DIPARTIMENTO DI BIOLOGIA
UNIVERSITÀ DEGLI STUDI DI PADOVA

Teaching Activity 2024-2025

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

II year

- Minimum of 3 CFU for Courses/workshops/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

Course unit English denomination	How to design and perform an experiment
Teacher in charge (if defined)	Graziano Martello
Teaching Hours	12
Number of ECTS credits allocated	2
Course period	January 2025 (10th, 17th, 24th, from 2 to 6 PM)
Course delivery method	☒ In presence ☐ Remotely ☐ Blended
Language of instruction	English
Mandatory attendance	☒ Yes (80 % minimum of presence) ☐ No
Course unit contents	The main critical points and possible mistakes made when designing an experiment will be described, as well as how to carry out an experiment accurately. How to present the results obtained will also be discussed.
Learning goals	Through group activities and classroom discussions, students will acquire the ability to plan an experiment, identifying key controls and possible strategies for estimating the various sources of experimental variability. Finally, the ability to present their results in an intuitive and clear manner will also be acquired.
Teaching methods	Introductory lecture, group activity involving the planning of an experiment, anticipating the different outcomes, critical points and how to present the data. Classroom discussion of the 'experiments' devised by the different groups.
Course on transversal, interdisciplinary, transdisciplinary skills	☒ Yes ☐ No
Available for PhD students from other courses	☒ Yes ☐ No
Prerequisites (not mandatory)	None
Examination methods (in applicable)	Exercises during the classes

Suggested readings	PDF files provided by the teacher.
Additional information	

Denominazione	Science Communication, Fundraising & Career Development
Docente (se già definito)	Teacher: Dr Ralf Dahm Co-Tutor: Prof. Natascia Tiso
Ore	20
CFU	3
Periodo di svolgimento	October 2025 (to be defined)
Modalità di erogazione	☐ In presenza ☐ A distanza ☒ Duale
Lingua di erogazione	Inglese
Obbligo presenza	☒ Sì (80 % minima di presenza) ☐ No
Contenuti del corso	This course will comprise: • Introductory lectures on science communication and fundraising • 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.
Obiettivi di apprendimento	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, such as papers, grant/fellowship applications • How to compile a compelling job application
Metodologie didattiche	Lessons in person and/or online. Exercises will include the preparation and evaluation of written assignments and/or oral presentations.
Corso su competenze trasversali, interdisciplinari, transdisciplinari	☒ Sì ☐ No
Possibile partecipazione di dottorandi di altri corsi	☒ Sì ☐ No
Prerequisiti (non obbligatorio)	Knowledge of the English language.

Modalità d'esame (se previsto)	Exam not required; assignments given during the course. At the end of the course: satisfaction survey.
Materiale studio	PDF files provided by the teacher.
Informazioni aggiuntive	Students will need a PC with a webcam in case of remote lessons.

Course unit English denomination	Science Communication
Teacher in charge (if defined)	To be defined
Teaching Hours	20
Number of ECTS credits allocated	2
Course period	To be defined
Course delivery method	☒ In presence ☐ Remotely ☐ Blended
Language of instruction	English
Mandatory attendance	☒ Yes (75% minimum of presence) ☐ No
Course unit contents	Science communication - Communication process - Content selection - Storytelling - Persona Branding - Written communication - Public speaking – PowerPoint presentations
Learning goals	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 and terminology.
Teaching methods	Non-direct teaching method. Direct involvement of participants through simulations and exercises.
Course on transversal, interdisciplinary, transdisciplinary skills	☒ Yes ☐ No
Available for PhD students from other courses	☒ Yes ☐ No
Prerequisites (not mandatory)	
Examination methods (in applicable)	
Suggested readings	
Additional information	

