ANNEX 2.1

DEGREE PROGRAM DIDACTIC REGULATIONS

BIOTECHNOLOGY FOR THE HEALTH

CLASS L-2

School: Medicine and Surgery

Department: Molecular medicine and Medical biotechnologies

Didactic Regulations in force since the academic year 2025-2026

Course: Advanced biotechnologies for animal health	**Teaching Language:** Italian
SSD (Subject Areas): MVET-02A formerly VET/03; MVET-03B formerly VET/06	**CREDITS:** 5+5
Course year: III	**Type of Educational Activity: frontal lesson**
Teaching Methods: In presence	
Contents extracted from the SSD declaratory consistent with the training objectives of the course: The MVET-02A sector includes the disciplines and research topics relating to biotechnologies aimed at the etiopathogenetic study of nosological entities in pets, livestock, wild and laboratory animals, also included in the sector of oncology and diagnostic technologies relating to domestic, wild and laboratory animals. The MVET-03B sector represents a cultural-scientific complex that studies fungi, protozoa and metazoa (parasites) that cause parasitic diseases. Most of them are zoonoses, foodborne, waterborne, vector-borne, as well as neglected tropical diseases or poverty-related. The training competences and research areas cover parasite biology and parasite-host-environment relationship, addressing systematic, evolutionary, genetic, ecological, immunological, physiological and pathological aspects, also with the use of mathematical, genetic and statistical methodologies, in a One Health vision. In particular, the sector deals with epidemiology, clinical and laboratory diagnosis, prophylaxis, therapy and control of parasitic diseases of human, domestic and wild animals. The field also covers health entomology, ecoparasitology and wildlife health management, biotechnology applied to parasitology and analysis of socio-economic factors related to parasitosis.	
Objectives: The main objectives of the course are: - Learning the main biotechnological applications of general veterinary pathology, particularly in the field of oncological diagnostics and research. - Learning advanced techniques for the diagnosis of the main parasitic diseases of veterinary interest, in particular zoonosis.	
Propaedeuticities: None **Is a propaedeuticity for:** None	
Types of examinations and other tests: Oral exam	

ANNEX 2.1

DEGREE PROGRAM DIDACTIC REGULATIONS

HEALTH BIOTECHNOLOGY

CLASS L-2

School: Medicine and Surgery

Department: Molecular medicine and medical biotechnology

Didactic Regulations in force on the academic year 2025-2026

Course: Animal Anatomy and Physiology	**Teaching Language:** Italian
SSD (Subject Areas): MVET-01/A Veterinary anatomy (VET/01 Anatomy of the domestic animals) MVET-01/B Veterinary physiology (VET/02 Veterinary physiology	**CREDITS:** **5** **5**
Course year: II	**Type of Educational Activity:** C
Teaching Methods: In person	
Contents extracted from the SSD declaratory consistent with the training objectives of the course: VETERINARY ANATOMY: The research topics of the SSD are the morphology and biology of all animal species of veterinary medical interest also from a translational and biotechnological point of view, from the macroscopic to the molecular level. The SSD is also interested in morphology from comparative, topographical and applicative aspects, as well as knowledge on the organization and morphogenetic mechanisms during development and on cellular functions. VETERINARY PHYSIOLOGY: The research topics of the SSD are the physiology of cells, organs, systems of animals of veterinary interest, comprising also the ethology, animal health and welfare. It studies the regulatory mechanisms of complex cellular systems, identifying potential biotechnological applications also in the field of animal and translational research. Through investigation methods (*in vitro, ex vivo and in vivo*), it studies cellular, physiological and vegetative functions, the neurophysiological bases of cognitive, emotional and behavioral processes, the mechanisms that regulate them, and which contribute to the maintenance of homeostasis in natural or modified environments.	
Objectives: The aim of the course is to provide the student with adequate knowledge of the anatomy and physiology of the organs and systems various animal species used in the biotechnology field. In particular, it will deepen the macroscopic and microscopic anatomy of the digestive system, male	

and female urogenital tracts. Furthermore, the organization of the main endocrine glands involved in the control of reproductive function will be examined, analyzing their neuroendocrine mechanisms also in relation to behavioral aspects. The course also intends to transmit to the student the operational skills necessary to concretely apply the knowledge acquired to design systems and/ or animal experimental models through which different processes in the field of biotechnology can be studied

Propaedeuticities:
NO
Is a propaedeuticity for:
NO
Types of examinations and other tests:
Oral test

ANNEX 2.1

DEGREE PROGRAM DIDACTIC REGULATIONS

HEALTH BIOTECHNOLOGY
CLASS L-2

School: Medicine and Surgery

Department: Molecular Medicine and Medical Biotechnology

Didactic Regulations in force since the academic year 25-26

<table>
<tr><td colspan="2">Course: Biochemistry</td><td colspan="2">Teaching Language: Italian</td></tr>
<tr><td colspan="3">SSD (Subject Areas): BIOS-07/A (Formerly BIO/10)</td><td>CREDITS:
Biochemistry of Macromolecules (5CFU)
Cellular metabolism (5CFU)</td></tr>
<tr><td colspan="2">Course year: year 1/ second semester</td><td colspan="2">Type of Educational Activity: B</td></tr>
<tr><td colspan="4">Teaching Methods:
In person</td></tr>
<tr><td colspan="4">Contents extracted from the SSD declaratory consistent with the training objectives of the course:
Biochemistry studies all biological processes at the molecular level, the structure, properties, intracellular localizations and functions of glucidic and lipidic biomolecules, peptides and protein macromolecules, the molecular mechanisms and regulation of biotransformations; bioenergetics, enzymes, metabolic pathways and their regulation.</td></tr>
<tr><td colspan="4">Objectives:
The aim of the course is to give students the fundamental methodological tools needed to understand the structural organization of biological macromolecules, as well as the phases of the main metabolic pathways and the mechanisms that control and coordinate them. The student must also demonstrate knowledge and understanding of the role of hormones in enzyme regulation.</td></tr>
<tr><td colspan="4">Propaedeuticities:
None
Is a propaedeuticity for:
None</td></tr>
<tr><td colspan="4">Types of examinations and other tests:

Written and oral examination. The course will include two multiple-choice intercourse tests. Passing these two tests gives direct access to the oral examination in the January and February sessions.</td></tr>
</table>

ANNEX 2.1

DEGREE PROGRAM DIDACTIC REGULATIONS

HEALTH BIOTECHNOLOGY

CLASS L-2

School of Medicine and Surgery

Department of Molecular Medicine and Medical Biotechnology

Didactic Regulations in force since the academic year 2025-2026

<table>
<tr><td colspan="2">Course:
Biotechnology for Clinical Biochemistry and Clinical Molecular Biology</td><td>Teaching Language:
Italian</td></tr>
<tr><td colspan="2">SSD (Subject Areas):
BIOS-09/A (formerly BIO/12)</td><td>CREDITS:
6 Credits Clinical Biochemistry
6 Credits Clinical Molecular Biology</td></tr>
<tr><td>Course year: III</td><td colspan="2">Type of Educational Activity: B</td></tr>
<tr><td colspan="3">Teaching Methods:
in-person (lectures and laboratory)</td></tr>
<tr><td colspan="3">Contents extracted from the SSD declaratory consistent with the training objectives of the course:
Study and interpretation of biological and biochemical parameters in different biological matrices, as well as in vivo, in relation to physiopathological states, to the interaction with microbial organisms, to the clinical biochemistry of nutrition and motor activities. Study of biochemical and biomolecular tools to carry out diagnostic, preventive and therapeutic interventions for hereditary and acquired genetic diseases. Study of analysis methodologies that allow the interpretation and evaluation of indicators of physiopathological conditions throughout the clinical care pathway, from primary prevention to diagnosis, prognosis, monitoring of the disease and therapy.</td></tr>
<tr><td colspan="3">Objectives:
The student must be able:
• to independently evaluate the characteristics of diagnostic tests and to independently and critically interpret experimental studies related to biochemical-clinical markers and clinical molecular biology.
• to use the correct terminology and to explain the basic and applicative notions of the subject to experts and non-experts.
• to expand their knowledge and to update themselves independently through the study of scientific texts and experimental articles.</td></tr>
<tr><td colspan="3">Propaedeuticities:
None
Is a propaedeuticity for:
None</td></tr>
<tr><td colspan="3">Types of examinations and other tests:
Written test with 30 multiple choice questions. The written test will be considered passed if the student has correctly answered at least 9/15 questions of the Clinical Biochemistry module and 9/15 questions of the Clinical Molecular Biology module. Passing the written test is necessary to take the oral test.</td></tr>
</table>

