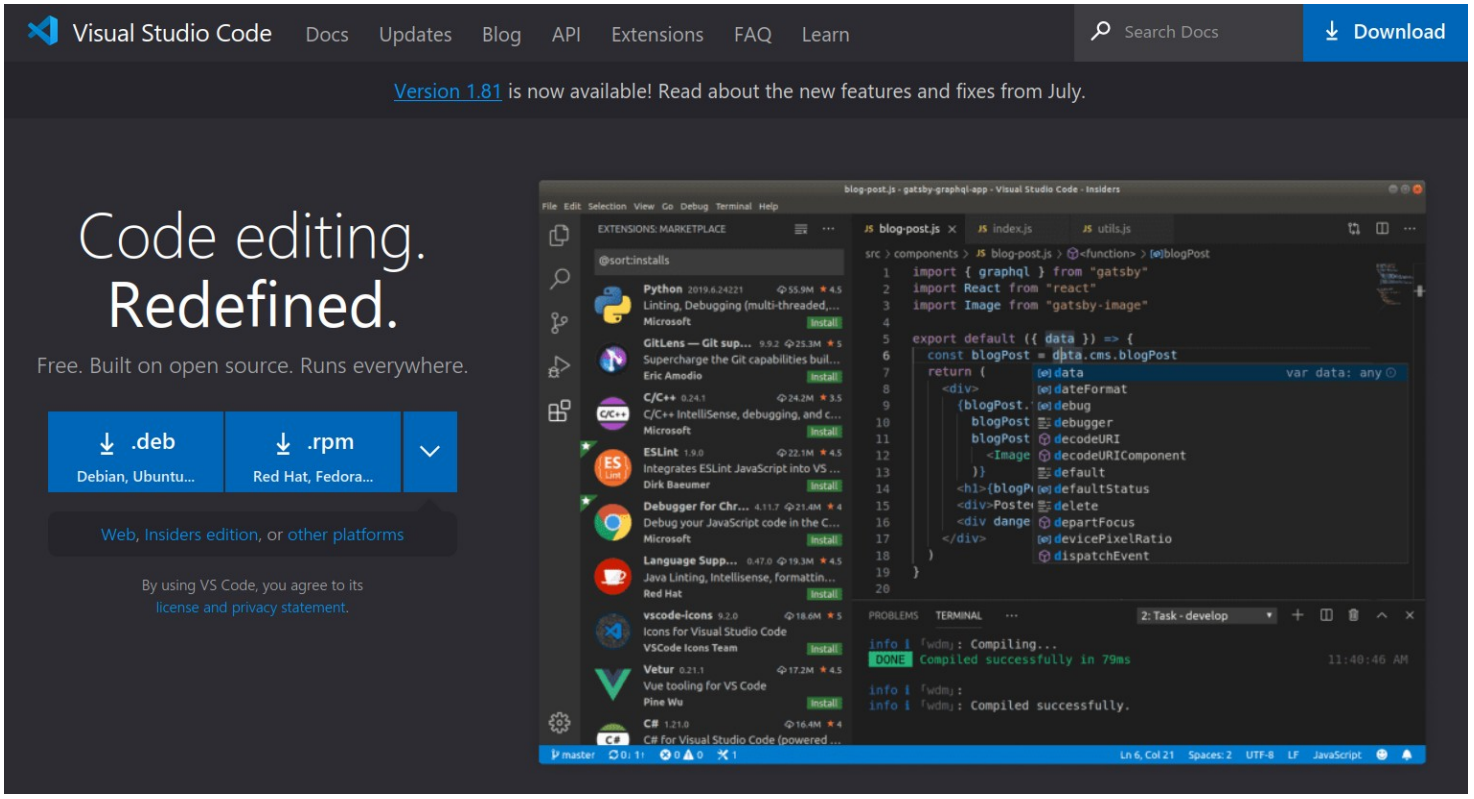

GitHub Codespaces

Advanced IDEs

PyCharm


VSCode

Install VSCode



https://code.visualstudio.com/

A) Create the Python environment

A.1) Create a folder on your computer for everything related to this course.

We will refer to that folder as **`<sdse>`**

A.2) Configure the Python environment

A.2.1) Launch VScode

A.2.2) Open folder: **`<sdse>`**

A.2.3) Terminal → New Terminal

A.2.4) In the terminal, find your python command using "**`which python3`**".

If there is no return value, try "**`which python`**".

If still there is no return value, consult with a GSI.

A) Create the Python environment

A.2.5) Upgrade pip, venv. Type the following two lines into the terminal (use "**python**" in place of "**python3**" if that's what works in step 4).

```
python3 -m pip install --user --upgrade pip
python3 -m pip install --user virtualenv
```

A.2.6) Create the environment. The next line will create the python environment for the class and store it in **<sdse>**/sdseenv. (again use "**python**" in place of "**python3**" if that's what works in the step A.2.4)

```
python3 -m venv sdseenv
```

B) Configure VSCode

B.1) File → New File → firstfile.py. You can place this file in the **<sdse>** folder or any of its subfolders, but not in the environment folder **<sdse>/sdseenv**.

B.2) You should get a popup window asking whether you want to install the Python extension (if you do not already have it). Install it.

B.3) Install Jupyter extensions. Open the command pallette, type "Python: Install the Jupyter Extension", press Enter.

B.4) Select the Python interpreter

B.4.1) In the Status Bar, click on "Select Interpreter"