Course unit English denomination	Notes for statistical data analyses
Teacher in charge (if defined)	Federico Ferraccioli
Teaching Hours	20
Number of ECTS credits allocated	3
Course period	January 2025
Course delivery method	☒ In presence ☐ Remotely ☐ Blended
Language of instruction	English
Mandatory attendance	☒ Yes (80 % minimum of presence) ☐ No
Course unit contents	- Statistical inference: hypothesis testing, interpretation of p-value, types of errors, power. Confidence intervals. The problem of multiple tests. - Basic methods: inference on proportions and means, comparisons of two or more samples. Non-parametric alternatives (Wilcoxon, Kruskall-Wallis). - Advanced methods: One-way or two-way analysis of variance. Introduction to regression models. Introduction to principal component analysis.
Learning goals	- Ability to conduct statistical analyses using some of the widely used techniques and interpret the results. - Ability to critically understand the main statistical methods used in the biological literature.
Teaching methods	- Lectures - Case studies on real data
Course on transversal, interdisciplinary, transdisciplinary skills	☒ Yes ☐ No
Available for PhD students from other courses	☒ Yes (with students of the PhD Programme in Biomedical Sciences) ☐ No
Prerequisites (not mandatory)	- Basics of probability - Main probability distributions - Basic statistical concepts (mean, variance, correlation, etc.)
Examination methods (in applicable)	Multiple choice test
Suggested readings	Lecture slides and other teaching materials made available online.

Additional information	Books : - M. C. Whitlock, D. Schluter, Analisi statistica dei dati biologici. -- Zanichelli, 2010. - B. Shahbaba, Biostatistics with R. An introduction to Statistics Through Biological Data. - Springer, 2012

Course unit English denomination	The power of your experimental design: statistical aspects of your experimental design
Teacher in charge (if defined)	Prof. Chiara Romualdi
Teaching Hours	10
Number of ECTS credits allocated	2
Course period	February 2025
Course delivery method	☒ In presence ☐ Remotely ☐ Blended
Language of instruction	English
Mandatory attendance	☒ Yes (80% minimum of presence) ☐ No
Course unit contents	Basics of inferential statistics, statistical tests, and statistical power. Calculation of the proper sample size when you are planning a new experiment
Learning goals	- Learning about statistical power and its importance in experimental design. - Acquiring skills to calculate the appropriate sample size for new experiments. - Enhancing the ability to plan experiments with robust statistical considerations.
Teaching methods	Lezioni Workshops
Course on transversal, interdisciplinary, transdisciplinary skills	☒ Yes ☐ No
Available for PhD students from other courses	☐ Yes ☒ No
Prerequisites (not mandatory)	Basic of statistics
Examination methods (in applicable)	Homework / Quiz
Suggested readings	Slides of the Teacher

Additional information	Suggested: Laptop

Course unit English denomination	Science Communication
Teacher in charge (if defined)	To be defined
Teaching Hours	20
Number of ECTS credits allocated	2
Course period	To be defined
Course delivery method	☒ In presence ☐ Remotely ☐ Blended
Language of instruction	English
Mandatory attendance	☒ Yes (75% minimum of presence) ☐ No
Course unit contents	Science communication - Communication process - Content selection - Storytelling - Persona Branding - Written communication - Public speaking – PowerPoint presentations
Learning goals	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 and terminology.
Teaching methods	Non-direct teaching method. Direct involvement of participants through simulations and exercises.
Course on transversal, interdisciplinary, transdisciplinary skills	☒ Yes ☐ No
Available for PhD students from other courses	☒ Yes ☐ No
Prerequisites (not mandatory)	
Examination methods (in applicable)	
Suggested readings	
Additional information	

