

Introduction to (Scientific) Programming with Python

Mirta Stantic, Timo Flesch

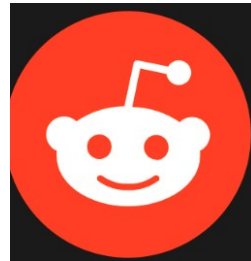
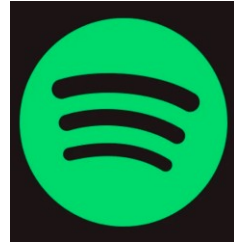
MT 2019

Outline

- Why Python?
- Practical
 - Part1: A quick intro to programming (in python)
 - Part2: Python for scientific programming
- Additional Resources

Why Python?

**It's a general purpose programming language,
used to power many of the apps you use every day!**



Why Python?

There are free(!!) add-ons for everything:

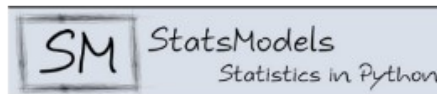
Create your own experiments!



Make beautiful figures!



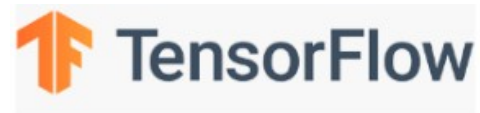
Perform sophisticated statistical analyses



Organise and analyse numerical data



Hop on the machine learning hype train!



Why Python?

It's just better than its competitors!



>



Matlab is very expensive! Python is free. When using the right packages/addons, Python has the same functionality and syntax as Matlab



>



Python is much easier to learn, as the syntax is less complex.
At least for science, there is a better community/ecosystem
Some python packages run C(++) code in the background, which makes them almost as fast as their C++ counterparts



>



Python is a general purpose language. It can be used for almost everything.
R was developed for statistical analyses



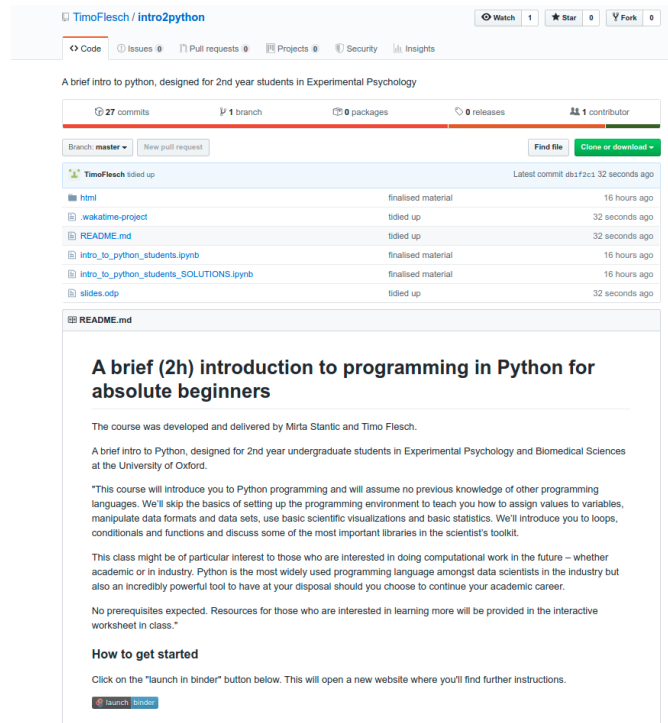
>



Again, much simpler syntax. You can achieve the same results with fewer lines of code

Python Practical

1. Go to <http://www.github.com/timoflesch/intro2python>



The screenshot shows the GitHub repository page for 'timoflesch/intro2python'. At the top, there are navigation tabs for 'Code', 'Issues', 'Pull requests', 'Projects', 'Security', and 'Insights'. Below these, a description reads: 'A brief intro to python, designed for 2nd year students in Experimental Psychology'. Statistics show 27 commits, 1 branch, 0 packages, 0 releases, and 1 contributor. A file list table is visible, showing files like 'html', '.wakatime-project', 'README.md', 'intro_to_python_students.ipynb', 'intro_to_python_students_SOLUTIONS.ipynb', and 'slides.odp'. The 'README.md' file is selected, displaying its content. The README title is 'A brief (2h) introduction to programming in Python for absolute beginners'. The text describes the course developed by Mirta Stantic and Timo Flesch, designed for 2nd year undergraduate students. It mentions that the course will introduce Python programming and assume no previous knowledge. It also states that the class might be of particular interest to those interested in computational work in the future. At the bottom, there is a 'How to get started' section with a 'Launch binder' button.