B.4.2) Click on "Enter Interpreter Path". Choose **<sdse>/sdseenv/bin/python3**

Configure VSCode

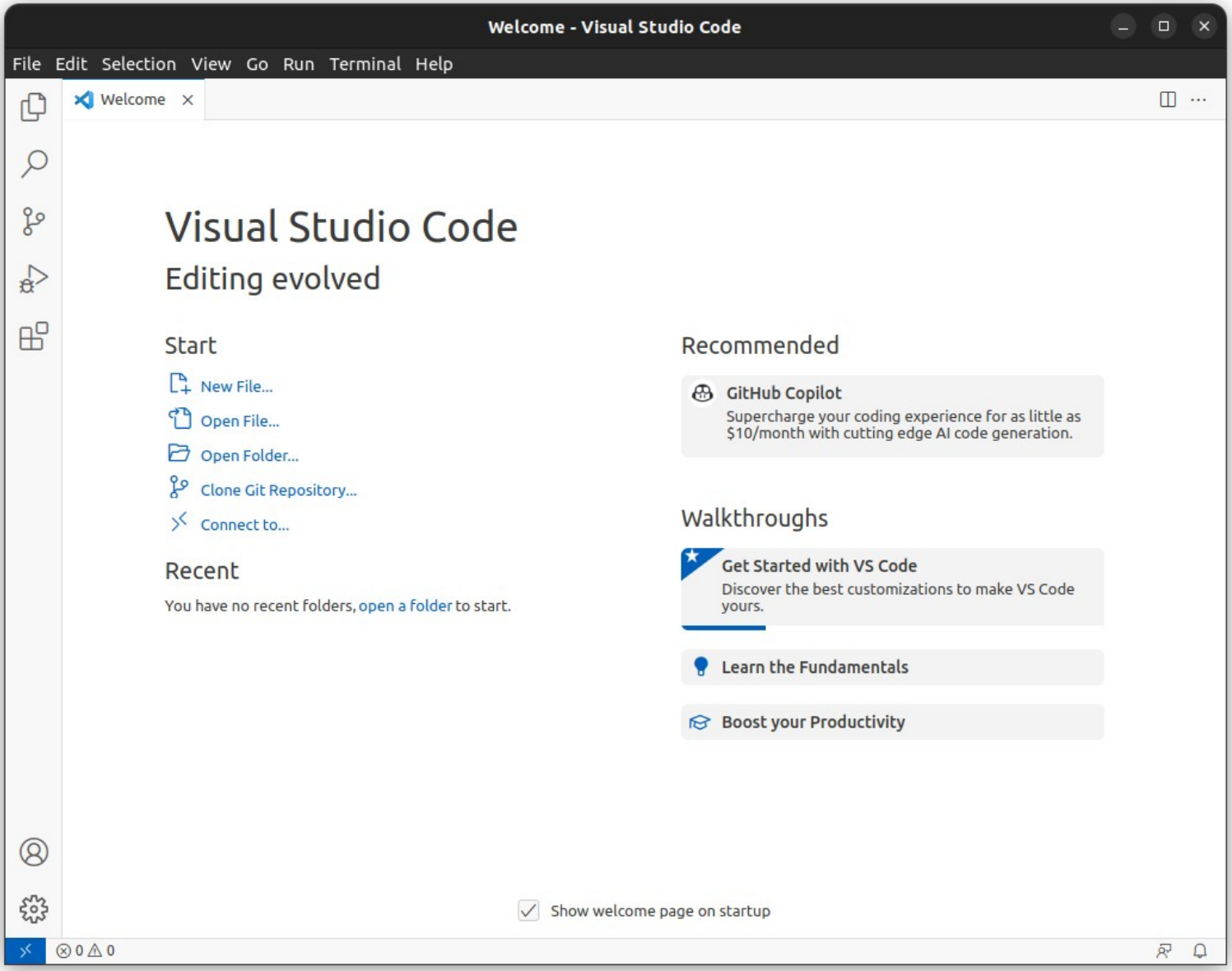
B.6) Add some code to firstfile.py

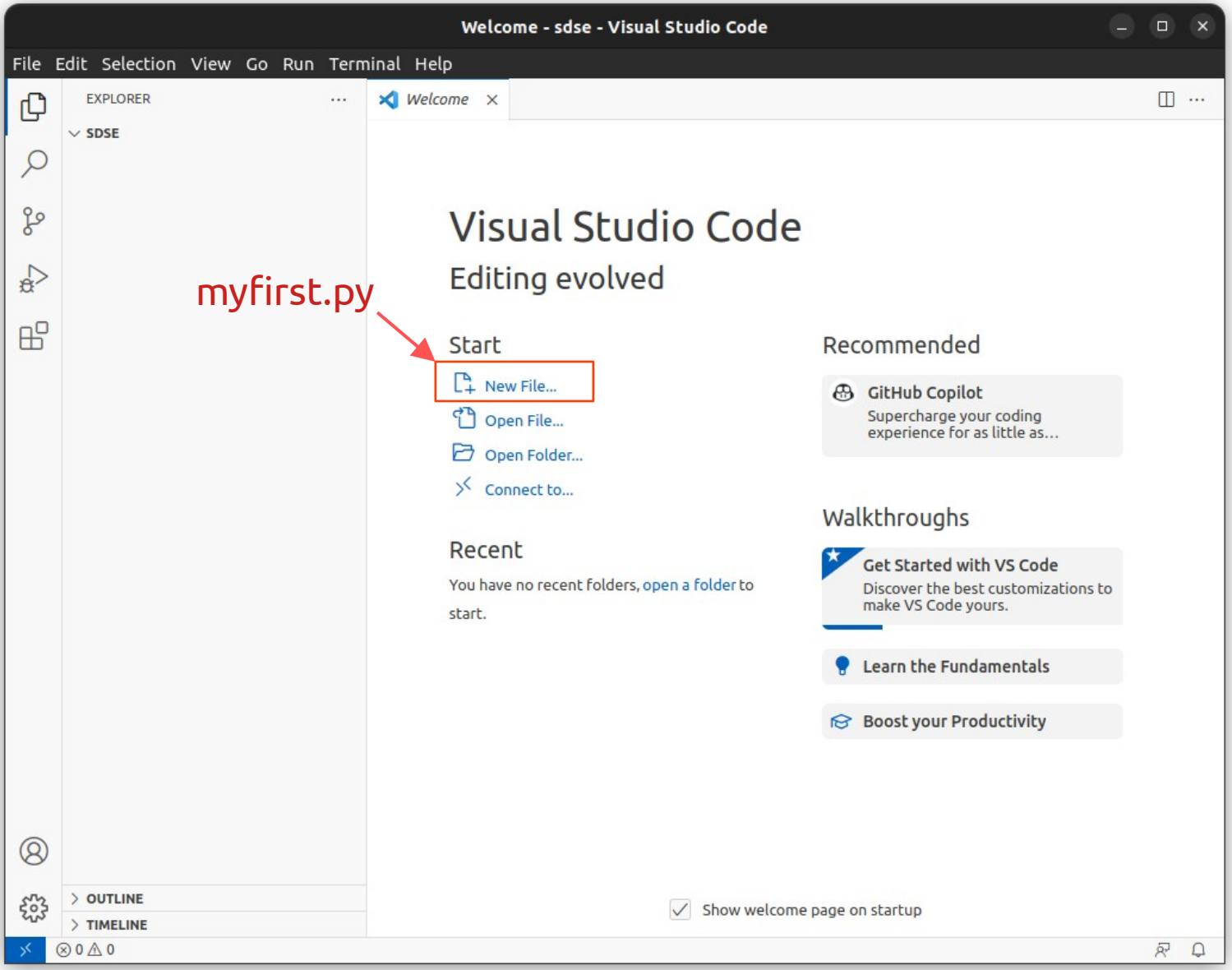
```
print("Hello, World!")
```

