MANIFESTO OF STUDIES A.Y. 2022-2023

EDUCATIONAL ACTIVITIES

	1st YEAR - MANDATORY COURSES -					
	Course	**Teacher**	**Hours**	**ECTS**	**Synopsis**	**Evaluation procedure**
1	**Laboratory Safety Course**	Prof. Alessandro Provenzani and Ines Mancini (CIBIO)	12	3	General Laboratory Procedures, Equipment Use, and Safety Considerations. The course consists of lectures and hands-on activities and provides training in chemical manipulation, laboratory activity, biology hazard, fire, and radiation safety.	Biology part: written exam. Chemical part: written exam.
2	**Laboratory Techniques**	Various	6	1	Procedure relative to the PhD project.	Approval by the tutor

	2nd YEAR - MANDATORY COURSES -					
	Course	**Teacher**	**Hours**	**ECTS**	**Synopsis**	**Evaluation procedure**
1	**Scientific Publishing & Communication**	Ralph Dahm (IMB Mainz) Marie-Laure Baudet (CIBIO)	20	4	To be successful, scientists need to raise funding for their projects and effectively communicate their science. No career can be built without writing successful grant applications or publishing high-impact papers, presenting attractive posters, and giving compelling talks. It is therefore essential that scientists learn early on in their careers how best to present their data and ideas in different contexts. This course explains the fundamentals of science communication and fundraising, including: ● 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, incl. papers and grant/fellowship 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.	

BIOMOLECULAR SCIENCES CURRICULUM
OPTIONAL COURSES

	Course	Teacher	Hours	ECTS	Synopsis	Evaluation procedure
1	**Molecular Spectroscopic Techniques**	Prof. Graziano Guella (Dept. Physics)	12	3	The lessons include principles and applications of molecular spectroscopy for the elucidation of bioorganic structures and binding phenomena. Main emphasis will be on modern applications of Nuclear Magnetic Resonance and Mass Spectrometry in biochemical contexts but fundamentals of electronic and vibrational spectroscopy will be also presented.	Individual reports and discussion on an assigned topic
2	**RNA Molecular Biology and Biotechnology**	Prof. Michela A. Denti (CIBIO)	12	3	The course aims to familiarize the students with cutting-edge new discoveries in the field of RNA biology, and we expect the students to be familiar with the major topics of RNA-based regulation by the conclusion of the course. Topics will include: RNA secondary and tertiary structure; small and large ribozymes; riboswitches; Post-transcriptional gene silencing and RNA interference; RNA splicing modulating therapies; non-coding RNAs.	Presentation of cutting-edge papers, suggested by the teacher and presented by a 30 min journal club by the student.
3	**Chemical modifications and organic synthesis of biomolecules**	Prof. Ines Mancini (Dept. Physics)	12	3	The course will focus on the core principles of synthetic strategy and methodology, with the discussion of recently published topics in the field. Strategies in total synthesis: conversion of functional groups, carbon-carbon reactions, application of organometallic reagents. New methodologies: solvent role and choice, solid supported synthesis, microwave irradiation and other eco-friendly techniques. Asymmetric synthesis: stereoselectivity and introduction of new desired elements of chirality. Asymmetric and bio- catalysis using enzymes and chiral natural molecules. Design and synthesis in modern drug discovery: combinatorial and biomimetic approaches. Click chemistry. Synthesis and characterization of supra-molecular systems. At the request of the student, detailed topics related to his/her PhD research activities can be taken into account.	Individual presentation and critical discussion of an assigned paper or of a selected topic