ANNEX 2.1

DEGREE PROGRAM DIDACTIC REGULATIONS

BIOTECHNOLOGY FOR HEALTH

CLASS L-2

School: Medicine and Surgery

Department: Medicina Molecolare e Biotecnologie Mediche

Didactic Regulations in force since the academic year 2025-2026.

Course: **Business Economics and Business Ethics in Biotechnology**	**Teaching Language:** **Italian**
SSD (Subject Areas): SECS P/07 old one and now ECON – 06/A Economia Aziendale]	**CREDITS: 5 credits**
Course year: III°	**Type of Educational Activity: B**
Teaching Methods: **IN PERSON**	

Contents extracted from the SSD declaratory consistent with the training objectives of the course:

The course "*Business Economics and Business Ethics in Biotechnology*" comprises the didactic-training activity relating to characteristics, constitutive processes and lasting economic functionality of companies of any type, including family ones, and of administrations in the different sectors of the economy, profit and non-profit, private and public, of their subsystems (activities and processes).
The approach is multidisciplinary and interdisciplinary. The SSD is divided into closely integrated and complementary research fields ranging from institutional principles of business administration to management and governance, to accounting, culture and ethics, social responsibility, business-economic reflections of sustainability, use of information in decision-making and control processes, economic communication, financial and non-financial reporting, accounting and financial statements, analysis and recording of costs and revenues, planning and control, management accounting tools, social and environmental reporting.

Objectives:

The course deals with the important concepts of the Business Administration theory and

the Accounting studies, providing students with the fundamental elements for the understanding of management and accounting procedures of companies across their life cycles. The course deals also with the study of the logics and procedures of financial accounting and management accounting of different entities, also operating in the biotechnology sector and health care organizations. The topics covered will include general accounting and financial reporting principles, cash basis accounting, accrual basis accounting, determination of net income and equity, preparation of financial statements. Particular attention will be given to business ethics as one of the essential factors for survival and business development, also in the biotechnology sector. Furthermore, the connection between business ethics and the related corporate social responsibility and social and sustainability reporting will be explored.

Propaedeuticities:

None

Is a propaedeuticity for:

None

Types of examinations and other tests:

An oral examination to test the understanding of the course contents is scheduled. The students shall apply business economics, ethics and administration logics and principles. The students will also be judged in terms of individual judgement and communication skills. The final mark is expressed out of thirty. Students may sit also for a written examination (partial test), during the course, based on multiple choice questions and open questions.

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DEGREE PROGRAM DIDACTIC REGULATIONS

HEALTH BIOTECHNOLOGY

CLASS L-2

School: Medicine and Surgery

Department: Molecular Medicine and Medical Biotechnology

Didactic Regulations in force since the academic year 2025-2026

Course: Cell Biology and laboratory	**Teaching Language:** Italian
SSD (Subject Areas): BIOS/10A Cell and Applied Biology ex BIO/13)	**CREDITS: 8+1**
Course year: I year II semester	**Type of Educational Activity: A**
Teaching Methods: in-person	
Contents extracted from the SSD declaratory consistent with the training objectives of the course: The sector is interested in teaching and training activities in the field of the integrated study of the cells and living organisms, with particular regard to the basic mechanisms involved in the following processes: cellular mechanisms of transmission and control of genetic and epigenetic information of wild and mutated cells or organisms, development, differentiation and proliferation of cells, biogenesis and function of organelles and cellular structures, interaction and communication between cells and the biological bases of development.	
Objectives: The course aims to illustrate the structural and functional complexity of cells and the ways in which cells modulate and integrate the activity of the different cellular components, both constitutive and in response to external stimuli. The course describes the dynamism of the activity of the main cellular organelles and the relationship between them, the elements of the cytoskeleton and all the cytoplasmic components. Overall, the course will provide the knowledge necessary for understanding the different cellular activities, a necessary condition for the subsequent study of the pathologies associated with their alteration.	
Propaedeuticities: none **Is a propaedeuticity for:** none	
Types of examinations and other tests: The course includes three inter-course tests which allow students to acquire "bonus" points that can be used to increase the score of the final test. The final exam is divided into an oral discussion of the topics covered in the course. In some sessions, it is possible that the oral exam is preceded by a short written-test with multiple choice or free choice questions to exclusively determine access to the oral exam without a provisional score.	

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DEGREE PROGRAM DIDACTIC REGULATIONS

HEALTH BIOTECHNOLOGY

CLASS L-2

School: Medicine and Surgery

Department: Molecular Medicine and Medical Biotechnologies

Didactic Regulations in force since the academic year 2025-2026

Course: CELLULAR MOLECULAR AND COMPUTATIONAL BIOTECHNOLOGY		**Teaching Language:** Italian
SSD (Subject Areas): BIOS/7-A (ex BIO/10)		**CREDITS:** 10
Course year: II	**Type of Educational Activity: C**	

Teaching Methods:
In-person. This course consists of taught classes and midterm examinations.

Contents extracted from the SSD declaratory consistent with the training objectives of the course:
Among the contents of the SSD declaratory, the course explores in detail biochemical methodologies for the identification and structural and functional characterization of biomolecules, structural and computational biology, systems biology, bioinformatics, recombinant molecular technologies and omics (e.g. genomics, transcriptomics, proteomics) for the study of macromolecules and biological processes. This course also addresses the construction of in vitro and in vivo models, for the engineering of biological systems and synthetic biology in precision medicine.

Objectives:
The aim of this course is to address the main techniques necessary for experimental analysis in biotechnological research. It provides students with the basic notions necessary for the characterization of an in vitro biological system, with basic principles on the maintenance of eukaryotic cells in culture, observation and analysis by optical microscopy, fundamentals of extraction and quantitative analysis of nucleic acids and proteins, genome analysis and acquisition of the main sequencing and annotation strategies.

Propaedeuticities:
None, but students should have already gained basic biochemistry credits and demonstrate knowledge of the main biochemical reactions of biological processes.