Course unit English denomination	Gene Editing - Basic
Teacher in charge (if defined)	Bellin Milena
Teaching Hours	5
Number of ECTS credits allocated	1
Course period	Spring 2025
Course delivery method	☒ In presence ☐ Remotely ☐ Blended
Language of instruction	English
Mandatory attendance	☒ Yes (75% minimum of presence) ☐ No
Course unit contents	1. History of genome editing: meganucleases, ZFN, TALEN, CRISPR-Cas9. 2. Discovery of CRISPR-Cas system. 3. CRISPR-Cas9 genome editing: DNA repair pathways, double-/single-cut editing. 4. CRISPR-Cas based genome editing tools: CRISPRi, CRISPRa, base editing, transposases, and prime editing.
Learning goals	Become familiar with the existing technologies that enable genome editing
Teaching methods	Lectures
Course on transversal, interdisciplinary, transdisciplinary skills	☐ Yes ☒ No
Available for PhD students from other courses	☒ Yes ☐ No
Prerequisites (not mandatory)	max 3750 caratteri
Examination methods (in applicable)	max 3750 caratteri
Suggested readings	provided scientific papers

Additional information	max 3750 caratteri

Course unit English denomination	Gene Editing - Advanced
Teacher in charge (if defined)	Bellin Milena
Teaching Hours	10
Number of ECTS credits allocated	2
Course period	Spring 2025
Course delivery method	☒ In presence ☐ Remotely ☐ Blended
Language of instruction	English
Mandatory attendance	☒ Yes (75% minimum of presence) ☐ No
Course unit contents	The course comprises both lectures and guided journal club activities, discussing the utilization of genome editing as possible treatment for human diseases
Learning goals	Acquire familiarity with the latest discoveries in the gene editing field and explain them with a short powerpoint presentation.
Teaching methods	Lectures and journal clubs
Course on transversal, interdisciplinary, transdisciplinary skills	☐ Yes ☒ No
Available for PhD students from other courses	☒ Yes ☐ No
Prerequisites (not mandatory)	
Examination methods (in applicable)	max 3750 caratteri
Suggested readings	provided scientific papers
Additional information	max 3750 caratteri

Course unit English denomination	Evolution under anthropogenic pressures and conservation
Teacher in charge (if defined)	To be defined
Teaching Hours	5
Number of ECTS credits allocated	1
Course period	To Be defined
Course delivery method	☒ In presence ☐ Remotely ☐ Blended
Language of instruction	English
Mandatory attendance	☒ Yes ☐ No
Course unit contents	Effects of anthropic activities on wild populations Case studies on evolution under anthropogenic pressures and conservation
Learning goals	The course aims at introducing students to the topics related to the evolutionary effects of anthropic activities and the conservation consequences through different case studies. In addition, the course will promote discussion among PhD students and teachers about the role of research in filling gaps in our understanding of these processes and in contributing to conservation.
Teaching methods	Lezioni Workshops
Course on transversal, interdisciplinary, transdisciplinary skills	☐ Yes ☒ No
Available for PhD students from other courses	☐ Yes ☒ No
Prerequisites (not mandatory)	
Examination methods (in applicable)	
Suggested readings	Slides of the teachers

Additional information	The entire event will be held in Chioggia

Course unit English denomination	Fluorescence microscopy II: designing a fluorescence microscopy experiment.
Teacher in charge (if defined)	Marta Giacomello
Teaching Hours	10
Number of ECTS credits allocated	2
Course period	January 2025
Course delivery method	☒ In presence ☐ Remotely ☐ Blended
Language of instruction	English
Mandatory attendance	☒ Yes (70% minimum of presence) ☐ No
Course unit contents	Students will learn the principle of fluorescence microscopy, types of assays and probes (ratiometric and non-ratiometric, genetically encoded or synthetic), and design a fluorescence microscopy experiment.
Learning goals	Skills in fluorescence microscopy assay development
Teaching methods	Frontal lessons, group work
Course on transversal, interdisciplinary, transdisciplinary skills	☒ Yes ☐ No
Available for PhD students from other courses	☒ Yes ☐ No
Prerequisites (not mandatory)	n/a
Examination methods (in applicable)	n/a
Suggested readings	Scientific articles and reviews
Additional information	n/a