4	**Origins of Life**	Prof. Sheref S. Mansy (CIBIO)	12	3	In the same year that the Watson-Crick DNA structure was published, another important discover was made. The graduate student Stanley Miller recreated in the laboratory the conditions that he thought best represented that of the early Earth, which included the small, simple molecules water, methane, ammonia, and hydrogen plus simulated evaporative and precipitation processes along with lightning. Miller's experiment revealed that amino acids, one of the key building blocks of life as we know it, naturally emerged from mixtures of simple molecules. Since that time, the field has progressed tremendously. We now have prebiotically plausible pathways for the generation of nucleotides, lipids, and even the formation of protocellular structure. There are still many gaps in our knowledge, but biologists, geologists, chemists, and astronomers are all working to find how life began here on the Earth and how life could emerge elsewhere. Historical and recent research papers will be discussed covering the first genetic polymers, what constitutes a living system, and how (proto)metabolism drives the maintenance of a cell.	Participation and a journal article presentation
5	**Developmental Biology. Mini series of talks**	Marie-Laure Baudet Paola Bellosta Matthias Carl Lucia Poggi (CIBIO)	12	3	It is not birth, marriage or death, but gastrulation which is truly the most important time in your life" (L. Wolpert). Developmental biologists investigate how morphogenetic, signaling, and proliferation/differentiation processes are coordinated during embryogenesis to facilitate the generation of a fully functional animal from a single fertilized egg. This knowledge is central to understand the complex pathophysiology of diseases that are frequently caused by developmental defects. This mini series of seminars/lectures aims at providing a contemporary view on fundamental developmental processes, from the growth control of organs such as the eye and brain and the emergence of neurons and neuronal connectivity within, to the processes leading to aging, and aspects of cognitive neuroscience. The lectures include state-of-the-art research at CIBIO involving animal models commonly used for developmental studies. In particular, the latter will help attending students to re-evaluate the great potential of the Institute for collaborative research activities invaluable for their own research. Each lecture will be accompanied by papers sent in advance to the students to facilitate and promote discussion	Presentations of selected papers by the students.
6	**Genomic and proteomic biomarkers: from target discovery to drug development applications**	Prof. Enrico Domenici (CIBIO)	12	3	The objective of the course is to introduce the concept of biomarkers, with a particular emphasis on disease and clinical response biomarkers, and their applications in the	The evaluation will be based on small group journal clubs focusing on specific biomarker topics, where each

					identification of novel therapeutic targets and patient stratification strategies. A number of examples of genome- or proteome wide-approaches for biomarker discovery and validation will be provided and their potential impact in drug discovery will be highlighted. A special focus will be given to translational neuroscience biomarkers and their promise to personalized therapies. Biomarkers and Translational approaches ● definition and field of applications ● biomarker needs in neuroscience Biomarker investigations by expression analysis ● genomics, proteomics and metabolomics approaches in biological fluids ● examples from neurodegenerative and neuropsychiatry disorders Genetic biomarkers ● from GWAS to patient stratification strategies	student will be assessed for group and individual effort.
7	**Advanced imaging approaches in Biomedicine**	Alessio Zippo (CIBIO)	12	3	Most important advances in biotechnology and medicine are occurring at the intersection between biology, physics, computer science, and engineering. The course will provide the broad knowledge of the most advance advanced imaging methodology and their applications in biomedical science to compete in this interdisciplinary environment. The program will emphasize concepts and problem-solving attitude over memorization. The student will be exposed to innovative approaches such as super-resolution microscopy, single molecule tracking and optogenetics. We will discuss the advantages of applying molecular biophysical methodologies to address specific biological questions, including macromolecule dynamics. An overview of the challenges and solutions related to quantitative analyses of imaging data will be presented.	Presentation and critical discussion of a paper (during the last 2-hours lecture)
8	**Neural Stem cell**	Luciano Conti (CIBIO)	12	3	The course's aim is to introduce the students to biological properties of neural stem cells and their exploitation for basic and translational applications. Different populations of developmental stage-specific neural stem cell populations will be presented, together with their isolation from mammalian neural tissue. Main emphasis will be devoted to in vitro neural stem cells systems generated starting from pluripotent stem cell.	Presentation and critical discussion of a paper (during the last 2-hours lecture)

