Teaching Activity
PhD Programme in Biosciences

DIPARTIMENTO DI BIOLOGIA
UNIVERSITÀ DEGLI STUDI DI PADOVA

Teaching Activity 2025-2026

The training activities in our PhD Program are founded upon three primary pillars: course attendance, seminar participation, and involvement in the Journal Club activities.

Courses

The courses proposed by our PhD Programme are divided into Interdisciplinary Courses and Thematic Courses, the complete list is reported below. Students are required to enroll in each course they plan to attend by filling the **course enrollment form** that will be available in the moodle web platform and that will be opened by the PhD Office, at the beginning of each academic year. Once the student is enrolled in a course his/her attendance will be mandatory. For the courses proposed by our PhD Program, the **Course Certification of the Attendance** (available on moodle) will be signed and approved by the Instructor of the course.
In addition to these courses, external courses may also be considered after approval of a written request signed by the Student and the Supervisor and sent to the PhD Office. At the end of the course, in order to get recognition of attendance for external courses, students shall obtain a certificate of attendance signed by the Instructor.

Seminars

Seminars proposed by the PhD Programme are announced by email by the PhD Office. Seminars external to our Course may also be considered. In order to certificate the attendance of the seminar students shall bring with them the **Seminar Certificate of Attendance** sheet (available on moodle), fill it in with the required information and have it signed by the speaker.

Journal Club

Journal Club activity is mandatory and is organized by members of the Academic Board. Students have to critically present a recent paper to other PhD students. The topic of the paper has to be general enough to be of broad interest. Attendance to JC meetings must be at least 75%.

Requirements and duties

Teaching Activity requirements **for students from the 40° cycle onwards** are the following:

I year

- Minimum of 3 CFU for Courses/summer school
- 3 CFU for Journal Club
- Minimum of 2 CFU for Seminar Cycles

II year

- Minimum of 3 CFU for Courses/summer school
- 3 CFU for Journal Club
- Minimum of 2 CFU for Seminar Cycles

III year

- 3 CFU for Journal Club
- Minimum of 2 CFU for Seminar Cycles

Your training activities will be reported in a **Progress Report** document, which must be endorsed by your Supervisor and submitted following the indication provided by email by the PhD Office at the conclusion of each year (specific deadlines will be communicated via email by the PhD Office).

Index of Interdisciplinary Core Courses

Index of Thematic Courses

Abstract, Schedule and Location - Interdisciplinary Core Courses

How to design and perform an experiment (12 h - 2 CFU)

Instructors: Prof. Graziano Martello

Location: To be defined
Schedule: To be defined

Description: The course comprises both lectures and practical activities, focused on how to design and perform experiments, and how to interpret and present results. I will draw parallels between how we make decisions in our everyday life and how we should perform experiments. We will discuss several examples, ranging from simple biological experiments to bioinformatic analyses.

Fellowship and grant writing (20 h - 3 CFU)

Instructors: Prof. Luca Scorrano

Location: To be defined
Schedule: To be defined

Description This course aims at providing PhD students with basic principles on how to write convincing fellowship and grant applications. The course is organized in three intertwined blocks of lessons. The first block deals with the basic principles of the scientific method applied to biology, to provide a conceptual framework for grant applications. The second block of lessons uses hands-on examples of fellowships and grants to explain basic features of grantsmanship. Students are then asked to write a 2-page fellowship proposal on their topic of choice, using an EMBO fellowship like format. These proposals are due before the third block of lessons when we go through them and rank them as if we were a reviewing panel. The course is mostly flipped classroom and group work, except for the fellowship proposal that is of course individual.

Notes for statistical data analyses (20 h - 3 CFU)

Instructor: To be defined
Location: To be defined
Schedule: To be defined

Description: This course provides an introduction to statistical methods commonly used in biological research. The emphasis will be on understanding fundamental statistical concepts and applying them to biological data analysis. Topics covered include descriptive statistics, hypothesis testing, correlation and regression analysis, and basic concepts of parametric and non-parametric statistical inference. Students will learn how to apply these methods using R statistical software.

The power of your experimental design: statistical aspects of your experimental design (10 h - 2 CFU)

Instructor: Prof. Chiara Romualdi
Location: To be defined
Schedule: To be defined

Description: The course will offer an overview of statistical power computations across a range of experimental designs, encompassing single-sample designs, two-sample designs, case-control designs, and other experimental designs based on the Analysis of Variance model. Key concepts such as statistical power, statistical precision, sample size, and effect size will be examined. Demonstrations of statistical power computations will be conducted using various software tools, including free online web applets and G*Power. Additionally, participants will engage in practical exercises involving power computations throughout the course.

