Idealistic Python & Shell Course

09:30 to 16:30
November 21-25, 2022
Course room 2, Forum 3
Campus Virchow Clinic
Charité Universitätsmedizin, Berlin

An introductory course on Python programming and using the command line (shell), with no assumed programming or other computing knowledge.

Overview

Although the narrow aim is to turn you into a Python programmer, the broader one is to show you how to work effectively on data via programming. In addition to learning Python, we will spend a lot of time working with the bash shell (also a programming language) from the command line, and writing small shell scripts (i.e., programs written in the shell language). There are many applications of programming we could cover. These will certainly include reading data (from Excel or CSV/TSV files) and use them to make plots for publications; bioinformatics packages (BioPython, numpy, pandas) and tools; the importance of testing code and data; source code control (git & GitHub). We'll collectively decide what to focus on, depending on your interests and needs.

When non-programmers working with data run into a problem they cannot solve with pre-existing tools (e.g., Excel), the reaction is usually either to ask someone else for help, to do it manually, or to give up. In this course we will add another option: write a program. The course aim is concrete and modest: turn you into someone who, when faced with a data problem, thinks "I can write a quick script to solve that problem" (and then does so). Many people go back to their regular lives after taking courses, don't put into practice what they learned, and eventually forget it all. I don't want that to happen with our course. We'll aim to turn everyone into an active programmer. To get you going on a path that fundamentally changes how you work with data for the rest of your career. It's impossible to learn everything about programming in a week, but it is possible to take the crucial first steps and to make them stick.

Although I will formally lead the course, it will only be successful if it is a group effort. Attitude is extremely important. We'll get past the initial learning hump, teach each other (so if you already know a bit more, please come with the intention of helping others

catch you up), learn by doing, learn where to find help, and end up with a small group who can continue to encourage and help each other in the longer term. Hence “idealistic”.

There is no *a priori* course agenda. We will work on simple, relevant real problems, rather than working our way through abstract programming concepts and exercises. We’ll solve practical problems that are just over the horizon of what one can do manually. Things that are very hard, error prone, and time-consuming by hand but easy and fast with a little code. If you have data and/or problems you'd like us to work on, please bring them.

Running the course is a big time commitment for me, so I will expect a similar commitment from you :-) Please plan to dedicate as much time as possible to the course. That means spending your days in the class, and preferably spending your evenings reading, programming, learning, doing homework tasks, etc. Make sure you have the time to really throw yourself into the course. If you can't commit this time around, don't worry, I will run the course again.

Logistics

- If you cannot make it to the course, please let me know.
- The course will be held in course room 2 in Forum 3 of the Charité Campus Virchow Clinic, here https://goo.gl/maps/z9bTWEzUAzmEEPPeA
- The main entrance to the campus is right by the Amrumer U-bahn stop. There are other entrances. E.g., the one on Seestraße is close to the Forum building.
- Note that the Virchow campus is not the same as the Mitte campus (where our Institute of Virology is located, 3.5km southeast of the Virchow campus).
- If you do not have a Charité id card, you will need an invitation letter to get onto the campus. As far as I know, this applies to five of you: **Aramish Fatima, Beatriz Bellido, Eva Neugebauer, Lily Montague,** and **Willemijn Rijnink**. The name on your invitation letter should match whatever other id you bring (passport, national id card, etc). **Please let me know if your invitation should be for a different name.**
- The course is completely full - we’re at the maximum allowed room capacity.
- **You will need to wear an FFP2 mask.**
- It’s completely fine if you have to miss some part of the course due to other committments. But try not to!
- I am assuming we will all be able to use eduroam for wifi connections. **If you don’t have eduroam, please let me know.**

Preparing for the course

You'll need to bring a laptop. If you don't have one, **let me know ASAP** and I'll see if I can arrange something.

There are three things that are closely tied together in what you'll be doing in the course. 1) You'll write code in the Python language. 2) You'll do that in a text editor. You'll then 3) run those programs on the command line (using bash). You will (hopefully!) become comfortable with those three tools during the course.

Even though this is a course for people with zero background, it will help a lot if you can manage to do a few setup things **before the course**. I ask this so we don't spend literally half of the first day with me going around to people's laptops one by one, swearing at Windows. I have better reasons to swear at Windows, as you will see.

Windows users

Please install Windows Subsystem for Linux (WSL). Installation instructions are at https://learn.microsoft.com/en-us/windows/wsl/install Use the default (Ubuntu) Linux operating system that it will install (don't worry, this has nothing to do with you running Windows on your laptop, it just installs Linux as a "virtual machine").

Once you have WSL installed, run it and it should open a black window with a prompt that you can type commands at (try: date or echo Hello World). This is the "shell". We'll do a lot with it during the course. Then, try to get copy & paste to work. You will want to be able to copy text (e.g., from your browser) and paste it into the shell window. It might work out of the box, using control-shift-c and control-shift-v (instead of the usual control-c and control-v that you use in Windows).

Mac users

Regarding the shell, you should be good to go. You can use the Terminal program (in Applications / Utilities) for entering commands. If you like, you could install iterm2 (https://iterm2.com/).

If you don't have brew, you should install it (see instructions at https://brew.sh/). It's a software package manager that will make your life much easier. Once you have brew installed, you can install Python version 3 by running `brew install python3` on the command line.

Everyone

Install a text editor

If you don't know what a text editor is or don't have one installed, please install Sublime Text (https://www.sublimetext.com/) or some other text editor of your choosing (there are many). Note that **Microsoft Word is not a text editor**, or at least not the kind you're going to need. Sublime Text is very nice. I usually get people to use it, though I don't use it myself as I am too old and cranky.

Make yourself a GitHub account

At https://github.com/ and let me know your username. I can then add you to a GitHub group that will allow you to see various code repositories.

Optionally

Try installing miniconda

See https://docs.conda.io/en/latest/miniconda.html Don't worry if you can't get this set up, it can be slightly tricky.

Play with bash shell

It would be good to familiarize yourself a little with the command line (sometimes referred to as “the terminal”, “the shell”, or bash). You can of course find intro tutorials online.

Learn a bit of Python

You could try learning some Python (version 3.6, or higher) ahead of time. E.g., see https://www.codecademy.com/learn/python or http://learnpythonthehardway.org or any other online course or video or book, etc.

Join us on Slack

Some Charité virology members use Slack. We have a `#python` channel, and you’re welcome to join in. Send me an email if you’d like me to add you.