timoflesch / intro2python

Watch 1 Star 0 Fork 0

Code Issues Pull requests Projects Security Insights

A brief intro to python, designed for 2nd year students in Experimental Psychology

27 commits 1 branch 0 packages 0 releases 1 contributor

Branch: master New pull request Find file Clone or download

File	Latest commit	Time
html	finalised material	16 hours ago
.wakatime-project	tidied up	32 seconds ago
README.md	tidied up	32 seconds ago
intro_to_python_students.ipynb	finalised material	16 hours ago
intro_to_python_students_SOLUTIONS.ipynb	finalised material	16 hours ago
slides.odp	tidied up	32 seconds ago

README.md

A brief (2h) introduction to programming in Python for absolute beginners

The course was developed and delivered by Mirta Stantic and Timo Flesch.

A brief intro to Python, designed for 2nd year undergraduate students in Experimental Psychology and Biomedical Sciences at the University of Oxford.

"This course will introduce you to Python programming and will assume no previous knowledge of other programming languages. We'll skip the basics of setting up the programming environment to teach you how to assign values to variables, manipulate data formats and data sets, use basic scientific visualizations and basic statistics. We'll introduce you to loops, conditionals and functions and discuss some of the most important libraries in the scientist's toolkit.

This class might be of particular interest to those who are interested in doing computational work in the future – whether academic or in industry. Python is the most widely used programming language amongst data scientists in the industry but also an incredibly powerful tool to have at your disposal should you choose to continue your academic career.

No prerequisites expected. Resources for those who are interested in learning more will be provided in the interactive worksheet in class."

How to get started

Click on the "launch in binder" button below. This will open a new website where you'll find further instructions.

[Launch binder](#)

Python Practical

2. Click on “launch binder”

How to get started



Click on the “launch in binder” button below. This will open a new website where you'll find further ir



Python Practical

3. Stare for a while at this screen:

Thanks to Google Cloud, OVH and GESIS Notebooks for supporting us 🙏!



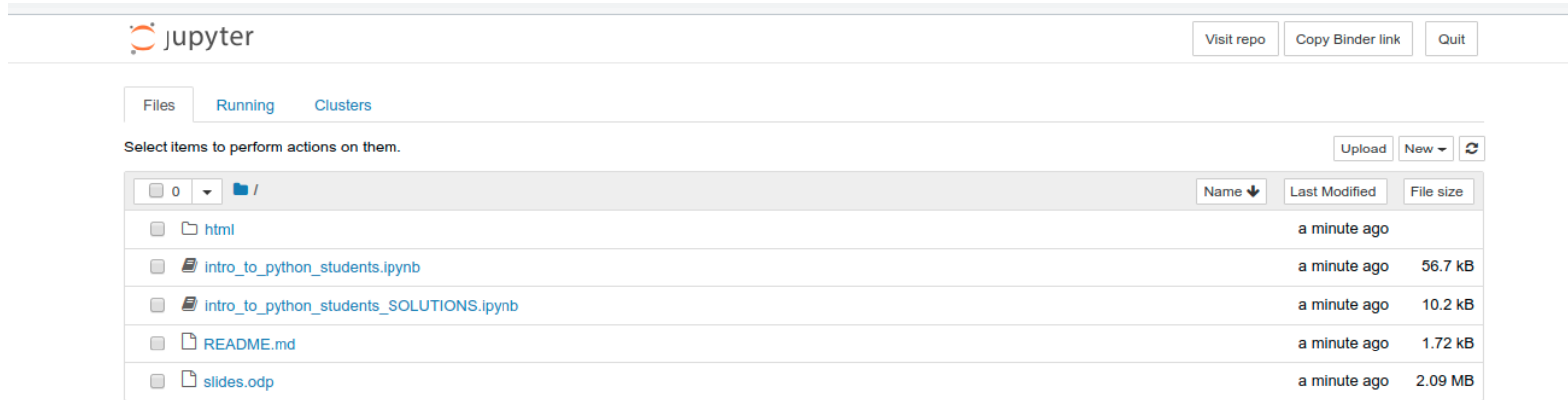
Starting repository: TimoFlesch/intro2python/master
New to Binder? Check out the [Binder Documentation](#) for more information