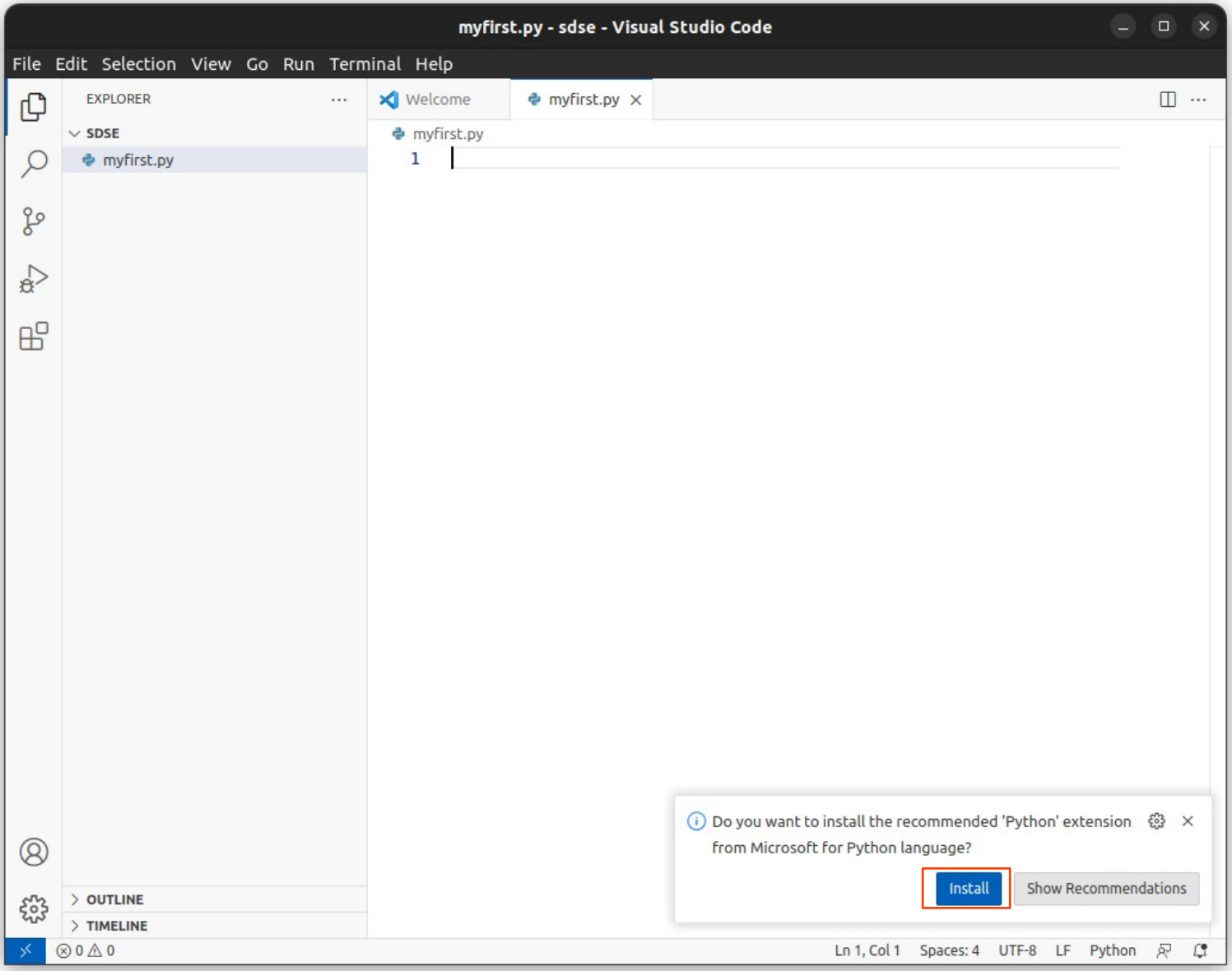
B.6) Click on the run button (sideways triangle) in the upper right-hand corner. You should get "Hello, World!" in the terminal.

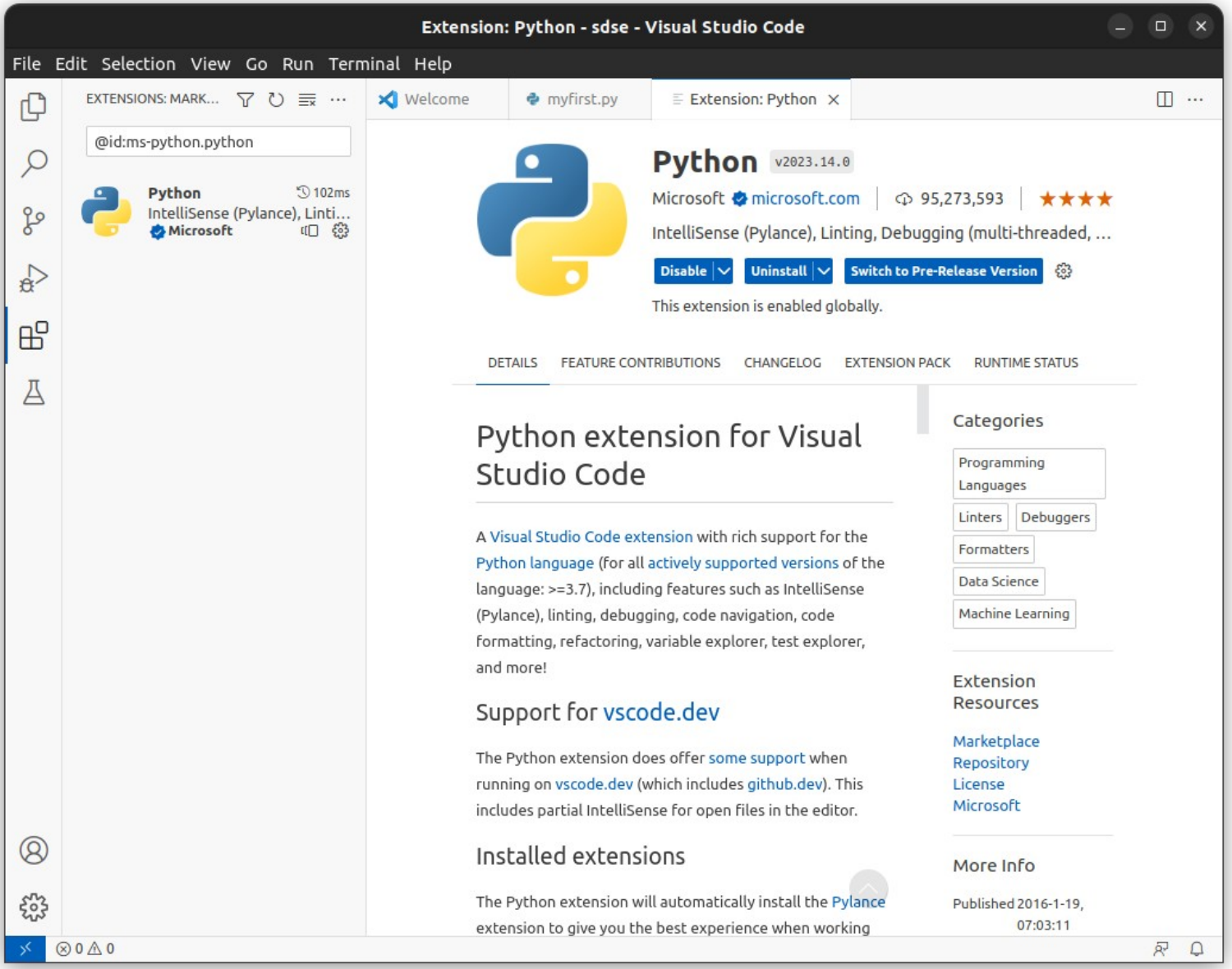
B.7) Create a jupyter notebook: File→New File→firstnb.ipynb