Is a propaedeuticity for:
None

Types of examinations and other tests:
Individual assessment will be based on a written test and on an oral presentation of the topics of the lessons (with final grade of 30)

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DEGREE PROGRAM DIDACTIC REGULATIONS

HEALTH BIOTECHNOLOGY

CLASS L-2

School: Medicine and Surgery

Department: Molecular Medicine and Medical Biotechnology

Didactic Regulations in force since the academic year 2025-2026

Course: Clinical Biochemistry and Microbiology	**Teaching Language:** Italian
SSD (Subject Areas): Clinical biochemistry and clinical molecular biology (BIO-12; BIOS-09/A) Microbiology and clinical microbiology (MED/07; MEDS-03/A)	**CREDITS:** Clinical Biochemistry 5 CFU Clinical Microbiology 5 CFU
Course year: III	**Type of Educational Activity:** C
Teaching Methods: In-person	

Contents extracted from the SSD declaratory consistent with the training objectives of the course:

Organization about: the activities in the clinical analysis laboratory, the development of instrumental technologies, including automated, the qualitative and quantitative analysis of parameters of clinical relevance, the methods of control of quality, the evaluation of individual parameters for predicting diseases, sensitivity/resistance to xenobiotics, responses to foods in normal and pathological conditions. Study of the cellular and molecular bases of microbial pathogenicity, host-microorganism interaction and microbial ecosystems in humans. Therapeutic monitoring of antimicrobial drugs and microbial biotechnology with applications in diagnostics, therapy and prevention. Insights into bacteriology and virology.

Objectives:

The course aims to provide good knowledge about the pathophysiological mechanisms that generate the determinations of the main clinical-laboratory tests, in order to understand how different pathologies can alter these laboratory parameters. The course will also allow students to understand the characteristics and main mechanisms underlying microbial pathogenicity, in particular through the understanding of the molecular mechanisms of host-pathogen interaction. It will provide a framework for understanding current issues related to microbial infections: characteristics of primary pathogens, triggering of infectious processes, microbial identification and diagnostic techniques.

Propaedeuticities: None. Basic knowledge of biochemistry and topics of Microbiology and Immunology is recommended

Is a propaedeuticity for: None

Types of examinations and other tests:

Written and oral. The written test of both modules is based on 30 questions (15 per module). Written test for the two modules has a minimum threshold of 18 correct answers. Candidates who have passed the written test take the oral test which will be held on the same date as the exam.

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DEGREE PROGRAM DIDACTIC REGULATIONS

HEALTH BIOTECHNOLOGY

CLASS L-2

School: Medicine and Surgery

Department: Molecular Medicine and Medical Biotechnologies

Didactic Regulations in force since the academic year 2025-2026

<table>
<tr><td colspan="2">Course:
English</td><td colspan="2">Teaching Language:
English</td></tr>
<tr><td colspan="3">SSD (Subject Areas):
N/A</td><td>CREDITS:
4</td></tr>
<tr><td colspan="2">Course year: I</td><td colspan="2">Type of Educational Activity: E</td></tr>
<tr><td colspan="4">Teaching Methods:
In-person</td></tr>
<tr><td colspan="4">Contents extracted from the SSD declaratory consistent with the training objectives of the course:
N/A</td></tr>
<tr><td colspan="4">Objectives:
Development of understanding skills of basic and biotechnological sciences covered in scientific texts, including linguistic preparation of basic grammatical structures compatible with level B1; understanding of documents written in the medical-scientific language.</td></tr>
<tr><td colspan="4">Propaedeuticities:
none
Is a propaedeuticity for:
No additional course</td></tr>
<tr><td colspan="4">Types of examinations and other tests:
Written test, multiple choice</td></tr>
</table>

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DEGREE PROGRAM DIDACTIC REGULATIONS

HEALTH BIOTECHNOLOGY

CLASS L-2

School: Medicine and Surgery

Department: Molecular Medicine and Medical Biotechnologies

Didactic Regulations in force since the academic year 2025-2026

Course: General and Inorganic Chemistry with Laboratory	**Teaching Language:** Italiano
SSD (Subject Areas): CHIM/03 CHEM-03/A	**CREDITS:** 9
Course year: I	**Type of Educational Activity: A**
Teaching Methods: In-person	
Contents extracted from the SSD declaratory consistent with the training objectives of the course: General and Inorganic Chemistry deals with the chemical properties of the elements and their inorganic compounds, of natural and synthetic origin, in their theoretical and applicative aspects, based on the study and insight of the periodic system of the elements.	
Objectives: The course of General and Inorganic Chemistry aims to introduce the first-year student to the scientific language and the way of thinking about the matter and energy that are typical of Chemistry. The course emphasizes the centrality of the atomic model in the description of the physical and chemical properties of the elements; the importance of theoretical models of chemical bonding in explaining stability and reactivity of compounds; the relevance of the electronic structure and structure of a compound to the properties of the compound itself; introduces the criteria that allow to predict spontaneous or non-spontaneous transformations and the laws of chemical equilibrium. The course provides the necessary tools for the student to be able to set up and solve stoichiometric and analytical calculation problems.	
Propaedeuticities: none **Is a propaedeuticity for:** **No additional course**	
Types of examinations and other tests: The student can choose to take the exam in two ways. The classic one consists of passing the written test and the oral interview. The alternative modality consists in participating in a series of initiatives that consist of carrying out classroom tests, weekly homework, passing the midterms, participating in laboratory activities and oral presentation (workshop) of a topic covered in the laboratory experiences. Each activity corresponds to a score that contributes to the final grade.	

ANNEX 2.1

DEGREE PROGRAM DIDACTIC REGULATIONS

HEALTH BIOTECHNOLOGY

CLASS L-2

School: Medicine and Surgery

Department: Medicina molecolare e Biotecnologie mediche

Didactic Regulations in force since the academic year 2025-2026

Course: General Patology	**Teaching Language:** Italian	
SSD: MEDS-02/A Patologia Generale		**CFU:** 6
Course year: 2025-2026	**Type of Educational Activity: A**	
Teaching Methods: In-person		
Contents extracted from the SSD declaratory consistent with the training objectives of the course: The course is focused on providing notions of general pathology and physiology, integrating information from basic experimental research in the basic pathological processes analysed with genetic, epigenetic, transgenic biochemical, molecular, cellular and ultrastructural methodologies. The goal of the course is to provide students with basic knowledge of mechanisms of major diseases, of genetic and immunological disorders of molecular medicine, organ pathophysiology, oncology and cytopathology.		
Objectives: The course aims at providing basic notions on the cause of diseases and on basic pathogenetic mechanisms. In particular, the course will provide details on the physiopathology of endocrine disorders as well as on the mechanism of inflammation, of the response to cellular damage and of the control of cell division. Moreover, how alterations of these processes may lead to pathological conditions of endocrine, degenerative and neoplastic nature will be further developed.		
Propaedeuticities: None **Is a propaedeuticity for:** None		
Types of examinations and other tests: The Examination will be achieved through a written test, multiple choice questions, and an oral part.		

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DEGREE PROGRAM DIDACTIC REGULATIONS

HEALTH BIOTECHNOLOGY

CLASS L-2

School: Medicine and Surgery

Department: Molecular Medicine and Medical Biotechnologies

Didactic Regulations in force since the academic year 2025-2026

Course: General pharmaceutical chemistry		**Teaching Language:** Italian
SSD (Subject Areas): CHIM/08 CHEM-07/A		**CREDITS:** 7
Course year: 3rd year	**Type of Educational Activity:** C	
Teaching Methods: In-person		
Contents extracted from the SSD declaratory consistent with the training objectives of the course: Medicinal chemistry studies the chemistry of products of natural, biotechnological, synthetic and semi-synthetic origin endowed with biological activity in humans as well as in animal and plant organisms, including drugs, diagnostic agents and labeled ligands. Particularly, it develops and applies chemical methodologies for the design and synthesis of bioactive molecules, and the study of molecular mechanisms of their actions, structure-activity relationships, and ADMET profiles. The object of study of general medicinal chemistry are the concepts and methods underlying medicinal chemistry approaches.		
Objectives: The course provides the student with the basic knowledge of pharmaceutical chemistry necessary for the design, synthesis and production of substances that can be used in medicine for the diagnosis, prevention, treatment and cure of human or animal diseases. Furthermore, it provides fundamental knowledge of the structural and physico-chemical properties that regulate the pharmaceutical, pharmacokinetic and pharmacodynamic phases. The course also includes the study of some classes of drugs exemplifying the chemical-pharmaceutical approaches.		
Propaedeuticities: none **Is a propaedeuticity for:** none		
Types of examinations and other tests: The exam is divided into a written test (open-ended and/or multiple-choice questions) and an oral test. Access to the oral test is only possible if the written test is sufficient.		