9	**Epigenetics mechanisms and their role during Cell Differentiation and transformation, Metabolism, Neuronal diseases**	Marta Biagioli Fulvio Chiacchiera (CIBIO)	12+6	4	When the human genome project was completed it was immediately evident that DNA sequence was not the only matter, but a crucial point was, how are the genes turned on and off to preserve cell identity? The answer is epigenetics, heritable changes in gene expression not caused by changes in the DNA sequence. Of relevance, differently from genetic mutations, epigenetic signatures are reversible and specific enzymes endowed with writer, reader and eraser abilities have been identified. The fundamental role of this class of enzyme has been readily investigated for clinically relevant applications and several “epi-drugs”, able to influence DNA or histone modifications, are currently in clinical trials. But what is epigenetics? The students will revise the molecular structure of chromatin and nucleosomes packaging. They will then familiarize with the most common DNA and histone modifications [5mC and 5hmC, H3K27me3, H3K4me3/2/1, H3K36me3], expression of chromatin-linked noncoding RNAs as well as the usage of different histone variants, evaluating their regulatory role in genomic organization, transcriptional activation, elongation and repression during the normal physiology of the cell. The course will then move to describe 6 different applications of Epigenetics Control, through a series of research seminars by different investigators (*Epigenetics Mondays Seminars*)	Presentations of selected papers by the students.
10	**Regenerative medicine and Artificial Intelligence applications to biomedicine**	Paola Bellosta, Martin Hanczyc, Alessandro Romanel, Luciano Conti, Flavia Ravelli (CIBIO) Antonella Motta (DII)	12	3	These mini-series of lectures aim at showing our view on the future developments in tissue engineering approaches with respect to the fast-moving disciplines that embrace artificial intelligence (AI) and biomedicine. From studies on three-dimensional polymers to the analysis of biological processes, we will talk about our experiments and or applications that study and synthesize “intelligent” materials identified using AI for application in regenerative medicine	The final evaluation will be based on a student group presentation.

BIO - INDUSTRY CURRICULUM
OPTIONAL COURSES

	Course	Teacher	Hours	ECTS	Synopsis	Evaluation procedure
1	**Entrepreneurial Basic Skills for Biotech** **Module 1:** From innovation to a business model	Prof. Alberto Nucciarelli (DEM)	12	3	Purpose of the course is to provide the students basic skills required for the path to entrepreneurship in the biotech sector. The course consists of **three separate modules**: This module defines the path from bio-tech innovation to business modelling in the Biotech industry. To do so, the module stems from the characteristics of innovation to discuss the necessary adherence of a business model to technology and its applications. With the aid of case studies, the module aims to help understand the relationship between innovation and business models choice. This module provides students with the basic knowledge on choosing the right business model for a specific technology and understand main costs and revenue structures supporting a sustainable business model.	
	Moldue2: Working on a business plan	Stefano Milani (Milani & Partners, Milano)	12	3	This module guides students to conceive a business plan. To do so, the module elaborates on the technique of creating a financially sound business plan. The module aims to guide students producing a working business plan to be used for funds seeking and finalising the transition of R&D outcomes to the market. This module provides students with the basic skills to structure a business plan, understand its founding features and present it to potential investors.	
2	**Preclinical research and clinical development programs of drugs**	Prof. Borlak Jürgen (Medical School of Hannover)	12	3	The main objective of this course is to provide an overview of biomedical research strategies and clinical development programs in the drug/ biotech industry. The students will be made familiar with some basic experimental concepts as well as legal requirements for the development of novel drugs. Emphasis is given to the knowledge gain from genome biology and complex data analysis arising from high throughput technologies. *1.* Introduction into basic concepts in preclinical drug research and development *2.* Methods in experimental drug research and clinical development with emphasis on microarray mass spec, high throughput cell biology assays and in vivo imaging modalities	Group exam of n=4 students; students are requested to prepare a 20 min presentation followed by in-class discussion; upon request students can be examined individually.