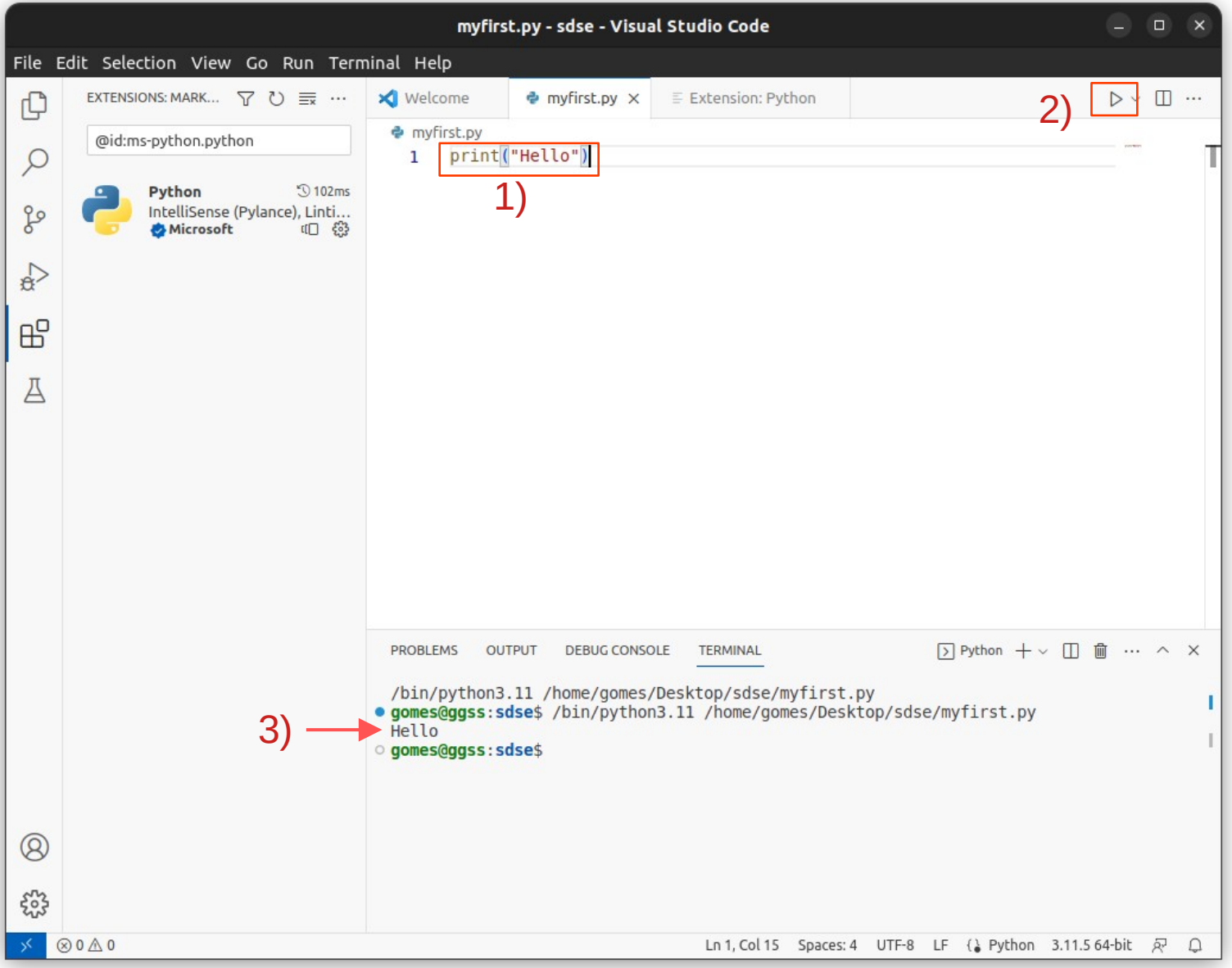
B.8) Put `print("Hello, World!")` in the first cell and run it with "Shift-Enter". It will ask you to choose a Python kernel. Select the sdseenv kernel we just created. It may also ask you to install the ipykernel extension. You should do that. After that, you should see "Hello, World" below the cell upon hitting "Shift-Enter".

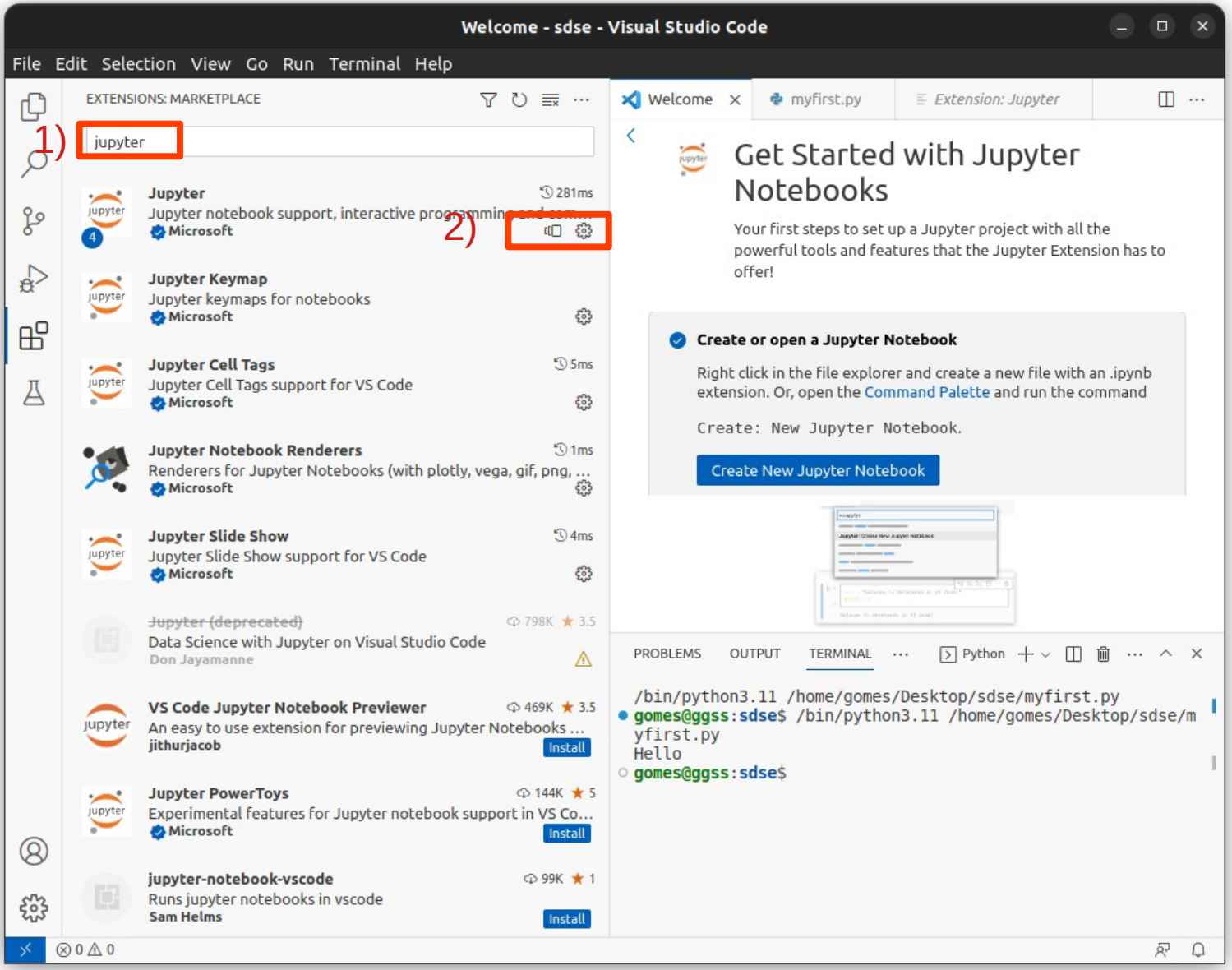

Welcome - Visual Studio Code
File Edit Selection View Go Run Terminal Help
Welcome
Visual Studio Code
Editing evolved
Start
New File...
Open File...
Open Folder...
Clone Git Repository...
Connect to...
Recent
You have no recent folders, open a folder to start.
Recommended
GitHub Copilot
Supercharge your coding experience for as little as $10/month with cutting edge AI code generation.
Walkthroughs
Get Started with VS Code
Discover the best customizations to make VS Code yours.
Learn the Fundamentals
Boost your Productivity
Show welcome page on startup
0 0