DEGREE PROGRAM DIDACTIC REGULATIONS

HEALTH BIOTECHNOLOGY

CLASS L-2

School of Medicine

Department of Molecular Medicine and Medical Biotechnologies

Didactic Regulations in force since the academic year 2025-2026

Course: GENETICS	**Teaching Language:** ITALIAN
SSD (Subject Areas): BIO/18 - BIOS-14/A	**CREDITS:** 6
Course year: I	**Type of Educational Activity:** B
Teaching Methods: IN-PERSON	

Contents extracted from the SSD declaratory consistent with the training objectives of the course:

The sector is concerned with the scientific and educational-training activity of the modes of transmission, modification and expression of hereditary characteristics at the level of prokaryotic and eukaryotic cells, individuals and populations. It defines and analyses the structure of genetic material and its levels of organisation in microbial, plant and animal systems, including humans. It analyses the structure and evolution of genes and genomes, developing and using laboratory, computational and bioinformatics methodologies for the study of genomes and their functioning. It studies epigenetic modifications, analysing their molecular bases, heredity and consequences at the phenotypic level. It studies the regulation of genetic expression and the mechanisms of mutagenesis. It also deals with the genetic dissection of complex processes and characteristics and the manipulations of hereditary material used for the purpose of understanding biological phenomena. It investigates the genetic and molecular bases of evolution, development, immune response, behavior, inherited diseases and the practical applications of genetics and molecular technologies derived from it, such as genetic engineering in the biomedical, pharmaceutical, agri-food, industrial and environmental sectors. This sector includes computational and systems biology in their applications to genetic and genomic issues using bioinformatics tools.

Objectives:

The aim of the course is to provide basic and specialized notions of:
MENDELIAN GENETICS: Mendel's laws, Backcrossing, Calculation of probability, Mitosis and Meiosis. CHROMOSOMIC THEORY OF EDITARITY: Genes and chromosomes; genes and chromosomes during mitosis and meiosis processes; sex-linked inheritance; genetic association and recombination; construction of genetic and cytological maps. The experiments of Morgan and Bridges. Sex chromosomes and association with sex. Sex determination in mammals; X chromosome inactivation. FAMILY TREE: Autosomal and X-linked transmission, dominant and recessive - Independent assortment deviations; Association; crossing-over; mapping of eukaryotic chromosomes by recombination - Inheritance pattern of associated genes. Association mapping, three-point intersection, alleles, interactions between alleles of a gene, loci, multiple alleles. EXTENSION OF MENDELISM: Incomplete dominance, codominance, lethal recessive alleles, Interaction between genes in metabolic pathways, How genetics dissects complexity - Epistasis, modifier genes, penetrance and expressiveness. FROM GENE TO PHENOTYPE: The function of genes - metabolic pathways, Garrod's hypothesis: a gene - an enzyme. Auxotrophic mutations. Beadle and Tatum's experiments. DNA is

the genetic material: Griffith, Avery-McLeod-McCarty, Hershey-Chase-Meselson-Stahl experiments. The genetic code, colinearity between genes and proteins. Basic of Genetic Engineering. Introduction to functional genomics. Animal models for the study of gene function dissection. CHROMOSOMAL and GENE MUTATIONS: the fluctuation test; Spontaneous mutations, induced mutations, mechanisms of mutagenesis; the Ames test - DNA Damage Repair Mechanisms; Suppression; Complementation; Consequences of mutations on gene expression; dominant and recessive mutations; The human karyotype; Polytene chromosomes - Variations in the number of chromosomes; monoploidy and polyploidy; aneuploidy; non-disjunction; aneuploidy and examples of human pathologies; gene balancing. Changes in the structure of chromosomes; deletions, duplications, inversions and translocations. REGULATION OF TRANSCRIPTION IN PROKARYOTIS: E. coli Operon "LAC". POPULATION GENETICS: Calculation of allelic and genotypic frequencies -The principle of Hardy-Weinberg equilibrium (H&W). The achievement of equilibrium for alleles associated with X- Use of the H-W principle to estimate allele frequencies, Genetic drift, Natural selection, Balanced polymorphism. LABORATORY: bacterial transformation and AMES test with statistical analyses.

Propaedeuticities:

None; It is however recommended that the students have already taken the following exams: general chemistry, mathematics, and computational technique.

Is a propaedeuticity for:

None

Types of examinations and other tests:

Examination: written and oral.

Passing the written test is binding for the purposes of assessing the oral test. The multiple-choice written test will be assessed in terms of the number and accuracy of the answers.

ANNEX 2.1

DEGREE PROGRAM DIDACTIC REGULATIONS

HEALTH BIOTECHNOLOGY

CLASS L-2

School: Medicine and Surgery

Department: Molecular Medicine and Medical Biotechnology

Didactic Regulations in force since the academic year 2024-2025

<table>
<tr><td colspan="2">Course:
Immunobiology and Food Biochemistry</td><td>Teaching Language:
Italian</td></tr>
<tr><td colspan="2">SSD (Subject Areas):
MED/04 MEDS-02/A
BIO/10 BIOS-07/A</td><td>CREDITS:
CFU 6
CFU 6</td></tr>
<tr><td>Course year: III</td><td colspan="2">Type of Educational Activity: Lectures and laboratory activities</td></tr>
<tr><td colspan="3">Teaching Methods:
In-person</td></tr>
<tr><td colspan="3">Contents extracted from the SSD declaratory consistent with the training objectives of the course:
<u>Immunobiology:</u> Study of the main pathogenetic mechanisms associated with immunological diseases. It aims to offer an in-depth understanding of immune system cell organization, their interactions, and the molecular signaling pathways involved in both innate and adaptive immune responses.
<u>Food Biochemistry</u>: Biochemistry studies all molecular biological processes, the structure, properties, intracellular locations and functions of biomolecules and supramolecular complexes. In particular, Food Biochemistry provides knowledge of the structure, characteristics and biochemical roles of the main molecules of food interest, the biochemical mechanisms involved in the perception, digestion, absorption and catabolism of the main nutrients and biochemical aspects of food production.</td></tr>
<tr><td colspan="3">Objectives:
The course aims to provide skills in the structure of the main molecules of food interest (macro and micronutrients) and their roles in nutrition and human physiology, in the organoleptic and technological characteristics of foods. Attention is then turned to the cellular and molecular mechanisms that regulate the functioning of the immune system, and in particular the pathological aspects and alterations of the immune system that can lead to autoimmune diseases and allergies, mainly of a food type, offering a complete overview of the possible dysfunctions of the immune system.</td></tr>
<tr><td colspan="3">Propaedeuticities:</td></tr>
</table>

None; it is however recommended to acquire knowledge imparted by the courses of Cellular Biology, Physiology and Biochemistry.

Is a propaedeuticity for: N/A

Types of examinations and other tests:

The learning assessment includes a final oral exam covering program topics, as well as discussion of practical experiences. During the course, students are encouraged to prepare a laboratory notebook documenting practical activities and reflecting on the obtained results. In addition, students are also invited to read and comment on scientific articles related to the topics covered and, in particular, to the relationship between food and health.