					3. Genetic models of disease with emphasis on cancer biology and validation of such disease models for the development of novel anticancer drugs *4.* The molecular basis for drug metabolism and disposition including case studies *5.* The molecular basis for drug induced toxicities including case studies *6.* Basic concepts in pharmacogenetics and pharmacogenomics and its application to individualized drug therapies *7.* The application of genomic sciences for improved and individualized drug therapies *8.* Round table discussion with students – and 2 to 3 short presentations from students on selected topics of the course objective.	
3	**Liquid biopsy: principles, technologies and diagnostic perspectives**	Salvatore Pernagallo (Destina Genomics)	8	2	Tumours are known to release cells and DNA or RNA into body fluids - it has recently become possible to obtain information about tumours by analysing these circulating elements. To interrogate those elements diagnostic tests, require blood samples, contrasting traditional biopsies that need tumour tissue samples, and are therefore often referred to as liquid biopsies. Tissue biopsy is the 'gold standard' (the most accurate diagnostic test) for cancer diagnosis. However, removal of the tumour tissue by surgery or, in some cases, needle biopsy, is an invasive process. Moreover, the difficulty of reaching the tissue biopsy limits the clinician's ability to take a sample from tumour. The genetic information contained in the tumour cells and their circulating DNA or RNA can provide important clues about the tumour, such as the likelihood of response or relapse after treatment or response to therapy. Liquid biopsy therefore represents a promising and non-invasive test to be performed in addition to tissue biopsies. Currently, there are two main approaches to liquid biopsy: ● Circulating tumour cell (CTC) test that examines whole tumour cells in blood ● Circulating tumour DNA (ctDNA) test, which looks for DNA released from tumour cells in the blood Other techniques, such as the observation of cellular fragments called extracellular vesicles (exosomes) or small molecules of non-coding RNA (microRNA), are under investigation. Currently, the medical application of liquid biopsy is limited to defining the prognosis of breast, colon and prostate cancer, and determining the treatment of these tumours and non-small cell lung cancer. **Course overview**	Journal club – Students will present recent articles regarding liquid biopsy (minimum 4 of IF). This will be held the week after the end of the course

					This teaching course is aimed to provide a substantive overview of the main approaches in the liquid biopsy field and will offer the possibility to be driven into the latest liquid biopsy techniques. **Learning objectives** After attending this course students will be able to: ● Provide an overall background about liquid biopsy field with particular emphasis on circulating microRNAs. ● Review non-invasive methods to track the molecular profile of cancer by testing liquid biopsies. ● Explore latest technologies for testing liquid biopsies. Learn about some interesting EU project aiming to develop new technologies in the field of liquid biopsy	
4	**Research to business**	Various from HIT - Hub Innovazione Trentino - Fondazione	25	4	This course aims to provide PhD students with the fundamental concepts for helping PhD create impact from their research. In particular Students will be driven to think about the value of their research work in the market. They will explore mega-trends and markets and how to leverage the potential of innovation inside the research. They will investigate with experts the concepts of value proposition and customer, legacies and opportunities related to the IP strategies and protection. Public and private financing strategies and opportunities will be presented. **Main Learning Outcomes** At the end of the classes participants will be able to: - Understanding differences when planning and developing a new entre/intra-preneurial project in different contexts - Ability to understand, create, capture value of the research project in a market - Ability to integrate the strategic role of IP and other intangible assets into the research project and future professional scenarios." **Teaching and Learning Methods** Teaching and learning methods are primarily based on applied lectures, testimonials and real case studies from researchers, entrepreneurs, local and/or international business managers. They combine lectures, testimonials from professionals, discussions, individual and group work, hands-on activities and games. Participants will be evaluated with group exercise, and individual reports. Participants will be asked to reflect on their entrepreneurial skills (working in an interdisciplinary team and communicate effectively) and choose one entrepreneurial competence among the ENTRECOMP European framework to improve during the course (self-direct learning).	Attendance is mandatory at least 75% of the meetings.