Welcome - sdse - Visual Studio Code
File Edit Selection View Go Run Terminal Help
EXPLORER
SDSE
Welcome
myfirst.py
Visual Studio Code
Editing evolved
Start
New File...
Open File...
Open Folder...
Connect to...
Recent
You have no recent folders, open a folder to start.
Recommended
GitHub Copilot
Supercharge your coding experience for as little as...
Walkthroughs
Get Started with VS Code
Discover the best customizations to make VS Code yours.
Learn the Fundamentals
Boost your Productivity
Show welcome page on startup
OUTLINE
TIMELINE
0 0


myfirst.py - sdse - Visual Studio Code
File Edit Selection View Go Run Terminal Help
EXPLORER
SDSE
myfirst.py
Welcome
myfirst.py
myfirst.py
1
Do you want to install the recommended 'Python' extension from Microsoft for Python language?
Install
Show Recommendations
OUTLINE
TIMELINE
0 0
Ln 1, Col 1
Spaces: 4
UTF-8
LF
Python

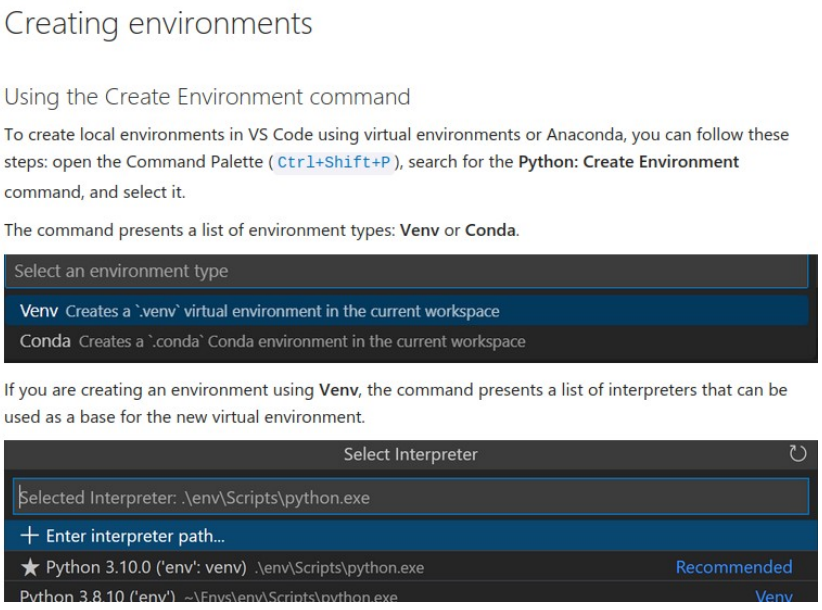

Extension: Python - sdse - Visual Studio Code
File Edit Selection View Go Run Terminal Help
EXTENSIONS: MARK...
@id:ms-python.python
Python
102ms
IntelliSense (Pylance), Linti...
Microsoft
Welcome
myfirst.py
Extension: Python
Python
v2023.14.0
Microsoft microsoft.com
95,273,593
IntelliSense (Pylance), Linting, Debugging (multi-threaded, ...
Disable
Uninstall
Switch to Pre-Release Version
This extension is enabled globally.
DETAILS
FEATURE CONTRIBUTIONS
CHANGELOG
EXTENSION PACK
RUNTIME STATUS
Python extension for Visual Studio Code
A Visual Studio Code extension with rich support for the Python language (for all actively supported versions of the language: >=3.7), including features such as IntelliSense (Pylance), linting, debugging, code navigation, code formatting, refactoring, variable explorer, test explorer, and more!
Support for vscode.dev
The Python extension does offer some support when running on vscode.dev (which includes github.dev). This includes partial IntelliSense for open files in the editor.
Installed extensions
The Python extension will automatically install the Pylance extension to give you the best experience when working
Categories
Programming Languages
Linters
Debuggers
Formatters
Data Science
Machine Learning
Extension Resources
Marketplace
Repository
License
Microsoft
More Info
Published 2016-1-19, 07:03:11
0 0


myfirst.py - sdse - Visual Studio Code
File Edit Selection View Go Run Terminal Help
EXTENSIONS: MARK...
@id:ms-python.python
Python
102ms
IntelliSense (Pylance), Linti...
Microsoft
Welcome
myfirst.py
Extension: Python
myfirst.py
1 print("Hello")
1)
2)
PROBLEMS OUTPUT DEBUG CONSOLE TERMINAL
Python
/bin/python3.11 /home/gomes/Desktop/sdse/myfirst.py
gomes@ggss:sdse$ /bin/python3.11 /home/gomes/Desktop/sdse/myfirst.py
Hello
gomes@ggss:sdse$
3)
Ln 1, Col 15 Spaces: 4 UTF-8 LF Python 3.11.5 64-bit

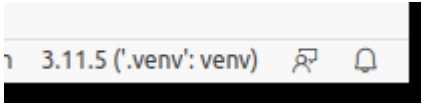

Welcome - sdse - Visual Studio Code
File Edit Selection View Go Run Terminal Help
EXTENSIONS: MARKETPLACE
1)
jupyter
Jupyter
281ms
Jupyter notebook support, interactive programming and com...
Microsoft
2)
Jupyter Keymap
Jupyter keymaps for notebooks
Microsoft
Jupyter Cell Tags
5ms
Jupyter Cell Tags support for VS Code
Microsoft
Jupyter Notebook Renderers
1ms
Renderers for Jupyter Notebooks (with plotly, vega, gif, png, ...
Microsoft
Jupyter Slide Show
4ms
Jupyter Slide Show support for VS Code
Microsoft
Jupyter (deprecated)
798K ★ 3.5
Data Science with Jupyter on Visual Studio Code
Don Jayamanne
VS Code Jupyter Notebook Previewer
469K ★ 3.5
An easy to use extension for previewing Jupyter Notebooks ...
jithurjacob
Install
Jupyter PowerToys
144K ★ 5
Experimental features for Jupyter notebook support in VS Co...
Microsoft
Install
jupyter-notebook-vscode
99K ★ 1
Runs jupyter notebooks in vscode
Sam Helms
Install
Welcome
myfirst.py
Extension: Jupyter
Get Started with Jupyter Notebooks
Your first steps to set up a Jupyter project with all the powerful tools and features that the Jupyter Extension has to offer!
Create or open a Jupyter Notebook
Right click in the file explorer and create a new file with an .ipynb extension. Or, open the Command Palette and run the command
Create: New Jupyter Notebook.
Create New Jupyter Notebook
PROBLEMS
OUTPUT
TERMINAL
Python
/bin/python3.11 /home/gomes/Desktop/sdse/myfirst.py
gomes@ggss:sdse$ /bin/python3.11 /home/gomes/Desktop/sdse/myfirst.py
Hello
gomes@ggss:sdse$
0 0