ANNEX 2.1

DEGREE PROGRAM DIDACTIC REGULATIONS

HEALTH BIOTECHNOLOGY

CLASS L-2

School of Medicine and Surgery

Department: Molecular Medicine and Medical Biotechnology

Didactic Regulations in force since the academic year 2025-2026

<table>
<tr><td colspan="2">Course: Instrumental Diagnostics</td><td>Teaching Language: Italian</td></tr>
<tr><td colspan="2">SSD (Subject Areas): MEDS-04/A (formerly, MED/08)
MEDS-22/A (formerly, MED/36)</td><td>CREDITS: 5 + 5</td></tr>
<tr><td>Course year: II</td><td colspan="2">Type of Educational Activity: C</td></tr>
<tr><td colspan="3">Teaching Methods: In Person</td></tr>
<tr><td colspan="3">Contents extracted from the SSD declaratory consistent with the training objectives of the course: Diagnostic Imaging is concerned with scientific and educational-training activities, as well as with healthcare activities appropriate to it in the field of Diagnostic Imaging and radiotherapy and interventional radiology of organs and systems and nuclear medicine; specific skills are general and oncological radiotherapy and clinical radiological anatomy. The sector is also interested in radiation protection, medical radiobiology and diagnostic imaging of sports activities. Pathological Anatomy is interested in scientific and educational-training activities, as well as healthcare activities appropriate to it, in the field of pathological anatomy, with specific expertise in integrated autopsy, histological, cytological, ultrastructural and molecular diagnostics with reference also to sectors of specialized organ and system pathology which involve specific anatomical-clinical skills.</td></tr>
<tr><td colspan="3">Objectives: The student must acquire the typical characteristics of the reference technologies and demonstrate that they are able to interpret the results of the radiological and anatomo-pathological investigations with diagnostic purposes. The student must also project the knowledge acquired into the possibility of generating biotechnological innovations in the reference sectors.</td></tr>
<tr><td colspan="3">Propaedeuticities: None

Is a propaedeuticity for: N/A</td></tr>
<tr><td colspan="3">Types of examinations and other tests: Oral Examination</td></tr>
</table>

ANNEX 2.1

DEGREE PROGRAM DIDACTIC REGULATIONS

HEALTH BIOTECHNOLOGY

CLASS L-2

School: Medicine and Surgery

Department: Molecular Medicine and Medical Biotechnology

Didactic Regulations in force since the academic year 2025-2026

Course: Internal medicine and oncology	**Teaching Language:** Italian
SSD (Subject Areas): MED/06-MEDS-09/A; MED/09-MEDS-05/A	**CREDITS:** 5 + 5
Course year: III	**Type of Educational Activity: C**
Teaching Methods: In person	
Contents extracted from the SSD declaratory consistent with the training objectives of the course: The MED/06- MED/06-MEDS-09/A- Medical Oncology sector is interested in the development of skills in clinical, cellular and molecular oncology research and in their applications to clinical diagnostics and therapy of neoplastic pathologies. MED/09-MEDS-05/A – Internal Medicine deals with advanced medical techniques and translational research applied in the field of the main internal medicine pathologies. Areas of expertise include biotechnologies and advanced technologies and methodologies applied to human health and diagnostic and therapeutic techniques of translational clinical interest.	
Objectives: The teaching of Internal Medicine and Oncology aims to provide students with the basic notions regarding the clinical practice of human solid malignant neoplasms. In detail, the topics relating to the process and causes of malignant transformation, the epidemiology of human neoplasms, clinical trials, conventional and new generation systemic antineoplastic treatments, the clinical classification of the main human tumours, from diagnosis to therapy are addressed. Furthermore, knowledge will be provided on evidence-based medicine, on the pathophysiology of coagulation and haemorrhagic and thrombotic pathologies, the pathophysiology of lipid and carbohydrate metabolism with their alterations. For the pathologies treated, the innovative and advanced therapies available will be discussed.	
Propaedeuticities: None **Is a propaedeuticity for:** **N/A**	
Types of examinations and other tests: Oral test	

ANNEX 2.2

DEGREE PROGRAM DIDACTIC REGULATIONS

HEALTH BIOTECHNOLOGY

CLASS L-2

School: Medicine and Surgery

Department: Molecular Medicine and Medical Biotechnologies

Didactic Regulations in force since the academic year 2025-2026

<table>
<tr><td colspan="2">Training Activity:
Introduction to the biotechnological laboratory</td><td>Training Activity Language:
Italian</td></tr>
<tr><td colspan="2">Content of the activities consistent with the training objectives of the course:
Other knowledge useful for job placement</td><td>CFU:
2</td></tr>
<tr><td colspan="2">Course year:
N/A</td><td>Type of Training Activity: F</td></tr>
<tr><td colspan="3">Teaching Methods:
in-person</td></tr>
<tr><td colspan="3">Objectives:
Students will be exposed to the basic activities of the biotechnological laboratory for the understanding of the methodological procedures that allow the transition from scientific knowledge to the generation of goods and services useful for socio-economic development in the wellness and health area.</td></tr>
<tr><td colspan="3">Propaedeuticities:
none

Is a propaedeuticity for:
No additional course</td></tr>
<tr><td colspan="3">Types of examinations and other tests:
The assessment will be carried out thanks to an oral presentation of the experimental data generated within the laboratory experience.</td></tr>
</table>

ANNEX 2.1

DEGREE PROGRAM DIDACTIC REGULATIONS

HEALTH BIOTECHNOLOGY

CLASS L-2

School: Medicine and Surgery

Department: Molecular Medicine and Medical Biotechnology

Didactic Regulations in force since the academic year 2025-2026

Fill in for each course/integrated course included in the study plan

Course: Laboratory of Organic Chemistry	**Teaching Language:** Italian	
SSD (Subject Areas): CHIM-05/A (ex CHIM06)		**CREDITS: 7**
Course year: II	**Type of Educational Activity: C**	
Teaching Methods: in-person and in laboratory		
Contents extracted from the SSD declaratory consistent with the training objectives of the course: Sector CHEM-05/A (CHIM/06) deals with scientific and didactic - training activities in the study of organic compounds, both of natural and synthetic origin, including amino acids, lipids and sugars, also examining the mechanisms involved in the synthesis of organic compounds both in the laboratory and in natural and environmental systems, and the study of phytochemical aspects and the isolation of organic substances from plants.		
Objectives: The aim of the course is to provide students with the necessary background to understand the chemistry of organic compounds and organic reactions mechanisms that are of interest in Biology, together with the necessary background to work safely in a chemical laboratory. In particular the aim of this course is teaching students how to safely work in a chemistry lab and to acquire problem solving skills.		
Propaedeuticities: None, recommendedOrganic Chemistry **Is a propaedeuticity for:** none		
Types of examinations and other tests: The final exam consists of an oral test.		

