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: Aula L, Vallisneri
Schedule: January 9, 16, 23, 30 14:00-17:00

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 (12 h - 3 CFU)

Instructors: Prof. Luca Scorrano
Location: Vallisneri
Schedule: June-July 2026

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: Prof. Federico Ferraccioli
Location: Aula 0B, Vallisneri
Schedule: January 2026, 26, 27, 28, 29, 30; 9:00 - 12:00

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: Aula 0B, Vallisneri
Schedule: February 2026, 3, 4, 5 - 10:00-12:30

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: Ralf Dahm & Prof. Natascia Tiso
Location: Vallisneri, room to be defined
Schedule: 16 June 2026 9:00-12:00 - 14:00-17:00; 17 June 2026 9:00-12:00

Description:
Description: This course explains the fundamentals of science communication and fundraising:
• The basic principles of good communication.
• How to prepare and deliver captivating scientific talks.
• How to design appealing posters.
• How to write clear and convincing scientific texts e.g. papers, applications.
• How to compile a compelling job application.
This course will comprise:
• Introductory lectures on the topics outlined above.
• Practical sessions during which participating students present their projects (in talks or on posters), grant proposals and job applications, and the tutors and other participants give feedback on a student's presentation/other materials.

Science Communication (13 h - 2 CFU) (Biomedical Sciences & Biosciences)

Instructors: Dr Elisabetta Mutto Accordi
Location: Vallisneri 5° piano nord
Schedule: January-February 2026 -
Note: the course is dedicated to students of the 3rd year and secondly to students of 2nd year. First-year students will be invited only if there are still places available.

Description:
Science communication is the practice of sharing scientific knowledge, research findings and technical information to non-expert audiences. This programme introduces the fundamental information that can bring a deep understanding of why Science Communication is important and how it can have an impact at a professional and social level. Starting from the needs, the expectations and the understanding levels of the audiences, the students will learn how to create a relation with the target based on clarity, precision and simplicity. The course will cover strategies to develop empathy and to build trust and credibility.
The programme: Science communication - Communication process - Content selection - Storytelling - Persona Branding - Written communication - Public speaking - PowerPoint presentations
PhD students will learn how to effectively communicate scientific and technical information to different audiences, in various contexts. 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, terminology and unnecessary complexity.
Students will learn how to break down complex topics and present them in engaging and understandable formats, without losing accuracy and ensuring that information is not distorted or oversimplified. They will practice to tailor content using storytelling, framing scientific concepts in compelling and narrative-driven ways, using metaphors and analogies to simplify. They will become skilled at changing their communicative approach, using diverse range of media to meet the needs of the target. They will learn evaluating the effectiveness of their communication by understanding audience feedback.
The program focuses on simulations and exercises in the classroom and on the direct involvement of participants. Students will exchange feedback on their work and refine their communication skills.

Abstract, Schedule and Location - Thematic Courses

Gene Editing (12 h - 2 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: Prof. Carlotta Mazzoldi
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: High content imaging: from low to high throughput approaches. (10 h - 2 CFU)

Instructors: Prof. Marta Giacomello

Location: Vallisneri, aula RI
Schedule: January 2026
12/01 14:30-16:30
13/01 14:00-16:00
14/01 14:30-17:30
15/01 14:00-16:00

Description:
High content imaging (HCI) is an approach that combines automated fluorescence microscopy and multiparametric image analysis. The main aim of HCI is to extract high content data (including morphological, texture, intensity parameters) from an image of a biological sample.
HCI is a three-steps process, including: (i) image acquisition; (ii) image processing; (iii) image analysis. HCI can be used for both medium and high throughput screens, based on fluorescent assays suitable for live 2D/3D biological models or multiplex cell painting.
Besides providing students with fundamental knowledge and skills for the design and analysis of HCI experiments, the course will give them the opportunity to work in groups and design a high-throughput experiment on a biological question of their choice.

Microscope imaging analysis (10 h - 2 CFU)

Instructors: Prof. Francesco Argenton, Dott.ssa Nicoletta Plotegher,
Location: To be defined
Schedule: 8, 9, 10, 11 June 2026 and 10 September 2026 - 10:30-12:30

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: Aula seminari 6° sud, Vallisneri
Schedule: 1,2,4,5 December 2025, 9:30-12:15 - 15:00 - 16:45

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

12. Neurodegeneration (13 h - 2 CFU) (Biomedical & SciencesBiosciences)

Instructors: Prof. Emanuela Zuccaro, Elena Ziviani, Elisa Greggio
Location and Schedule:
March:
10 - 16:00-17:30 seminar room 5th north floor
11 - 16:00-17:30 seminar room 5th north floor
18 - 16:00-17:30 seminar room 5th north floor
20 - 16:00-17:30 seminar room 5th north floor
27 - 16:00-17:30 seminar room 5th north floor

April
3 14:30-17:00 Facility microscopia Practical experience

Description:
The course provides a comprehensive exploration of both the molecular and clinical aspects of neurodegenerative diseases, offering in-depth insights into the clinical features and pathogenesis of a broad range of neurodegenerative diseases, including Alzheimer's disease, Parkinson's disease, repeat expansion disorders, and prion diseases.

NextGen DNAseq/RNAseq analysis (10 h - 2 CFU) -
THE COURSE IS CANCELLED