

# Preparing the next generation of scientists

## A TARGETED CURRICULUM DEVELOPED BY THE COMPUTATIONAL BIOLOGY DEPARTMENT

In 2016, upon request from the General Board of Directors, the Hub of bioinformatics and biostatistics in collaboration with the Image Analysis Hub developed a training program dedicated to PhD students. According to their background, students are strongly encouraged to validate the statistical modules, and choose additional bioinformatics and image analysis modules.

## A CORE FOUNDATION AND THE OPTION TO SPECIALIZE

Common core courses are mandatory for all IP PhD students. They include an introduction to reproducible research, experimental design and good scientific conduct. Each student then chooses a track of additional modules — R Programming and Statistics, Bioinformatics or Image Analysis — according to their background and field of research. We strongly encourage students who are not familiar with R or statistics to follow the corresponding modules.

## INSTITUTIONAL RECOGNITION

This PhD program has been acknowledged by the doctoral schools CdV, FIRE, SDSV and Bio SPC.



## MORE INFORMATION

### COURSE WEB PAGES

Updated information on the courses, as well as course content and descriptions are available on the main web-page:

<https://research.pasteur.fr/fr/course/bioinformatics-program-for-phd-students-2022-2023/>

Course material, attendance sheets and other practical information will be made available on Moodle:

<https://hub-teaching.pasteur.fr/moodle/>

### CONTACT

Get in touch with the teaching team about education and training at: [bioinfo-program@pasteur.fr](mailto:bioinfo-program@pasteur.fr)

### TEACHERS

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# Bioinformatics program for PhD students

**ACADEMIC YEAR 2022-2023**

Bioinformatics and Biostatistics Hub / Image Analysis Hub

# Mandatory common core

This seven-hour course is required for all PhD students. The following topics will be covered:

- Description of the courses, the Department of Computational Biology, and the Hub of Bioinformatics and Biostatistics, and the Hub of Image Analysis
- Computer science 101
- Introduction to experimental design
- Good practices and reproducibility
- Ethics, good scientific conduct, and plagiarism

Between lectures, students will have the opportunity to assess their R programming and statistics level to help them choose which module to attend.

SESSION 1: October 21, 2022 (all day: 9h30-13h00 and 14h00-17h30) - Building Lwoff, room Retrovirus

SESSION 2: February 17, 2023 (all day: 9h30-13h00 and 14h00-17h30) - Building Lwoff, room Retrovirus

# R Programming and Statistics (RS)

Knowledge of R Programming and Statistics is strongly recommended for all Institut Pasteur PhD students. Students already proficient in any one of these topics can skip any or all modules in this track.

## RS1 Introduction to R and Statistics

- FR SESSION 1 (12h): November 7-10, 2022 (mornings) - Teams
- SESSION 2 (18h): April 3-5, 2023 (all day) - rooms 2 and 3

## RS2 Hypothesis testing (12h)

- FR SESSION 1: November 14, 15, 17, 18, 2022 (mornings) - Teams
- SESSION 2: April 6, 7, 2023 (all day) - rooms 2 and 3

## RS3 Linear models (12h)

- FR SESSION 1: November 28, 29, December 1, 2, 2022 (mornings) - Teams
- SESSION 2: April 11, 12, 2023 (all day) - rooms 2 and 3

## RS4 Multivariate analyses (12h)

- FR SESSION 1: December 5, 6, 8, 9, 2022 (mornings) - Teams
- SESSION 2: April 13, 14, 2023 (all day) - rooms 2 and 3

# Bioinformatics (B)

In this track, we propose modules covering a wide range of bioinformatics tools used to treat and analyze -omics data. Please check the prerequisites before registering.

## B1 Unix basic commands (12h)

March 20-21, 2023 (all day) - room 6

## B2 Introduction to sequence analysis (12h)

March 22-23, 2023 (all day) - room 6

## B3 Refresher on utilities for HTS data analysis (6h)

March 24, 2023 (all day) - room 6

## B4 Basic concepts in HTS data analysis (6h)

March 27, 2023 (all day) - room 6 Prerequisite: B4

*B3- and B4-dependant modules:*

## B5 Expression, quantification, differential analysis (6h)

March 28, 2023 (all day) - room 6 Prerequisites: B3 + B4

## B6 Variant calling (6h)

March 29, 2023 (all day) - room 6 Prerequisites: B3 + B4

## B7 Genotype data and association studies (6h)

March 30, 2023 (all day) - room 6 Prerequisites: B3 + B4

## B8 ChiP-seq data analysis (6h)

March 31, 2023 (all day) - room 6 Prerequisites: B3 + B4

*B5-dependant modules:*

## B9 Single cell analysis (12h)

April 17-18, 2023 (all day) - room 6  
Prerequisites: B1 + B5

## B10 Functional analysis (12h)

April 19-20, 2023 (all day) - room 6  
Prerequisites: RS1 + B4 + B5

## B11 Advanced UNIX commands (12h)

May 11-12, 2023 (all day) - room 6 Prerequisite: B1

# Image Analysis (IA)

This track serves as a practical introduction to the common tools of BiImage Analysis. It is designed for students with no prior knowledge in image analysis.

## IA1 Getting started in BiImage Analysis with Fiji (6h)

SESSION 1: January 10, 2023 (all day) - room 5  
SESSION 2: June 27, 2023 (all day) - room 5

## IA2 Using machine learning for BiImage Analysis (3h)

SESSION 1: January 11, 2023 (morning) - room 5  
SESSION 2: June 28, 2023 (morning) - room 5

## IA3 Analysis of histopathology images with QuPath (3h)

SESSION 1: January 11, 2023 (afternoon) - room 5  
SESSION 2: June 28, 2023 (afternoon) - room 5

## IA4 Bioimage analysis with Python (6h)

SESSION 1: January 12, 2023 (all day) - room 5  
SESSION 2: June 29, 2023 (all day) - room 5

# Inscription

We remind you that registering for a course commits you to attend. If something unexpected prevents you from attending, contact [bioinfo-program@pasteur.fr](mailto:bioinfo-program@pasteur.fr).

## PRACTICAL DETAILS

### Language

Courses are taught in English except when marked with the FR symbol, in which case they are held in French.

### Times for RS, B and IA modules

Morning = 9h30 - 12h30 (9:30am-12:30pm)

Afternoon = 14h00 - 17h00 (2-5pm)

All day = 9h30-12h30 and 14h00 - 17h00 (9:30am-12:30pm and 2-5pm)

### Locations

Rooms 2, 3, and 6 are in the Education Center. Room 5 is in the "module" below the cantine.