Build logs

```
Step 32/52 : ARG REPO_DIR=${HOME}
--> Using cache
--> 0f786aa72c16
Step 33/52 : ENV REPO_DIR ${REPO_DIR}
--> Using cache
--> 79b94ba47762
Step 34/52 : WORKDIR ${REPO_DIR}
--> Using cache
--> 0d4a73bfcbad
Step 35/52 : ENV PATH ${HOME}/.local/bin:${REPO_DIR}/.local/bin:${PATH}
--> Using cache
--> c44c857cfd08
Step 36/52 : ENV CONDA_DEFAULT_ENV ${KERNEL_PYTHON_PREFIX}
--> Using cache
--> 348532062956
Step 37/52 : USER root
--> Using cache
--> 5f1702c7a308
Step 38/52 : COPY src/ ${REPO_DIR}
```


Python Practical

4. Now this screen should show up

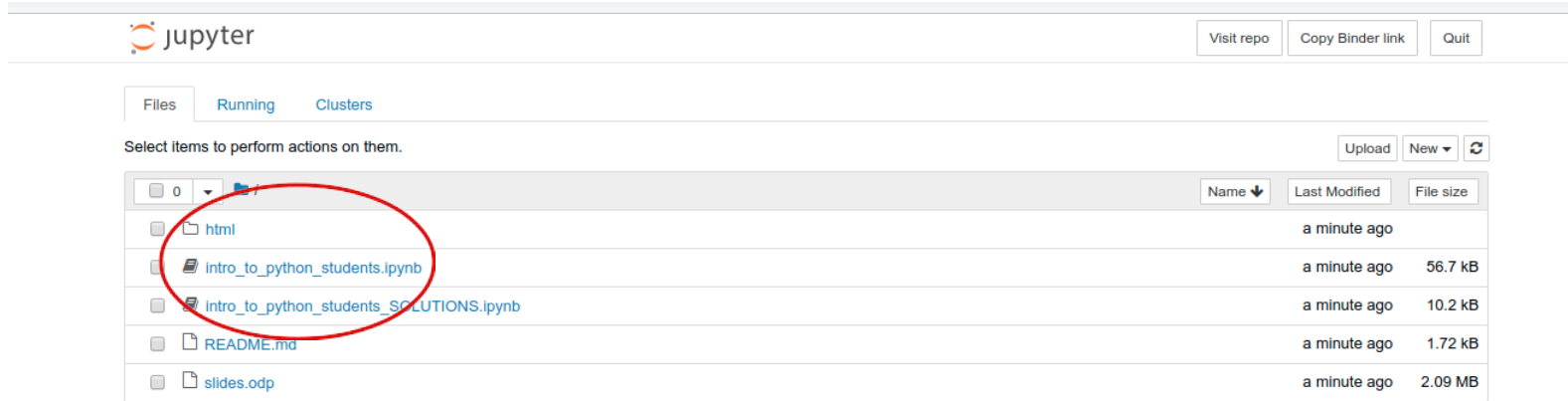


From here you can open the worksheet that we have provided for you.

This will run an interactive python session in your webbrowser, where you can write and execute your own python programs

Python Practical

4. Now this screen should show up



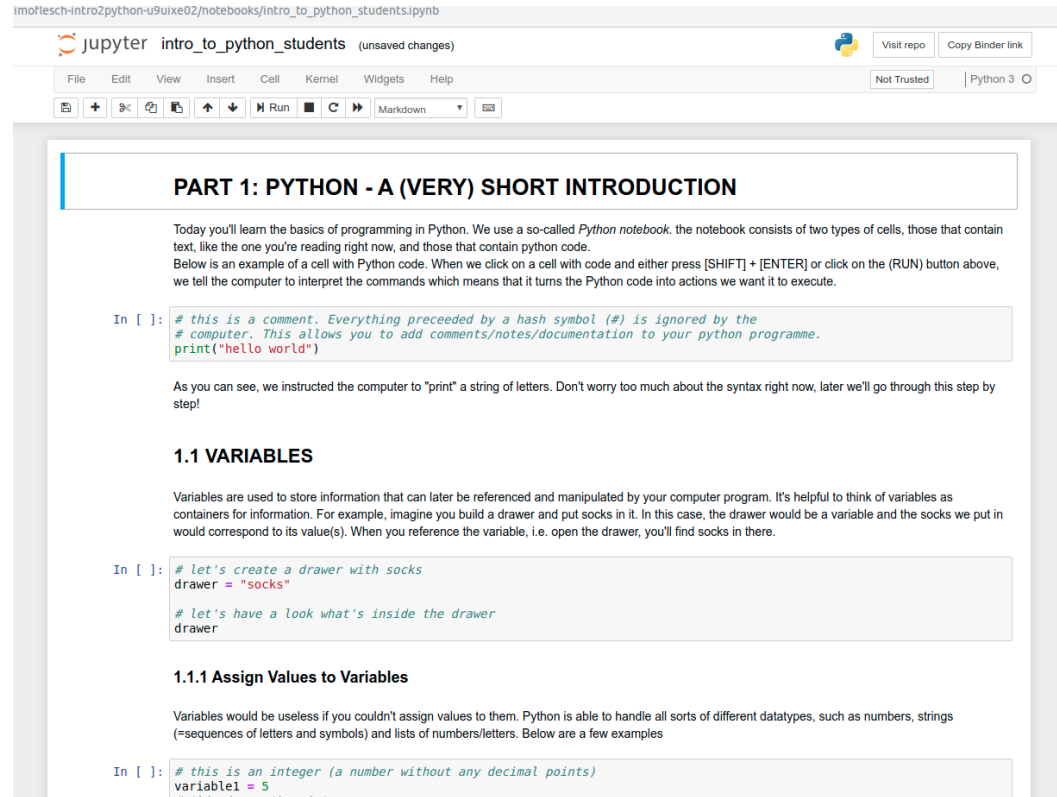
From here you can open the worksheet that we have provided for you.