ANNEX 2.1

DEGREE PROGRAM DIDACTIC REGULATIONS

BIOTECNOLOGIE PER LA SALUTE

CLASS L-2

School: Medicina e Chirurgia

Department: Medicina Molecolare e Biotecnologie Mediche

Didactic Regulations in force since the academic year 2025-26

<table>
<tr><td colspan="2">Course:
MATHEMATICS AND COMPUTATIONAL TECHNIQUES</td><td>Teaching Language:
Italian</td></tr>
<tr><td colspan="2">SSD (Subject Areas):
MATH-05/A ANALISI NUMERICA
(ex MAT/08 ANALISI NUMERICA)</td><td>CREDITS:
5</td></tr>
<tr><td>Course year: I</td><td colspan="2">Type of Educational Activity: Base (A)</td></tr>
<tr><td colspan="3">Teaching Methods:
in-person teaching</td></tr>
<tr><td colspan="3">Contents extracted from the SSD declaratory consistent with the training objectives of the course:
Basic mathematics concepts. Computational aspects of mathematics and applications in biomedical fields. Numerical methods for treating problems in applied sciences and technology.</td></tr>
<tr><td colspan="3">Objectives:
The student must demonstrate knowledge and understanding of the issues related to the use of basic tools of applied mathematics and computational reasoning. He must demonstrate to be able to deal with exercises that concern what is present in the program, starting from the notions learned regarding experimental data (collection and processing, including statistics), elementary and compound functions, and infinitesimal calculus (limits, derivatives, integrals).</td></tr>
<tr><td colspan="3">Propaedeuticities:
None
Is a propaedeuticity for:
None</td></tr>
<tr><td colspan="3">Types of examinations and other tests:
Written and Oral Tests.</td></tr>
</table>

WARNING: when compiling the Annex, it is essential to remember that it must be exactly the same as in the SUA (Annual single form of the Degree Program). If you wish to make any changes, you must consider that this action entails a change of Didactic Regulations or, if the field to be changed is RAD (University Didactic Regulations), of CdS detail sheet.

ANNEX 2.1

DEGREE PROGRAM DIDACTIC REGULATIONS

HEALTH BIOTECHNOLOGY

CLASS L-2

School: Medicine and surgery

Department: Molecular Medicine and Medical Biotechnology

Didactic Regulations in force since the academic year 2025-2026

<table>
<tr><td colspan="2">Course:
MICROBIOLOGY AND IMMUNOLOGY</td><td>Teaching Language:
Italian</td></tr>
<tr><td colspan="2">SSD (Subject Areas):
SSD: MICROBIOLOGIA E MICROBIOLOGIA CLINICA (MED/07; MEDS-03/A)
SSD: PATOLOGIA GENERALE (MED/04; MEDS-02/A)</td><td>CREDITS:
CFU MICROBIOLOGIA E MICROBIOLOGIA CLINICA: 6
CFU IMMUNOLOGIA: 5</td></tr>
<tr><td>Course year: II</td><td colspan="2">Type of Educational Activity: Frontal lesson</td></tr>
<tr><td colspan="3">Teaching Methods:
In-person</td></tr>
<tr><td colspan="3">Contents extracted from the SSD declaratory consistent with the training objectives of the course:
The course focuses on the study of the characteristics of microorganisms, the cellular and molecular bases of microbial pathogenicity and microorganism-host interactions as well as the fundamental mechanisms of immunology and immunopathology.</td></tr>
<tr><td colspan="3">Objectives:
The course will enable students to know, understand and describe the basic principles of the biology of microorganisms, their metabolism and interactions with other organisms, as well as the basic notions of molecular and cellular immunology of the immune system in humans.</td></tr>
<tr><td colspan="3">Propaedeuticities:
None
Is a propaedeuticity for:
None</td></tr>
<tr><td colspan="3">Types of examinations and other tests:
Written
Oral</td></tr>
</table>

ANNEX 2.1

DEGREE PROGRAM DIDACTIC REGULATIONS

HEALTH BIOTECHNOLOGY

CLASS L-2

School: Medicine and Surgery

Department: Molecular Medicine and Medical Biotechnology

Didactic Regulations in force since the academic year 2025-2026

Course: Molecular biology with laboratory	**Teaching Language:** Italian
SSD (Subject Areas): BIOS/08-A (formerly BIO/11)	**CREDITS:** 9
Course year: II	**Type of Educational Activity: A**
Teaching Methods: In-person	
Contents extracted from the SSD declaratory consistent with the training objectives of the course: Molecular biology is concerned with scientific activity in the field of biological functions at the molecular level, with enphasis on informational macromolecules. The main fields of research concern the study of the molecular mechanisms of biological processes and the structure and regulation of biological macromolecules involved in cellular functions such as DNA replication, repair and recombination, the structure and functions of chromatin, transcription and maturation of coding and non-coding RNAs, translation, maturation and degradation of proteins, and molecular signaling mechanisms. These functions and the consequences of their molecular alterations are studied in all relevant biological contexts, also through the development of innovative biotechnological approaches.	
Objectives: The educational objectives of the teaching aim to provide students with the acquisition of disciplinary knowledge and skills and critical skills for the integration of the concepts acquired in multidisciplinary contexts of scientific value, as well as technologically of an applicative nature.	
Propaedeuticities: None **Is a propaedeuticity for:** **N/A**	
Types of examinations and other tests: The exam includes ongoing assessments of progress through written tests based on multiple choice tests and short open-ended questions; if the tests are passed, a non-binding evaluation will be proposed for the student, who will be able to accept the proposal or request to take an oral evaluation.	

ANNEX 2.1

DEGREE PROGRAM DIDACTIC REGULATIONS

HEALTH BIOTECNOLOGY

L-2

School: MEDICINE AND SURGERY

Department: Molecular medicine and Medical biotechnologies

Didactic Regulations in force since the academic year 2025-2026

Course: MOLECULAR METHODOLOGIES AND MEDICAL GENETICS	**Teaching Language**: Italian	
SSD (Subject Areas): MEDS-01/A (MED/03) BIOS-08/A (BIO/11)		**CREDITS**: 5 Medical genetics 5 Recombinant technologies
Course year: II	**Type of Educational Activity**: C	
Teaching Methods: In person		

Contents extracted from the SSD declaratory consistent with the training objectives of the course:

MEDS-01/A: Structure of the human genome and its alterations. Diseases with a genetic component: mechanisms, diagnosis and therapies. Genetic susceptibility to complex diseases. Molecular mechanisms underlying inherited or acquired diseases and precision medicine therapeutic approaches.

BIOS-08/A: Qualitative and quantitative methodologies for the measurement, visualization and characterization, in vitro and in vivo, of biological molecules, their modifications and interactions, and for their manipulation in in vitro, ex vivo or animal models.

Objectives:

The course aims to describe the basic principles and methods of:

- The structure, function and variability of the human genome. The mechanisms underlying human genetic diseases, both hereditary and sporadic, will be analyzed, including the modes of transmission and molecular pathogenesis. The basic concepts of genetic susceptibility to multifactorial diseases will be introduced.
- The key principles of the biomolecular laboratory, through the description of a series of methodological concepts, typical of the experimental approach, for the solution of problems of biological biomedical and biotechnological interest. The main reference is represented by molecular analysis and the possibility of manipulating nucleic acids, in accordance with recombinant, sequencing and expression methods of exogenous proteins in prokaryotic and eukaryotic cell systems.

Propaedeuticities: None. **Is a propaedeuticity for**: Not any.
Types of examinations and other tests: Written and oral. The written test of both modules is based on multiple choice questions. Passing the written test allows access to the oral test.