QUANTITATIVE BIOLOGY CURRICULUM
OPTIONAL COURSES

	Course	Teacher	Hours	ECTS	Synopsis	Evaluation procedure
1	**Bioinformatics** **Module 1:** Machine learning techniques for classification and regression tasks in bioinformatics	Prof. Enrico Blanzieri (DISI)	8	1	The module will cover data and nature of the tasks, local, max-margin, and neural techniques for solving them. We will also illustrate examples from SVMs for RNA-protein binding prediction to the recent applications of deep learning to protein function classification.	Students will be required to review a paper on the topics discussed during the lessons.
	Module 2: Artificial intelligence techniques for the analysis and interpretation of single cell and spatial sequencing data	Dr. Toma Tebaldi	12	3	Thanks to the revolution of single cell sequencing, today we can obtain genomic and transcriptomic sequencing data from single cells. By looking at thousands of cells one at a time, we can see which set of genes each individual cell is transcribing, and we can capture the cellular diversity of human tissues with unprecedented resolution. Single cell data analysis requires the development of appropriate methods, for example for cell type identification and inference of gene regulatory networks. We will present, discuss and test some of the available techniques addressing the analysis of single cell and spatial sequencing data.	Presentation and critical discussion of an assigned paper.
2	**Introduction to metagenomics**	Prof. Nicola Segata (CIBIO)	12	3	The course will present the state-of-the-art metagenomic approaches for studying the microbial communities (microbiomes) populating the human body and the environment, and will describe the main recent microbial ecology findings, with a focus on those related to human diseases. On the methodological viewpoint, we will present metagenomic tools based on microarray chips, 16S rRNA sequencing surveys, and shotgun high-throughput sequencing from both the experimental and technological viewpoints. An overview of the challenges and solutions for computationally analyzing metagenomic data will be presented including methods for taxonomic characterization, functional profiling, genome assembly, phylogenetic inference of microbiomes. Advanced sequencing-based approaches for pathogen detection and characterization will also be presented. Recent findings about the relation between human associated microbial communities and complex diseases will be discussed as well as the mechanisms of vertical microbiome transmission (e.g. from mother to neonate) and gut microbial colonization.	Presentation and critical discussion of a paper (during the last 2-hours lecture)

3	**Getting started with R and RStudio: a hands-on introduction**	Dr. Pietro Franceschi (Edmund Mach Foundation)	12	3	R is a free software environment, designed for statistical computing which has become a standard for the advanced analysis of biological data. The objective of the course is to provide a "hands-on" introduction to R and RStudio, which will allow the students to 1) familiarize with the environment; 2) load and inspect data spreadsheets; 3) perform basic "data carpentry" operations; 4) visualize the data Due to the “hands on” nature of the course, students are encouraged to bring their own laptop	Practical Sessions
4	**Data Exploration**	Dr. Pietro Franceschi (Edmund Mach Foundation)	12	3	Being able to explore, visualize and interpret complex data is becoming more and more important in biology. With "omic" technologies it is now possible to measure thousands of variables on hundreds of samples, but "big" data can be also produced by many other platforms used to characterize biological samples. The course will focus on data exploration and visualization, introducing some of the bioinformatical and biostatistical tools/concepts which can be used to explore a multidimensional dataset (PCA, Clustering, Linear Modeling, ...). The aim is to highlight the advantages and limitations of each approach. During the course the different aspects will be illustrated by live R sessions on publicly available datasets. The students will be also encouraged to bring their own data to discuss and (possibly) analyse them. Basic knowledge on using R or Python is required.	Final test
5	**Applied Statistics for High-Throughput Biology**	Dr. Levi Waldron (City University of New York School Graduate of Public Health and Health Policy)	12	3	This course provides biologists and bioinformaticians with practical statistical and data analysis skills to perform rigorous analysis of high-throughput biological data. It covers essential statistical concepts behind the design of experiments and analysis of high-dimensional data generated by genomic technologies, including: sampling theory, linear modeling and confidence intervals, hypothesis testing, analysis of categorical variables, and methods of resampling (Monte Carlo, permutation tests, and bootstrap). The course assumes some familiarity with genomics, but does not have formal pre-requisites. Some prior exposure to the R statistical programming language, such as provided by the datacamp.com introductory course, will be very beneficial. **Topics** ● Introduction ○ introduction to R	Evaluation will be based on: ● Completion of laboratory exercises due at the starts of sessions 2 and 3 (40%) ● A data analysis project assigned in session 3 and due one week after the final lecture (60%)

