Elective Courses for PhD students 2018

Programming Basics for Biologists	
Offered by:	International Max Planck Research School for Cell, Developmental and Systems Biology (IMPRS-CellDevoSys)
Lecturer:	Florian Jug, Pavel Tomancak
Date:	04 - 06 April 2018
Time:	9:00 – 18:00
Location:	CSBD Seminar Room 2 (3rd floor)
Target audience:	Beginners
No of participants:	up to 12 PhD students
Registration deadline:	31 January 2018
Pre-course work:	Install the tools on your computer!
Course requirements (pre-existing knowledge):	You need to bring your own laptop. We will ask you to install a series of tools before the course. Detailed instructions will be given to you online.

COURSE AIM:

Discoveries in biology are driven as much by computer analysis as by laboratory work. In this course, students will learn the theory and practice of computer programming with emphasis on the practical techniques and problem solving skills required to use computer programming in biological research. We will use the freely available scripting language PYTHON. Nevertheless, all thought concepts translate to other languages. We intend to cover the basics of procedural programming, the very basics of object oriented programming, best practices in source code management using GIT/GitHub, and will then focus on the ability to use online resources to find solutions for typical problems.

After the course, you will be able to write your own python programs that can help you to analyze data from text files, binary files, or even image files. You will be able to apply your analysis not only to single, but also to many files and folders at once. The obtained results you will be able to plot and visualize in various ways. Additionally, you will be capable of asking google (or StackOverflow) the right way to find solutions for programming problems the course could not cover within 3 days. Last but not least you will have used GIT and GitHub, allowing you to collaborate with others on all your future programming projects.

COURSE CONTENT/ METHODS ENCOUNTERED DURING THE COURSE:

- Programming skills: programming primitives (loops, ifs, basic data structures, modules, functions, etc.), basics of object oriented programming.
- Python: installation of useful packages, writing modules and classes, code reuse, loading data and images from file, batch processing files and folders, basics of plotting analysis results, storing results to disk.
- Using online resources: How to use google, StackOverflow, etc. to find what you need.
- Fiji scripting: how to use python (jython) within Fiji to automate your image analysis.
- Collaborative programming: using GIT and GitHub (GitLab) for your source code, collaborative programming, and bugfixing.

COURSE STRUCTURE:

This course will be very hands-on. In the mornings, we will present the exercises for the day and present all needed concepts. The remainder of the day you can interact with the other course members and instructors in order to find your preferred solution(s).

The day will usually end with short presentations by selected students, showing off their way to solve the tasks at hand.

BACKGROUND READING:

This is an introductory course that does not assume prior knowledge.

Students with prior experience will be given more challenging exercises.

If you cannot wait, here is a nice online Python tutorial:

https://www.learnpython.org