

LECTURE 2.1

Getting started

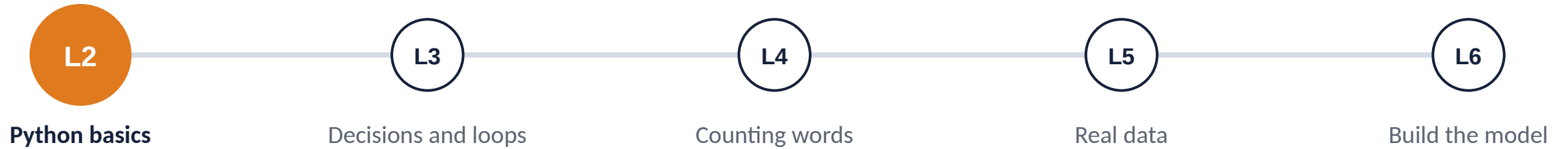
Running Python online in Colab and offline in Jupyter Notebook

Today's key line of code

```
print("Hello, Data Science!")
```

Where we are: Lecture 2, part 1 of 3

Part 1 of 3



Today you will

- 1 Understand what a program is and what Python does with it
- 2 Open Jupyter Notebook offline in the lab, and Colab at home
- 3 Run cells in several ways and write text cells
- 4 Understand execution order, and fix it with restart and run all
- 5 Save your work and move notebooks between lab and home

What is a program?

1

Instructions

A program is a list of instructions, written in a language the computer can follow.

2

Top to bottom

Python reads your code one line at a time, from the top, and does exactly what each line says.

3

Exact, not smart

A missing bracket or a misspelled name stops it. Precision is a skill you will build.

Two places to write Python

Jupyter Notebook (lab, offline)

- Runs on your own computer
- No internet needed
- Installed once with Anaconda
- Files saved in a folder on the PC

Google Colab (home, online)

- Runs on Google's computers
- Needs internet and a Google account
- Nothing to install
- Files saved in your Google Drive

One-time lab setup: Anaconda

Done once per PC, usually by the lab administrator, using the offline Anaconda installer.

What	Details
Anaconda Distribution	Free installer that includes Python, Jupyter Notebook, pandas, scikit-learn and matplotlib
Why Anaconda	Every library this course needs is already inside, so no internet is needed afterwards
Check it worked	Start menu shows Anaconda Navigator and Anaconda Prompt
Data files	Copy course files (for example sms.tsv for Lecture 5) to each PC or a shared folder
Students with laptops	Download the installer once at home or from the course share, then install offline

Start Jupyter Notebook in the lab

1

Launch

Start menu, Anaconda Navigator, then Launch under Jupyter Notebook. Or type jupyter notebook in Anaconda Prompt.