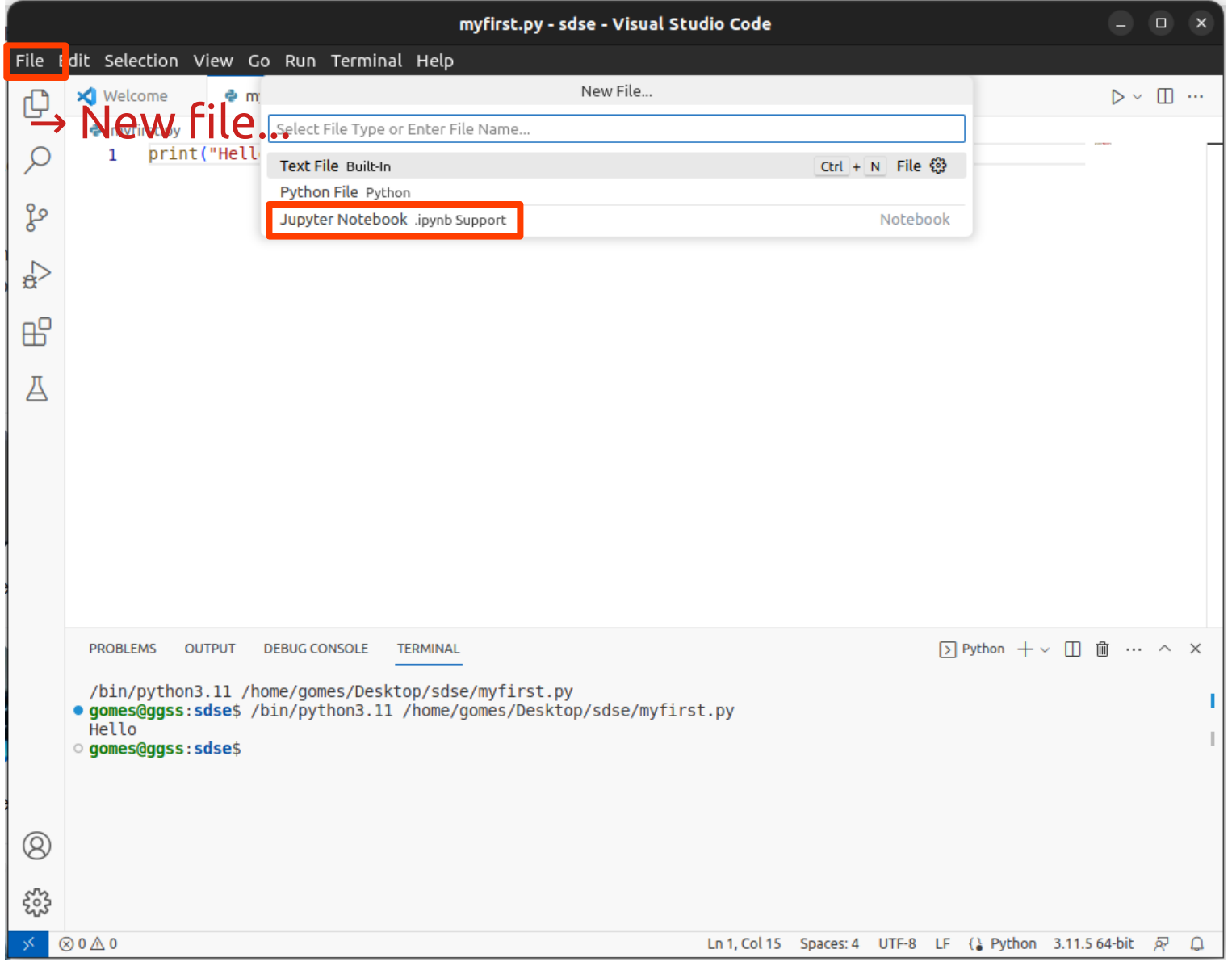
Follow: https://code.visualstudio.com/docs/python/environments “Creating environments”

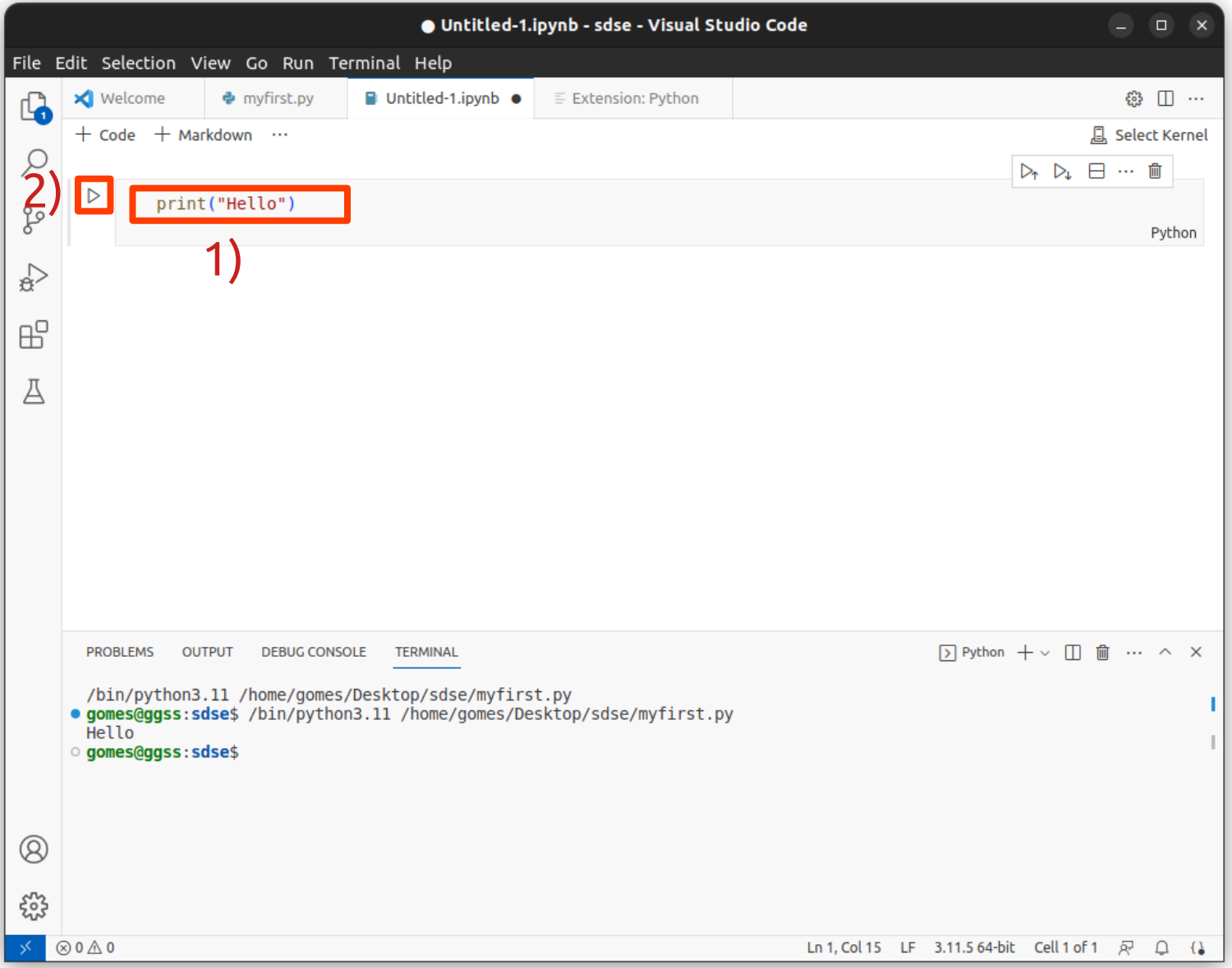
Create a Venv environment select python 3.10 or above