					○ random variables ○ distributions ○ populations and samples ● Fundamentals of hypothesis testing ○ Central Limit Theorem ○ t-distribution ○ type I and II error and power ○ confidence intervals ● Linear modeling ○ model matrix and model formulae ● Hypothesis tests for categorical variables (chi-square, Fisher's Exact Test) ● Resampling-based statistical methods ○ Monte Carlo simulation ○ permutation tests ○ bootstrap simulation	

OPTIONAL COURSES

	Course	Teacher	Hours	ECTS	Synopsis	Evaluation procedure
1	**The rules of research: introduction to biolaw and research integrity**	Dr. Lucia Busatta (CIBIO)	6	1,5	This course aims to provide PhD students with some key concepts concerning research integrity and biolaw applied to biomedical research. In particular, PhD students will be guided to understand which are most important legal principles of scientific research, who sets those rules and how they can interact with research activities. The aim is to show that rules governing research are conceived not as a limit to the freedom of the researcher, but as an instrument of guarantee and protection both for researchers and participants. The course will start form an introduction to the main principles of biolaw and bioethics concerning research. Then, the course will ideally follow the path of a research project or of a clinical trial, crossing the most relevant issues that a researcher deals with during the development of a project. The main focus will be on research integrity issues, including research regulation, code of ethics, publication integrity issues, the role of ethical committees, the relationship with research participants (in case of research with the human being). The teaching methodology includes frontal lectures, debates with students and group work	PhD students will be asked to prepare a presentation on a specific issue of research integrity they found during their research project, identifying the legal and ethical problems and proposing a solution. If the number of students attending the course makes it possible, preference will be given to oral presentations. If it will not be possible, students will have to send the presentation or a short paper to the lecturer.
2	**Introduction to the CIBIO Core Facilities**	Facility Managers (CIBIO)	6 each	1 (max 2 per cycle)	The courses will provide an introduction to techniques and instruments related to each Core Facility, together with examples of current applications. Part of the course will be dedicated to the discussion of specific topics and the possibility of a practical session will be evaluated on a case-by-case basis. Cibio Core Facilities are: ● High Throughput Screening (HTS) ● Next Generation Sequencing (NGS) ● Cell Analysis and Separation ● Advanced Imaging Mass Spectrometry (MS)	
3	**Make scientific figures better and faster**	Facility Advenced Imaging Managers (CIBIO)	6	1	This course is designed as an introduction to the principles and techniques for visualizing data. The aim of the course is to show how to turn data into publication-ready figures at high quality resolution, using Open Source software. This includes changes to file type, resolution, color	Attendance to all lessons and active participation