This will run an interactive python session in your webbrowser, where you can write and execute your own python programs

Click on “intro_to_python_students.ipynb”

Python Practical

5. You're now running an interactive worksheet with python code in your web-browser.
Have fun :-)



The screenshot shows a Jupyter Notebook interface in a web browser. The browser address bar shows the URL: `imoflesch-intro2python-u9uixe02/notebooks/intro_to_python_students.ipynb`. The Jupyter logo and the notebook title "intro_to_python_students (unsaved changes)" are at the top. Below the title bar is a menu bar with "File", "Edit", "View", "Insert", "Cell", "Kernel", "Widgets", and "Help". To the right of the menu bar are buttons for "Visit repo", "Copy Binder link", "Not Trusted", and "Python 3". Below the menu bar is a toolbar with icons for file operations, running, and markdown. The main content area has a title "PART 1: PYTHON - A (VERY) SHORT INTRODUCTION" in a blue-bordered box. Below the title, there is a paragraph of text explaining the basics of programming in Python and the concept of a Python notebook. This is followed by a code cell with the following code:

```
In [ ]: # this is a comment. Everything preceeded by a hash symbol (#) is ignored by the
# computer. This allows you to add comments/notes/documentation to your python programme.
print("hello world")
```

Below the code cell, there is a paragraph of text explaining the output of the code. This is followed by a section header "1.1 VARIABLES". Below this, there is a paragraph of text explaining the use of variables. This is followed by another code cell with the following code:

```
In [ ]: # let's create a drawer with socks
drawer = "socks"

# let's have a look what's inside the drawer
drawer
```

Below the code cell, there is a section header "1.1.1 Assign Values to Variables". Below this, there is a paragraph of text explaining the use of variables. This is followed by a final code cell with the following code:

```
In [ ]: # this is an integer (a number without any decimal points)
variable1 = 5
# this is another integer
```

Outlook

Learn coding!

1. A complete course <https://www.learnpython.org>
2. ditto <https://www.w3schools.com/python/>
3. Advanced Course <https://automatetheboringstuff.com>

How to install Python

1. Just python <https://www.codecademy.com/articles/install-python>
2. The Jupyter notebook (the thing you've been working with today)
<https://jupyter.org/install>
3. Anaconda (a collection of useful packages and other software for data scientists)
<https://www.anaconda.com/distribution/>

Outlook

Text Editors

1. atom editor <https://atom.io/>
2. vscode <https://code.visualstudio.com/>
3. Sublime <https://www.sublimetext.com/>

All in One Solutions

(Similar to the Matlab interface or R-Studio)

1. Spyder (free) <https://www.spyder-ide.org/>
2. Pycharm (free basic and commercial pro version) <https://www.jetbrains.com/pycharm/>

Outlook

Text Editors

1. atom editor <https://atom.io/>
2. vscode <https://code.visualstudio.com/>
3. Sublime <https://www.sublimetext.com/>

All in One Solutions

(Similar to the Matlab interface or R-Studio)

1. Spyder (free) <https://www.spyder-ide.org/>
2. Pycharm (free basic and commercial pro version) <https://www.jetbrains.com/pycharm/>

Outlook

Coding Challenges

1. Hackerrank <https://www.hackerrank.com/>
2. Leetcode <https://leetcode.com>

Python for Psychologists

<https://www.marsja.se/best-python-libraries-psychology/>

Outlook

Coding Challenges

1. Hackerrank <https://www.hackerrank.com/>
2. Leetcode <https://leetcode.com>

Python for Psychologists

<https://www.marsja.se/best-python-libraries-psychology/>