ANNEX 2.1

DEGREE PROGRAM DIDACTIC REGULATIONS

HEALTH BIOTECHNOLOGY

CLASS L-2

School: Medicine and Surgery

Department: Molecular Medicine and Medical Biotechnology

Didactic Regulations in force since the academic year 2025-2026

<table>
<tr><td colspan="2">Course:
Morphological and Functional Sciences</td><td>Teaching Language:
Italian</td></tr>
<tr><td colspan="2">SSD (Subject Areas):
Hystology: BIOS-13/A (ex BIO/17)
Anatomy: BIOS-12/A (ex BIO/16)
Physiology: BIOS-06/A (ex BIO/09)</td><td>CREDITS:
Hystology: 2
Anatomy: 3
Physiology: 5</td></tr>
<tr><td>Course year: II</td><td colspan="2">Type of Educational Activity: Frontal lesson</td></tr>
<tr><td colspan="3">Teaching Methods:
In-person</td></tr>
<tr><td colspan="3">Contents extracted from the SSD declaratory consistent with the training objectives of the course:
The scientific-disciplinary sector BIOS-13/A (Histology) is involved in scientific and educational activities in the field of studying human tissues in their dynamism, starting from a morpho-functional approach to understanding the processes that determine and control the origin, differentiation, and homeostasis of human body tissues. From their mutual integration arises a knowledge framework essential for medical training, to understand the modifications or alterations involving human cells and tissues under pathophysiological conditions. Histology uses a dynamic approach, starting from morphological elements to follow the behaviours of tissue cells in space and time, contributing to the understanding of cell functions within their tissue microenvironment and identifying the mechanisms underlying the maintenance of normal tissue structure in adults. Histology also deals with the study of stem cells, tissue renewal and regeneration, aging, and cell death. OMISSIS. The sector's studies employ advanced methodologies for identifying and characterizing tissue, cellular, and subcellular structures, their genesis, and their functional correlations to address specific scientific questions at various levels, including the development of applications in the biomedical field.
The scientific-disciplinary sector BIOS-12/A (Anatomy) is concerned with scientific and didactic activity in the field of conformation, organisation and structure of the human body, its constituent systems and organs, in their macroscopic, microscopic, ultramicroscopic and molecular aspects, with their functional aspects and clinical repercussions, in the various periods of life. It also</td></tr>
</table>

analyses organogenesis and the various developmental stages, identifying individual diversities, congenital variants, primary causes of morphogenetic events and their main alterations of clinical interest. Scientific and teaching activities will be associated with knowledge on the maintenance of the state of health. The disciplinary scientific group makes use of experimental methods for the acquisition of informative data and images at different levels of resolution. Furthermore, the group's knowledge and skills are indispensable for the understanding of pathophysiological, semeiological, anatomopathological and precision medicine aspects.
The scientific-disciplinary sector BIOS-06/A (Physiology) focuses on the study of vital functions in animals and humans, with a comparative approach, analyzing the physiological mechanisms at the molecular, cellular and systemic levels. It investigates cellular physiology, the mechanisms of vegetative life and relational life and their interrelationships, homeostatic mechanisms and the organism's responses to environmental changes. It studies behavior and the interactions between individuals and the environment, also evaluating the integration of organs and systems, even during physical activity and in extreme conditions. Finally, it explores applications in the medical, biotechnological and environmental fields, including translational research.

Objectives:
The histology module aims to provide an in-depth understanding of the microscopic structure and function of human cells and tissues. The student must:
-Know the structure of cells, tissues, and their classifications.
-Understand the main correlations between structures and functions.
-Know and be able to apply the main morphological techniques for studying cells and tissues.
-Understand the role of tissues in the formation of organ structures.
-Know the morphological and molecular bases of the main mechanisms of histogenesis, maintenance of the differentiated state, and tissue regeneration
The main objective of Anatomy module is to provide students with knowledge of organ structure. Students must also achieve, by the end of the course, the ability to associate the structure of organs and apparatuses with their physiological function. Particular emphasis will be placed on the study and understanding of the cardiovascular system and the nervous system, which have a significant functional impact on the organs of the other apparatuses.
The physiology module aims to provide the student with the basic knowledge concerning cellular functions to understand the functioning of the various organs and systems of the human body, their regulatory mechanisms and the main processes of integration and homeostatic control.

Propaedeuticities: none

Is a propaedeuticity for: none

Types of examinations and other tests:
The exam consists of a written test with multiple-choice questions related to the content of the three modules. The grading of the answers provides 1 point for correct answers and 0 points for incorrect answers and unanswered questions. Students who wish to improve their score on the written test can take the oral exam. Two mid-term written tests are scheduled. Students who pass both mid-terms will be exempt from the final exam, and their grade will be the average of the two mid-terms. The mid-term tests are valid for the June and July sessions of the current year. The minimum passing grade for each mid-term, as well as for the written and oral exams, is 18/30.

ANNEX 2.1

DEGREE PROGRAM DIDACTIC REGULATIONS

BIOTECNOLOGIE PER LA SALUTE

CLASS L-2

School: Medicina e Chirurgia

Department: Medicina Molecolare e Biotecnologie Mediche

Didactic Regulations in force since the academic year 2025-26

Course: **NUMERICAL ANALYSIS OF BIOLOGICAL DATA**	**Teaching Language:** Italian	
SSD (Subject Areas): MATH-05/A ANALISI NUMERICA (ex MAT/08 ANALISI NUMERICA)		**CREDITS:** 5
Course year: III	**Type of Educational Activity:** Base	
Teaching Methods: in-person teaching		
Contents extracted from the SSD declaratory consistent with the training objectives of the course: Scientific Computing: Numerical methods for treating problems in applied science and technology in order to extract quantitative information from experimental data and to simulate complex phenomena.		
Objectives: The course aims to provide students with specialized notions concerning the study of methods and algorithms for the numerical treatment of biological data. Through the numerical and algorithmic analysis of the solution phases, the student will approach problems coming from applications via the resolution models.		
Propaedeuticities: None **Is a propaedeuticity for:** None		
Types of examinations and other tests: Exam type: Oral and/or Project discussion		

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ANNEX 2.1

DEGREE PROGRAM DIDACTIC REGULATIONS

BIOTECHNOLOGY FOR HEALTH

CLASS L-2

School: Medicine and Surgery

Department: Molecular Medicine and Medical Biotechnology

Didactic Regulations in force since the academic year 2025-2026

Course: Organic Chemistry	**Teaching Language:** Italian
SSD (Subject Areas): CHIM-06 (CHEM-05A)	**CREDITS:** 9 CFU
Course year: 1st	**Type of Educational Activity: A**
Teaching Methods: in-person	
Contents extracted from the SSD declaratory consistent with the training objectives of the course: Contents that illustrate the field of carbon compounds, both natural and synthetic, including biomolecules and their mimetics, drugs and polymers. Some insights into the role of supramolecular interactions due to the formation of weak bonds and recognition between biomolecules (DNA and proteins) are introduced.	
Objectives: The course aims to provide the basics of the chemistry of carbon, nitrogen and phosphorus compounds, through knowledge of the structure, stereoisomerism and reactivity of the main functional groups.	
Propaedeuticities: No propaedeuticities **Is a propaedeuticity for:** No propaedeuticities	
Types of examinations and other tests: **Exam method:** Written and then oral. The final evaluation will be based on the outcome of two written tests (in progress) that will take place during the course. [	

ANNEX 2.1

DEGREE PROGRAM

HEALTH BIOTECHNOLOGY

CLASS L-2

School: Medicine and Surgery

Department: Medicina molecolare e Biotecnologie mediche

Didactic Regulations in force since the academic year 2025-2026

Course: Pharmaceutical Technology and Legislation	**Teaching Language:** Italian
SSD (Subject Areas): CHEM-08/A	**CREDITS:** 6
Course year: 3/3	**Type of Educational Activity:** Freely selected
Teaching Methods: In-person	
Contents extracted from the SSD declaratory consistent with the training objectives of the course: The scientific disciplinary group focuses on scientific and educational activities in the field of design and formulation, preparation and control, and regulatory aspects of medicinal products, including those for advanced therapies, as well as those prepared in pharmacies. It also covers medical devices, dietary supplements, cosmetic products, and health-related products. The group conducts research related to the design, production, chemical-physical, and biopharmaceutical characterization of medicines containing active ingredients of natural, synthetic, or biotechnological origin. The discipline addresses conventional dosage forms and innovative modified release systems, including micro and nanotechnological and supramolecular systems, for the delivery and targeting of active molecules in humans, animals, plants, and the environment, as well as for tissue regeneration. It also deals with the related materials used, including polymeric biomaterials of natural, synthetic, or semi-synthetic origin. Additionally, it studies the technological and process aspects of the industrial production of the products of interest, in relation to stability, quality assurance, and quality control.	
Objectives: The aim of this course is to introduce students to the basic knowledge and methodological tools to understand dosage forms for biologicals, and the development of biologic pharmaceutics from production up to marketing authorization within the regulatory framework.	
Propaedeuticities: None **Is a propaedeuticity for:** None	
Types of examinations and other tests: Exams will consist of a combination of written and oral examinations.	