Science Communication: How to communicate the impact of scientific projects to various audiences (13 h - 2 CFU)

Instructor: To be defined
Location: To be defined
Schedule: To be defined
Description:
In this course/these seminars/workshops PhD students will learn how to effectively communicate scientific and technical information to different audiences, in various contexts and situations. They will practice selecting the suitable language, appropriate content and messages. They will learn to stress the value and the impact of their scientific projects, avoiding discipline-specific jargon and terminology.

Abstract, Schedule and Location - Thematic Courses

Gene Editing (5 h - 1 CFU)

Instructors: Prof. Milena Bellin

Location: To be defined
Schedule: To be defined

Description: CRISPR-Cas system has revolutionized the field of genome engineering. This course will give a broad overview of the different and recent genome editing technologies, focusing on CRISPR-Cas, its discovery, applications, and the latest derived CRISPR-Cas based editing tools. Practical examples will be presented to show the advantages and limitations of the different strategies.

Evolution under anthropogenic pressures and conservation (5 h - 1 CFU)

Instructors: To be defined
Location: one day in Chioggia
Schedule: To be defined

Description: The day will consist of a sequence of seminars on the topic mentioned in the title, a visit to the Fish market of Chioggia (with discussion on conservation and species vulnerability to exploitation), and a visit to the Museum of Adriatic Zoology (with discussion of consequences of exploitation on biodiversity, using the Adriatic Sea as an example).

Fluorescence microscopy III: imaging in high throughput settings to accelerate your research. (10 h - 2 CFU)

Instructors: Prof. Marta Giacomello

Location: To be defined
Schedule: To be defined

Description:

Microscope imaging analysis (10 h - 2 CFU)

Instructors: Prof. Francesco Argenton, Dott.ssa Nicoletta Plotegher,
Location: To be defined
Schedule: To be defined

Description: The aim of this course is to provide a formal understanding of what digital images are and how this makes them suitable to be mathematically handled in order to get more insights into our biological data. This will be done by means of a combination of traditional presentations on the topic, of exercises and discussion on data provided by the teachers or by the students. The course will be organized as follows:

- principles of image analysis, math on images, ImageJ/Fiji, n-dimensional images, image analysis: shape/density, ROIs, background. Examples and exercises based on what was discussed in class. (4 hours)
- most common errors in Image Analysis -> (1) sample preparation; (2) asking the right question; (3) image acquisition; (4) image analysis: automated vs manual analysis, machine learning applications. Discussion about the errors and how to avoid them. (2 hours)
- analysis of images provided by the students. (2 hours)

Fundamentals of Evolutionary Biology (20 h - 3 CFU)

Instructors: Prof. Gil Rosenthal
Location: To be defined

Schedule: To be defined

Description: This course is designed to prepare PhD students across the life sciences with basic concepts in evolutionary biology and with the quantitative framework to apply and develop new analytical tools. The course is organized as ten, two hour lectures each featuring a critical reading from the scientific literature and a participatory in-class problem set. *Recommended reading: D. Futuyma, M. Kirkpatrick, Evolution.*

1 Evolution: History meets probability theory.
2 Binomial sampling, conditional probabilities, and population genetics
3 Population substructure and selection
4 Quantitative genetics and evolutionary constraint
5 Assortative mating, incompatibilities, and speciation
6 Phylogenetics and comparative biology
7 Evo-devo, genotype to phenotype and G X E
8 Nongenetic inheritance: from methylation to culture
9 Social evolution and indirect genetic effects
10 Eco-evolutionary feedbacks and global change

NextGen DNAseq/RNAseq analysis (10 h - 2 CFU)

Instructors: Dott. Mirko Pegoraro

Location: To be defined
Schedule: To be defined

Description: The course provides instruction on processing next-generation DNASeq/RNAseq data. The course begins with a lesson aimed at clarifying the inquiries addressed by Next-Generation Sequencing (NGS) and comprehending the files produced by both sequencing technology and data analysis. Subsequently, a demonstration is conducted on the analysis and visualization of RNA-Seq data. Participants are required to have access to a PC/laptop with internet connectivity and Linux.