PhD Course on Python Language and Programming

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Some of your possible motivations to take this course…

Because it’s *fun*;

because it will eventually free you by the *slavery* and dependence from programs written by others

because you would like to understand what programs really do under the hood…

Some *less obvious* motivations…

Writing code to solve any problem means:

to be *forced* to deeply understand the problem

to be *forced* to understand the required algorithms very precisely

to strengthen your logic and skills in the analysis of problems

to *learn* to think *algorithmically*

What you will get from this course…

You will learn the basic tools for writing codes in order to organize, to manipulate and to elaborate data

Essentially to understand and write (*esoteric*) code like that…

```
for iset, ix, iname in zip(set_list, x, set_name):
    exec(iset + '= data_class(iname, ix)')

l_set=list(eval(iset) for iset in set_list)
sets=np.array(l_set, dtype='object')
```

but…

… *but, if you really want to learn, you must practice a lot…*

learning how to use a programming language is much like learning a foreign language:

just studying the *grammar*, the *syntax* and learning by heart a more or less rich *vocabulary* is *definitely not enough*: you must *practice the language* until, al least, you start to *think in that language*!

So, you should start…

Why Python?

Python is *open source*

it is relatively young (*born* in the 90s), so probably it will last for many years to come

it is widely popular

it has a very large community of developers

You easily find help for any problem you might have

if you look for some particular feature or function, it is probable that someone else already developed it…

What is Python?

High level language
Interpreted
Supports *OOP* (*O*bject *O*riented *P*rogramming)

Main advantage over compiled languages: interactivity

main disadvantage: relatively low efficiency

Where to find (valuable) support…

Official sites

python.org

anaconda.org

numpy.org

scipy.org

pandas.pydata.org

sympy.org

Conferences and Tutorials

conference.scipy.org

YouTube playlist of tutorials

2019

2018

2016

2014

Specific topics

Pandas (David Chen 2019)

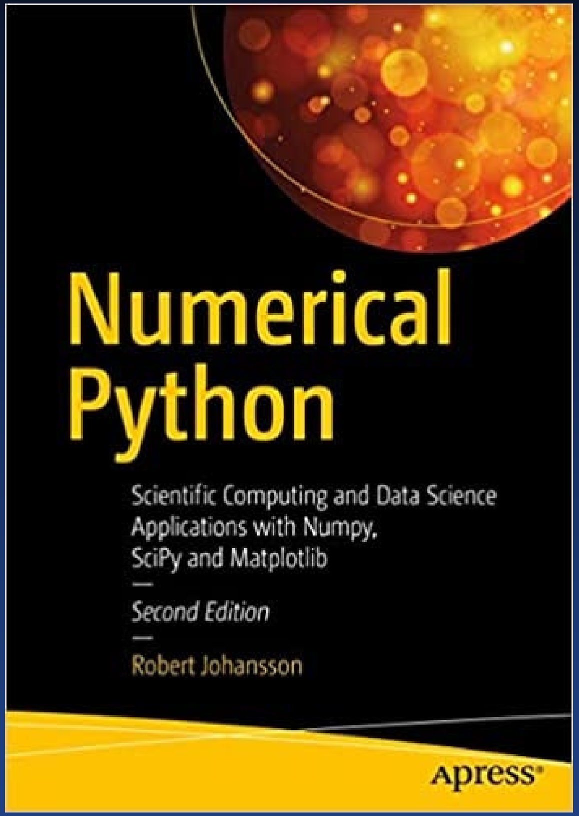
Numpy (Alex Chabot-Leclerc; 2019)

Conferences by Bob Martin (Uncle Bob)
A must!

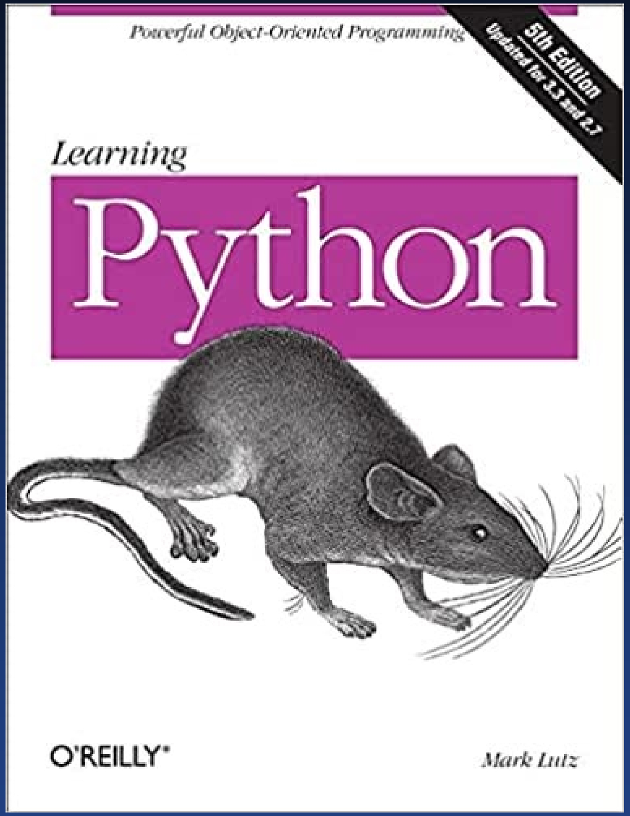
Logics

Clean code

Books


Numerical Python
Scientific Computing and Data Science Applications with Numpy, SciPy and Matplotlib
Second Edition
Robert Johansson
Apress

Overview, recipes, practical advices, specialized topic in scientific computing



Very in depth analysis of the language: *logics*, grammar, syntax

Topics specifically covered in this course

Variables and types

conditional and cycles

functions

files

variable scoping

Basic elements of the language

Python, Numpy, Matplotlib (Pandas)

Object Oriented Programming
Structuring the code → classes

least squares and general fits

Matplotlib

Some specialized aspects

(Scipy)