ANNEX 2.1

DEGREE PROGRAM DIDACTIC REGULATIONS

HEALTH BIOTECHNOLOGY

CLASS L-2

School: Medicine and Surgery

Department: Molecular Medicine and Biotechnology

Didactic Regulations in force since the academic year 2025-2026

Course: Pharmacology and Toxicology	**Teaching Language:** Italian
SSD (Subject Areas): BIOS-11/A (formerly, BIO/14)	**CREDITS:** 9
Course year:III	**Type of Educational Activity:Ordinary**
Teaching Methods: in-person	
Contents extracted from the SSD declaratory consistent with the training objectives of the course: Pharmacology aims to train, on an educational and scientific level, specific professional skills for the knowledge and study of drugs at a preclinical and clinical experimental level in humans. It studies and develops methodologies suitable for the evaluation of the mechanisms of action, pharmacokinetics, therapeutic, side and adverse effects and the consequent indications and contraindications for the use in humans of drugs of natural origin (pharmacognosy), synthetic or biotechnological, radiopharmaceuticals, theranostics and medical devices containing these substances, as well as toxic substances to which humans may be exposed (toxicology). It also pursues the study of interactions between drugs and pathophysiological conditions of the organism, also with a view to clinically relevant pharmacokinetic alterations. It also studies other factors influencing responses to drugs, such as their interactions with other chemical compounds, foods, functional foods, as well as the influence of gender, age, dosing regimen and other exposure conditions.	
Objectives: To train professional figures who are familiar with the pharmaconetic and pharmacodynamic profile of the drugs in use, who are able to understand and plan their delivery and predict their possible interactions on both a pharmacokinetic and pharmacodynamic level. They must also be able to develop methodologies suitable for their evaluation at a preclinical experimental level.	
Propaedeuticities: Any **Is a propaedeuticity for:** **Any**	
Types of examinations and other tests: Written and oral	

ANNEX 2.1

DEGREE PROGRAM DIDACTIC REGULATIONS

HEALTH BIOTECHNOLOGY

CLASS L-2

School: Medicine and Surgery

Department: Molecular Medicine and Medical Biotechnologies

Didactic Regulations in force since the academic year 2025-2026

Course: Physics with laboratory	**Teaching Language:** Italiano	
SSD (Subject Areas): PHYS-02/A (formerly FIS-02)		**CREDITS:** 6
Course year: I	**Type of Educational Activity: A**	
Teaching Methods: In-person		
Contents extracted from the SSD declaratory consistent with the training objectives of the course: Theoretical physics regards the study of models, mathematical methods and application to physical phenomena starting from principia and fundamental and new law. Computational skills are used. This scientific group is also characterized by teaching activity about general physics and classical physics.		
Objectives: The main task of this course is the understanding of the use of mathematical formalism in order to describe with a scientific method phenomena observed in Nature. Any scientific discipline is based on this approach. The scientific method is shown by means of simple physical examples and with laboratory experiences After this course the student should be able to solve simple physical problems on mechanics, fluid dynamics and thermo dynamics.		
Propaedeuticities: none **Is a propaedeuticity for:** **No additional course**		
Types of examinations and other tests: The student can choose to take the exam in two ways. The classic one consists of passing the written test. The alternative modality consists in participating in a series of initiatives that consist on carrying out classroom tests, weekly homework, passing the midterms, participating in laboratory activities and oral presentation (workshop) of a topic covered in the laboratory experiences. Each activity corresponds to a score that contributes to the final grade.		

ANNEX 2.1

DEGREE PROGRAM DIDACTIC REGULATIONS

HEALTH BIOTECHNOLOGY

CLASS L-2

School: Medicine and Surgery

Department: Department of Molecular Medicine and Medical Biotechnologies

Didactic Regulations in force since the academic year 2025/2026

<table>
<tr><td colspan="2">Course:
Plant Biotechnology Applied to Food Production</td><td>Teaching Language:
Italian</td></tr>
<tr><td colspan="2">SSD (Subject Areas):
AGR/06A or AGR/07</td><td>CREDITS:
6</td></tr>
<tr><td>Course year:II</td><td colspan="2">Type of Educational Activity:C</td></tr>
<tr><td colspan="3">Teaching Methods:
in-person</td></tr>
<tr><td colspan="3">Contents extracted from the SSD declaratory consistent with the training objectives of the course:
The scientific discipline covered in this course focuses on studying the structure, function, expression, regulation, and evolution of genes and genomes, as well as the heredity and evolution of agriculturally important organisms. The goal is to enhance plant genetics for traits such as food quality, environmental sustainability, and safety. This is achieved through genetic, molecular, and biotechnological methods, including plant tissue culture and genetic manipulation.</td></tr>
<tr><td colspan="3">Objectives:
The course aims to provide students with both theoretical and practical knowledge in the field of agro-food biotechnology. Students will gain expertise in the fundamental principles of plant biotechnology, such as genetic manipulation and in vitro culture, as well as the importance of sustainability and food safety. The course encourages a critical and innovative approach to research and analyzes the socio-economic impact of plant biotechnology.in the case of an integrated course, indicate the learning objectives of the teaching as a whole</td></tr>
<tr><td colspan="3">Propaedeuticities:
any
Is a propaedeuticity for:
any</td></tr>
<tr><td colspan="3">Types of examinations and other tests:
Oral test</td></tr>
</table>

ANNEX 2.2

DEGREE PROGRAM DIDACTIC REGULATIONS

HEALTH BIOTECHNOLOGY

CLASS L-2

School: Medicine and Surgery

Department: Molecular Medicine and Medical Biotechnologies

Didactic Regulations in force since the academic year 2025-2026

<table>
<tr><td colspan="2">Training Activity:
TRAINING</td><td colspan="2">Training Activity Language:
Italian</td></tr>
<tr><td colspan="3">Content of the activities consistent with the training objectives of the course:
Training and orientation periods</td><td>CFU:
5</td></tr>
<tr><td colspan="3">Course year:
N/A</td><td>Type of Training Activity: F</td></tr>
<tr><td colspan="4">Teaching Methods:
In-person</td></tr>
<tr><td colspan="4">Objectives:
Students will be exposed to experimental and/or practical and/or bioinformatics activities also based on bibliographic investigation methodologies, intra- or extra-moenia for the achievement of training objectives of a methodological and scientific nature for professionalizing purposes for entry into the world of work .</td></tr>
<tr><td colspan="4">Propaedeuticities:
none
Is a propaedeuticity for:
No additional course</td></tr>
<tr><td colspan="4">Types of examinations and other tests:
The assessment will be carried out thanks to specific experience reports, which may also represent the basis for the thesis.</td></tr>
</table>