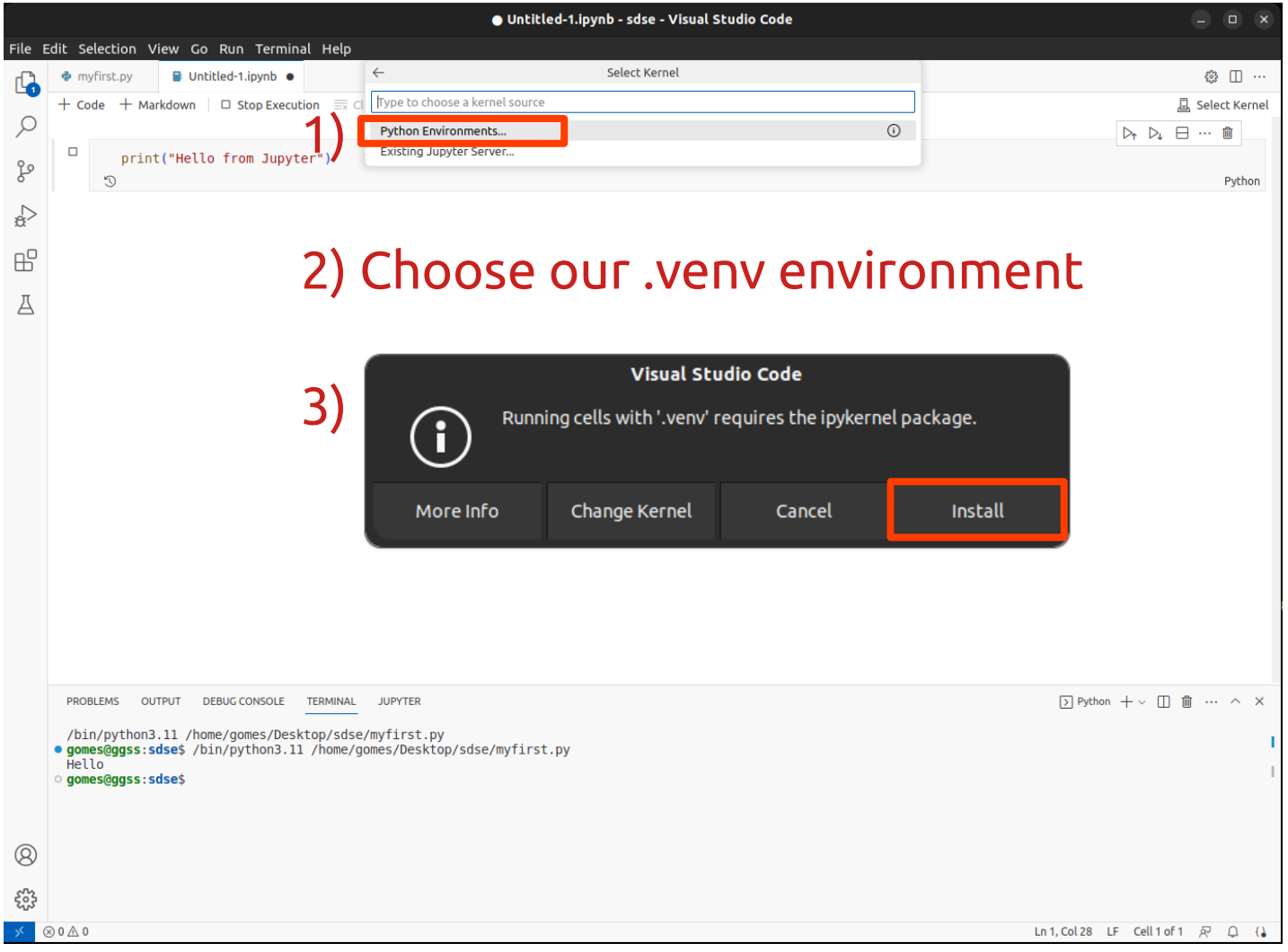


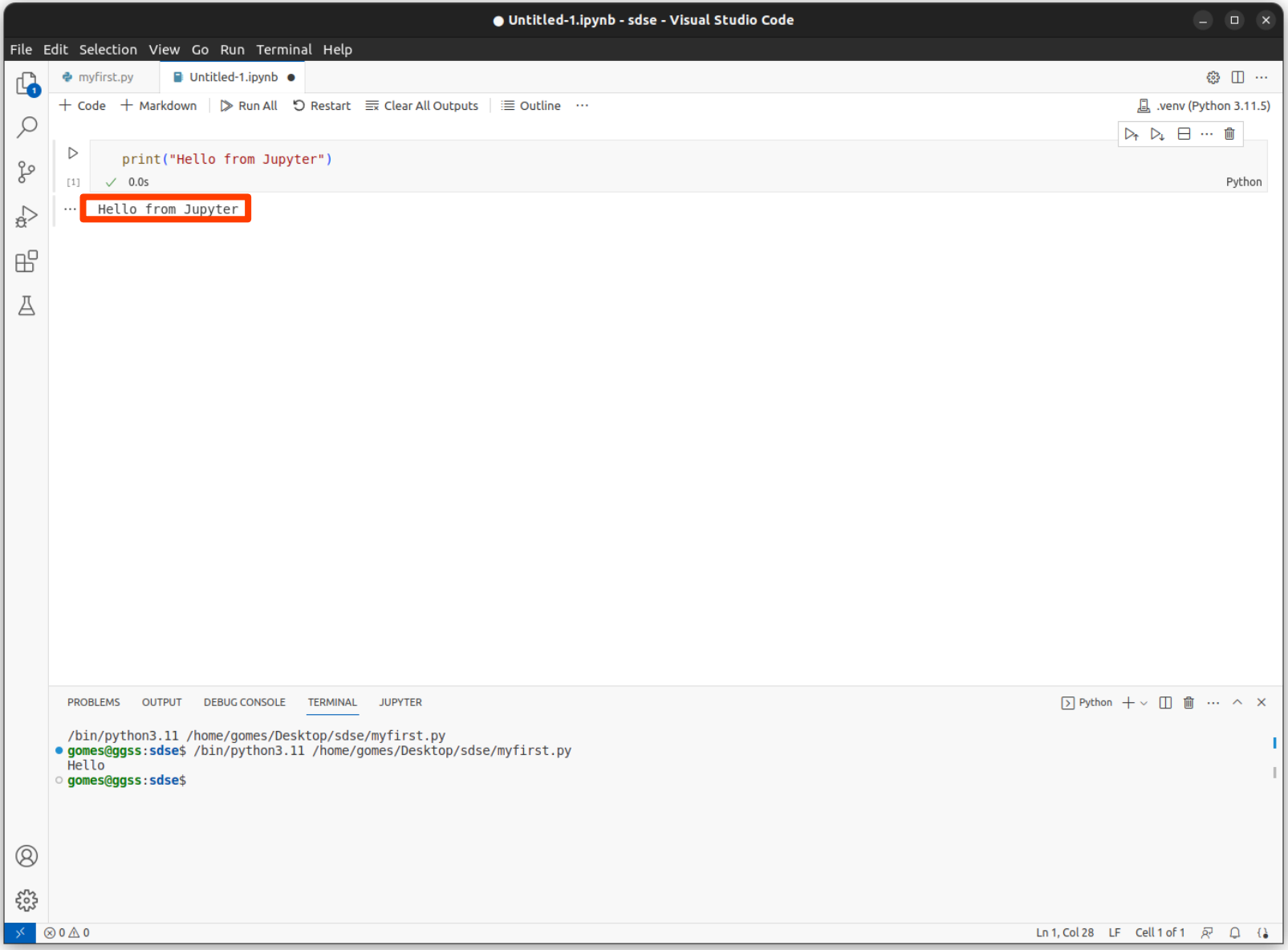
In the end you should have (‘.venv’:venv) in the status bar:



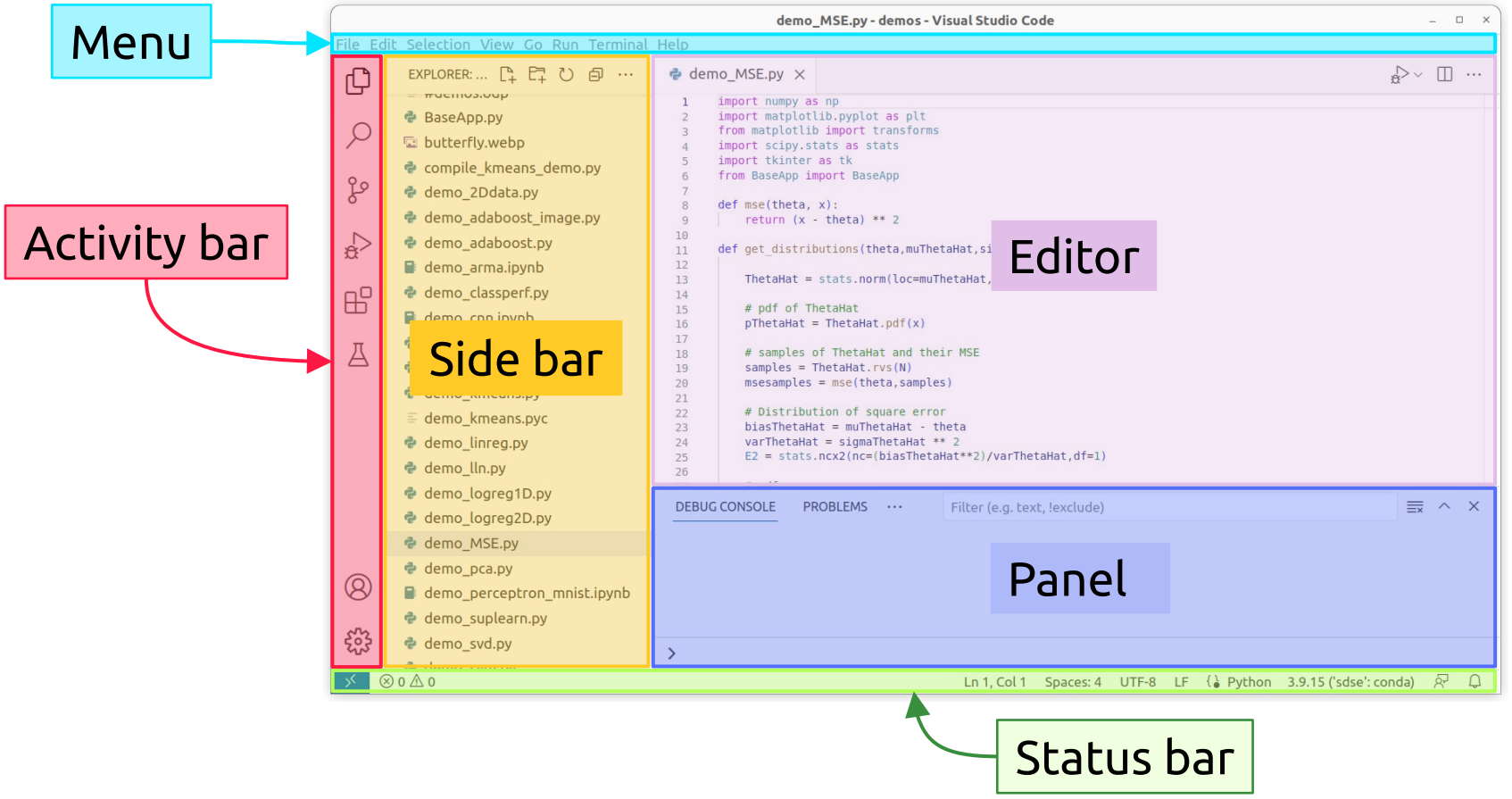

myfirst.py - sdse - Visual Studio Code
File Edit Selection View Go Run Terminal Help
New file...
Welcome
myfirst.py
1 print("Hell
New File...
Select File Type or Enter File Name...
Text File Built-In
Ctrl + N
File
Python File Python
Jupyter Notebook .ipynb Support
Notebook
PROBLEMS
OUTPUT
DEBUG CONSOLE
TERMINAL
Python
/bin/python3.11 /home/gomes/Desktop/sdse/myfirst.py
gomes@ggss:sdse$ /bin/python3.11 /home/gomes/Desktop/sdse/myfirst.py
Hello
gomes@ggss:sdse$
0 0
Ln 1, Col 15
Spaces: 4
UTF-8
LF
Python
3.11.5 64-bit


Untitled-1.ipynb - sdse - Visual Studio Code
File Edit Selection View Go Run Terminal Help
Welcome
myfirst.py
Untitled-1.ipynb
Extension: Python
+ Code + Markdown ···
Select Kernel
2)
print("Hello")
Python
1)
PROBLEMS OUTPUT DEBUG CONSOLE TERMINAL
Python
/bin/python3.11 /home/gomes/Desktop/sdse/myfirst.py
gomes@ggss:sdse$ /bin/python3.11 /home/gomes/Desktop/sdse/myfirst.py
Hello
gomes@ggss:sdse$
⊗ 0 ⚠ 0
Ln 1, Col 15
LF
3.11.5 64-bit
Cell 1 of 1


Untitled-1.ipynb - sdse - Visual Studio Code
File Edit Selection View Go Run Terminal Help
myfirst.py
Untitled-1.ipynb
Code
Markdown
Stop Execution
Select Kernel
Type to choose a kernel source
Python Environments...
Existing Jupyter Server...
1)
print("Hello from Jupyter")
Python
2) Choose our .venv environment
3)
Visual Studio Code
Running cells with '.venv' requires the ipykernel package.
More Info
Change Kernel
Cancel
Install
PROBLEMS
OUTPUT
DEBUG CONSOLE
TERMINAL
JUPYTER
/bin/python3.11 /home/gomes/Desktop/sdse/myfirst.py
gomes@ggss:sdse$ /bin/python3.11 /home/gomes/Desktop/sdse/myfirst.py
Hello
gomes@ggss:sdse$
Ln 1, Col 28
LF
Cell 1 of 1


● Untitled-1.ipynb - sdse - Visual Studio Code
File Edit Selection View Go Run Terminal Help
myfirst.py
Untitled-1.ipynb ●
+ Code + Markdown Run All Restart Clear All Outputs Outline ···
.venv (Python 3.11.5)
print("Hello from Jupyter")
[1] 0.0s
Python
Hello from Jupyter
PROBLEMS OUTPUT DEBUG CONSOLE TERMINAL JUPYTER
Python
/bin/python3.11 /home/gomes/Desktop/sdse/myfirst.py
gomes@ggss:sdse$ /bin/python3.11 /home/gomes/Desktop/sdse/myfirst.py
Hello
gomes@ggss:sdse$
⊗ 0 ⚠ 0
Ln 1, Col 28 LF Cell 1 of 1

VSCode layout



Useful VSCode keyboard shortcuts

	Shortcut	Action
Navigation	Cmd B	Toggle side bar
	Cmd J	Toggle panel
	F11	Full Screen
	Cmd ,	Open settings
	Cmd Shift P	Open command pallette
Coding	F5	Run debugger
	Shift Enter	Run in interactive window
	Cmd /	Toggle block comment
	Cmd Space	Make a coding suggestion

Note: Cmd is Ctrl in Windows/Linux and ⌘ in Mac.