					space, font, scale, line weights, and layout (to improve readability and professional appearance).	
4	**Academic writing for Science and Engineering level I**	CLA –Centro Linguistico d'Ateneo	24	3	The course aims to extend students' knowledge of grammatical, lexical and textual features of written academic English in a scientific context and to provide tools to enable students to resolve language questions independently. An active approach is used, with students writing texts related to their academic work and then correcting them individually and as a group. Students should already have a B2 level of English. As the course deals with a restricted version of English, i.e. academic English, the course can also be successfully taken by students with a good B1 level of English and experience with academic English. Most of the course content is at C1 level.	Students are required to complete 4 short written texts, and to revise them to a publishable standard. Texts are evaluated at C1 level. A minimum of 60% is required on the total score for coursework. A minimum of 75% attendance is required.
5	**Presentations for Science and Engineering**	CLA –Centro Linguistico d'Ateneo	16	2	The course aims to give both inexperienced presenters and those with some presenting experience an opportunity to develop their presentation skills and to have feedback on their use of English while presenting. An active approach is used, with students giving presentations on topics related to their research, and giving feedback to others on presentation skills. Students should already have a B2 level of English.	Students are required to complete at least one presentation that is generally comprehensible to the group.
6	**Academic writing for Science and Engineering level II**	CLA –Centro Linguistico d'Ateneo	24	0	The course aims to revise and extend students' ability to use the language and writing skills introduced in the Academic Writing for the Sciences and Engineering course, and to provide support in improving a text they are currently writing, focusing on accuracy and clarity. Particular attention is given to the writing of a literature review. The course is open to students who have passed the Academic Writing for the Sciences and Engineering course (or an earlier version of the course, Technical English or Scientific English.	75% attendance is required. Students are required to bring, and then correct, a text or text extract and to participate actively in class sessions

OTHER EDUCATIONAL ACTIVITIES					
Activity	**Description**	**Year**	**ECTS/Period**	**Evaluation procedure**	**Mandatory/suggested activity**
15 Seminars	Attendance to 15 seminar per year	1st, 2nd, 3rd	1/year	Evaluation form	mandatory
Summer School		anytime	2 total	Certificate provided by the organizing institution	

RESEARCH ACTIVITIES

Activity	Description	Year	ECTS/Period	Evaluation procedure	Mandatory/ suggested activity
General Laboratory Safety course	This course satisfies initial awareness training specified by the laboratory health and safety law and standard for personnel working in laboratories at the University of Trento. The course addresses the importance of health and safety, what accidents and work-related ill-health are, and why they occur. It will introduce to different risk range (chemical, physical, electrical, ionizing/radiation, biological and mechanical) of health and safety hazards and the harm they can do as well as their reduction/prevention. It explains the principles of Personal Protective Equipment (PPE) required for many work procedures in the laboratory environment, with emphasis on training in the maintenance, fit, and use of specific PPE for different work activities.	Anytime	1	Online test	
Journal Clubs		1st, 2nd, 3rd	1/year	Presentation	mandatory
1 progress report (WIP)		1st, 2nd, 3rd	3/year	Presentation	mandatory
Research period abroad			6/month	Written report	mandatory (at least 1 month)
Publication (1st author)	International peer reviewed journals		3 each	Publication accepted	
Publication (co-author)	International peer reviewed journals		2 each	Publication accepted	
Abstract or presentation at congresses			1 each	Abstract or presentation submission	
Teaching support activity	At High Schools/University		1/assignment	Certified	
Event organization (e.g. PhD Colloquia)			1 each	Certified	suggested
Tutoring	Tutoring undergraduate students		1 each B.Sc. student 2 each M.Sc. student **Max 3 credits total**	Certified	

Each PhD student is required to obtain a total number of 60 ECTS per year (educational and research activities) for a total of 180 ECTS split as follows:

- 20 ECTS for educational activities:
  - 8 credits for mandatory courses
  - 3 credits from seminars
  - for each Curriculum 6 credits for courses chosen among the dedicated courses list (Biomolecular or Bio-Industry or Quantitative Biology)
  - 3 credits for courses chosen among all the courses

- 160 ECTS for research activities

Regarding the Educational Credits:

- Credits for the institutional courses are specified in this Manifesto of Studies and have value in the year in which the course is attended.
- For the recognition of the credits obtained from courses organized by:
  a) other Doctorates,
  b) research Institutes,
  c) Universities (Master Degree)
  approval of the PhD Committee or the Executive Committee will be needed.
- **It is mandatory to obtain at least 10 educational ECTS within the first year of the Doctorate**.

Research ECTS comprise the mandatory research activities listed above plus the optional research activity and the regular lab activity.