Course unit English denomination	Quantitative analysis of bioimages
Teacher in charge (if defined)	Francesco Argenton Nicoletta Plotegher
Teaching Hours	10
Number of ECTS credits allocated	2
Course period	June – September 2025
Course delivery method	☒ In presence ☐ Remotely ☐ Blended
Language of instruction	English
Mandatory attendance	☒ Yes (75% minimum of presence) ☐ No
Course unit contents	Basic notions on microscopy image acquisition, including numerical aperture, linear and angular resolution and contrast. Physiological and psychological biases in image analysis. Principles of digital imaging, image pre-processing and processing for morphometry and densitometry. Image analysis methods and tools, including classical methods and deep-learning based methods. Use of most common softwares i.e. ImageJ and Ilastik.
Learning goals	To learn how to obtain quantitative information from bioimages, i.e. densitometry and morphometry
Teaching methods	classes
Course on transversal, interdisciplinary, transdisciplinary skills	☒ Yes ☐ No
Available for PhD students from other courses	☒ Yes ☐ No
Prerequisites (not mandatory)	none
Examination methods (in applicable)	Excercises and case studies
Suggested readings	Slides on moodle
Additional information	

Course unit English denomination	Fundamentals of Evolutionary Biology
Teacher in charge (if defined)	Prof Gil Guastoni Rosenthal
Teaching Hours	20
Number of ECTS credits allocated	3
Course period	December 2024
Course delivery method	☒ In presence ☐ Remotely ☐ Blended
Language of instruction	English
Mandatory attendance	☒ Yes (70% minimum of presence) ☐ No
Course unit contents	This course is designed to prepare PhD students across the life sciences with basic concepts in evolutionary biology, including microevolution, macroevolution, and evolutionary ecology, and with a perspective on the primary contemporary problems in the field.
Learning goals	Students will have a basic grasp of evolutionary biology, an awareness of contemporary techniques and controversies, and the quantitative framework to apply and develop new analytical tools.
Teaching methods	The course is organized as ten, three-hour lectures each featuring a critical reading from the scientific literature and a participatory in-class problem set
Course on transversal, interdisciplinary, transdisciplinary skills	☒ Yes ☐ No
Available for PhD students from other courses	☒ Yes ☐ No
Prerequisites (not mandatory)	
Examination methods (in applicable)	Written / Quiz
Suggested readings	D. Futuyma, M. Kirkpatrick, *Evolution* (optional); papers as assigned.
Additional information	

Course unit English denomination	Understanding DNA and RNA sequencing: theory and know how
Teacher in charge (if defined)	Dr Mirko Pegoraro
Teaching Hours	10
Number of ECTS credits allocated	2
Course period	09-17/04/2025
Course delivery method	☒ In presence ☐ Remotely ☐ Blended
Language of instruction	English
Mandatory attendance	☒ Yes (75% minimum of presence) ☐ No
Course unit contents	Theory and comprehension of next generation DNA/RNA sequencing. Practical comprehension of RNA-seq statistical analysis using Linux and R.
Learning goals	Understanding of DNA/RNA-seq output. Practical understanding of the statistical analysis of RNA-seq. Being able to statistically analyse RNA-seq. Being able to extract graphical representation of RNA-seq experiment (e.g. Volcano plot, heatmaps) Use of Linux and R.
Teaching methods	Lezioni Workshops
Course on transversal, interdisciplinary, transdisciplinary skills	☒ Yes ☐ No
Available for PhD students from other courses	☒ Yes ☐ No
Prerequisites (not mandatory)	Basic knowledge of R (preferable but not necessary)
Examination methods (in applicable)	Not Applicable
Suggested readings	Not Applicable
Additional information	Necessary: Laptop with installed R/R Studio, Putty (or equivalent), Xming (or equivalent) and WinSCP (or equivalent), internet connection. The module lessons will introduce RNA/DNA seq and explain how to understand DNA/RNA-seq output. The lessons introduce the analysis scripts. The workshops analyze RNA-seq using linux and R.