2

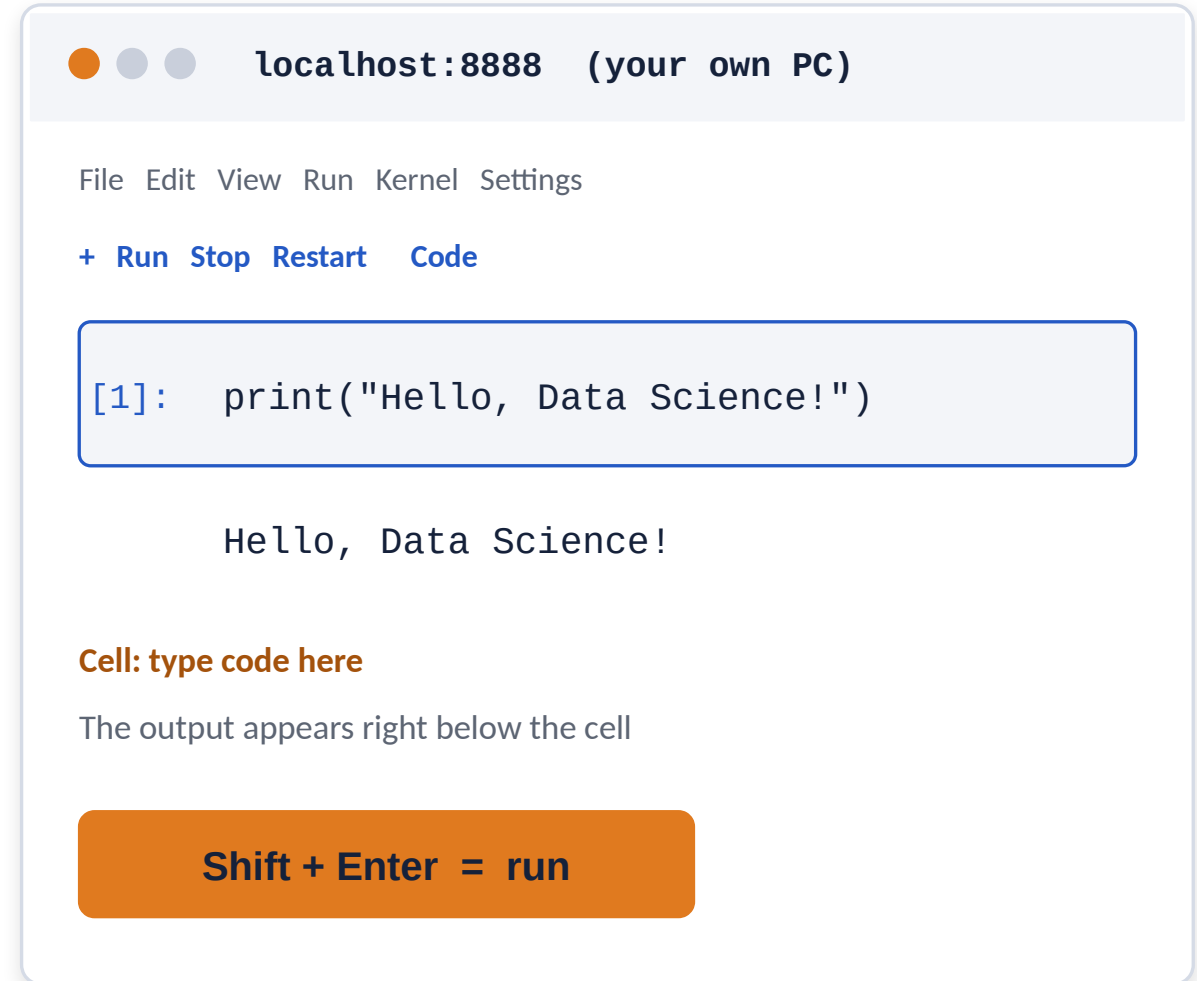
Your folder

A browser tab opens at localhost:8888. localhost means your own PC: no internet used. Open your course folder.

3

New notebook

New, then Notebook (pick Python 3 if asked). Rename it Lecture2_1 and run a cell with Shift + Enter.



Tour of a Jupyter notebook

The image shows a Jupyter notebook interface with several callouts explaining its components:

- localhost:8888/notebooks/Lecture2_1.ipynb**: The URL of the notebook.
- File Edit View Run Kernel Settings Help**: The top menu bar.
- + Run Stop Restart Code**: The toolbar buttons.
- Lecture 2.1: my first notebook**: The title of the notebook.
- A text cell: notes for humans.**: A text cell containing a heading and a note.
- [1]: print("Hello, Data Science!")**: A code cell containing a Python print statement.
- Hello, Data Science!**: The output of the code cell.
- []:**: An empty code cell.

Callouts on the right side of the notebook:

- Menus: Run and Kernel are the ones you need most**: Points to the Run and Kernel menus.
- Toolbar: add cell, run, stop, restart**: Points to the toolbar buttons.
- Text cell (Markdown): headings and notes**: Points to the text cell.
- Code cell: type Python here**: Points to the code cell.
- [1] := this cell ran first. [] := not run yet**: Points to the output of the code cell.
- Output appears right below its cell**: Points to the output of the code cell.

The same notebook in Colab

colab.research.google.com

File Edit View Insert Runtime Tools Help

+ Code + Text

Lecture 2.1: my first notebook

A text cell: notes for humans.

 `print("Hello, Data Science!")`

Hello, Data Science!

Runtime menu = Jupyter's Kernel menu

+ Code and + Text add cells

Text cells work the same way

Play button runs the cell; the run number appears after running

Output below the cell, as in Jupyter

Ways to run a cell

Learn the first two shortcuts by heart. The rest you can look up.

Action	Jupyter Notebook	Google Colab
Run, go to next cell	Shift + Enter	Shift + Enter
Run, stay on this cell	Ctrl + Enter	Ctrl + Enter
Run, add a new cell below	Alt + Enter	Alt + Enter
Run with the mouse	Run button in the toolbar	Play button beside the cell
Run every cell	Run menu > Run All Cells	Runtime menu > Run all
Stop a cell that runs forever	Stop (square) button	Click the spinning play button

Your first code cell

- `print()` shows text and results
- Notebooks also show the value of the last line automatically
- Here `2 + 3` on the last line displays 5
- The same code works in Jupyter and Colab

Code

```
print("Hello, Data Science!")  
2 + 3
```

Output

```
Hello, Data Science!  
5
```

Text cells: notes for humans

You type (text cell)

Markdown

```
# Lecture 2.1
My first notebook.

- Code cells run Python
- Text cells explain it
```

It displays as

Lecture 2.1

My first notebook.

- Code cells run Python
- Text cells explain it

- Change a cell to text: Jupyter Esc then M, or the Code/Markdown menu; Colab uses + Text
- # makes a heading, **word** makes bold, - makes a list
- Every homework notebook starts with a text cell: your name and ID

Execution order: the notebook trap

Python remembers what has RUN, not what is written on screen. Cell A: `x = 5`. Cell B: `print(x * 2)`.

Code

```
# Cell A
x = 5

# Cell B
print(x * 2)
```

step	what you do	x in memory	B prints
1	Run A	5	(nothing)
2	Run B	5	10
3	Edit A to x = 7, do not run	5	(nothing)
4	Run B	5	10 (surprise!)
5	Run A	7	(nothing)
6	Run B	7	14

Click to reveal the next row. Predict it first!

The cure: restart and run all

Restarting wipes Python's memory. Running all then rebuilds it from the top, in order, exactly as written.

Tool	Where to find it
Jupyter Notebook	Kernel menu > Restart Kernel and Run All Cells
Google Colab	Runtime menu > Restart session and run all (older versions say Restart runtime)
When	Before every homework submission, and whenever results look impossible
Why it matters	If a notebook only works when run in some special order, it does not really work

Saving, and moving between lab and home

1

Jupyter: a folder

Ctrl + S saves Lecture2_1.ipynb in the folder you opened. Copy it to a USB drive or the course share.

2

Colab: Google Drive

Saved automatically in Google Drive. File > Download > .ipynb gives you a file.

3

Move either way

Colab: File > Upload notebook.
Jupyter: put the .ipynb in your folder and click it. Data files must travel too.

Other ways to run Python (for later)

All of these work offline with the same Anaconda install. We stay with notebooks in this course.

Way	What it looks like	Used for
Interactive shell	>>> 2 + 3	Quick one-line experiments
Script file	python hello.py	Programs that run from start to end
IDLE / Thonny	Simple editor + Run button	Learning to write scripts
VS Code, PyCharm	Full code editor	Larger projects, professional work

```
Anaconda Prompt: running a script file
(base) C:\Users\student\course> python hello.py
Hello, Data Science!
```

Your turn

10 minutes

- 1 Start Jupyter and create a notebook named Lecture2_1
- 2 Add a text cell with your name, ID, and today's date
- 3 Add a code cell that prints a greeting, then a cell with $7 * 6$ alone
- 4 Restart and run all, then save with Ctrl + S

Code

```
# text cell (Markdown)
# Nadia Rahman, ID 1042

print("Hello, lab!")
7 * 6
```

Setup problems and fixes

You see	Usually means	Fix
'jupyter' is not recognized	Typed in the normal Command Prompt	Use Anaconda Prompt, or Anaconda Navigator
Browser: localhost refused to connect	The Jupyter server window was closed	Start Jupyter again; keep the black window open
NameError after reopening a notebook	Python's memory was cleared	Run all cells from the top
FileNotFoundError: sms.tsv	Data file not next to the notebook	Copy it into the notebook's folder
Nothing happens, [*] stays	A cell is still running or stuck	Stop button, or restart the kernel

Today's toolkit

Shift + Enter	Run cell, go to next
Ctrl + Enter	Run cell, stay
[1]: []: [*]:	Ran first / not run / running
Restart + Run all	Fix execution-order problems

Ctrl + S	Save the notebook
# Heading	Markdown heading in a text cell
.ipynb	Notebook file: works in both tools
localhost:8888	Jupyter on your own PC, offline

Homework 2.1

Due before Lecture 2.2 • [date]

1 Set up at home

Open Colab (or Jupyter if you have a laptop with Anaconda). Create HW2_1_<your ID>.

2 Text cells

Add a heading, a bold word, and a 3-item list about why you took this course.

3 Run in every way

Run one cell with Shift + Enter, one with Ctrl + Enter, one with Alt + Enter. In a text cell, describe the difference.

4 Break the order

Recreate the Cell A / Cell B trap. Write down what B printed and why, then fix it with restart and run all.

5 Move it

Download the notebook as .ipynb and open it in the other tool (or on the lab PC next class).

Submit on [LMS / Google Classroom]: your notebook file HW2_1_<your ID>.ipynb, or a Colab link set to “Anyone with the link can view”.

Recap: Lecture 2.1 in 90 seconds

RECAP

Lecture 2.1 in 90 seconds

A short recap of today's lecture. Pause any time.

Click to play or pause. Watch it again at home to revise.