COURSE DETAILS

"BIOMATHEMATICS"

SSD MATH03/A-MATH03/B

DEGREE PROGRAMME: BIOLOGY FOR ONE-HEALTH
ACADEMIC YEAR: 2025-2026

GENERAL INFORMATION – TEACHER REFERENCES

TEACHER:
PHONE:
EMAIL:

GENERAL INFORMATION ABOUT THE COURSE

TEACHING LANGUAGE: ENGLISH
YEAR OF THE DEGREE PROGRAMME: I
ANNUAL
CFU: 10

REQUIRED PRELIMINARY COURSES (IF MENTIONED IN THE COURSE STRUCTURE "REGOLAMENTO")

None

PREREQUISITES (IF APPLICABLE)

None

LEARNING GOALS

The course aims to provide students with introductory knowledge and basic methodological tools necessary to face, through the mathematical approach, the study of elementary processes of evolution typical of fields such as Population Dynamics, Ecology, Biology. More generally, the course aims to educate in the language of mathematical modeling and its multidisciplinary applications.

EXPECTED LEARNING OUTCOMES (DUBLIN DESCRIPTORS)

Knowledge and understanding
The student will acquire the ability to argue the construction of simple mathematical models. It will deepen the qualitative and quantitative understanding of biological phenomena through mathematical models. In addition,

he will acquire the ability to identify the most appropriate techniques for the study of models. Finally, he will become familiar with the use of difference equations and differential equations (study of equilibria, linear approximations, stability, particular solutions).

Applying knowledge and understanding
The student will be able to develop mathematical models of evolutionary phenomena of interest in Biology, to solve the problems of analysis and related them and to deduce from the analysis useful indications for the understanding of the phenomenon under consideration (identification of scenarios, forecasts)

COURSE CONTENT/SYLLABUS

[1CFU] Basic Mathematics: functions as the first model. Basic statistical methods.
[1CFU] Discrete logistic model: stability, period doublings and deterministic chaos.
[2 CFU] Malthus (exponential growth) and Verhulst models with applications.
Gompertz model for tumor growth.
[2 CFU] Interacting populations : Lotka-Volterra interaction model. Competition, cooperation and super-predation. Principle of competitive exclusion. Basic models of Mathematical Epidemiology with applications.

READINGS/BIBLIOGRAPHY

J. D. Murray. Mathematical Biology. An introduction. Springer,2002

TEACHING METHODS

Lectures and exercises in the classroom, group discussions.

EXAMINATION/EVALUATION CRITERIA

a) Exam type:

Exam type	
written and oral	
only written	
only oral	X
project discussion	
other	

COURSE DETAILS

" CELL AND TISSUE BIOLOGY (WITH LABORATORY)"

SSD BIOS-04/A

DEGREE PROGRAMME: BIOLOGY FOR ONE-HEALTH
ACADEMIC YEAR: 2025-2026

GENERAL INFORMATION – TEACHER REFERENCES

TEACHER:
PHONE:
EMAIL:

GENERAL INFORMATION ABOUT THE COURSE

TEACHING LANGUAGE: ENGLISH
YEAR OF THE DEGREE PROGRAMME: I
ANNUAL
CFU: 10

REQUIRED PRELIMINARY COURSES (IF MENTIONED IN THE COURSE STRUCTURE "REGOLAMENTO")

None

PREREQUISITES (IF APPLICABLE)

None

LEARNING GOALS

The course aims to provide students with the basic notions for understanding the key concepts on living organisms, starting from biological macromolecules up to cellular organelles and cells. Furthermore, it aims to delve into the mechanisms of interaction between cells for the formation of biological tissues, using a transdisciplinary approach and highlighting the interrelationship with the shared environment.
The molecular mechanisms that regulate specific cellular processes such as proliferation, differentiation, metabolism, survival, and cell death will be explored. Students, through analytical and problem-solving approaches, will develop the ability to better understand cellular responses to environmental changes, including the mechanisms that lead to the transformation of differentiated cells into tumor cells. Finally, the laboratory part will provide basic knowledge of microscopic, histological and cell culture techniques.

EXPECTED LEARNING OUTCOMES (DUBLIN DESCRIPTORS)

Knowledge and understanding
The student must demonstrate knowledge of the structure and function of the different components of animal cells and understand the differences between the different eukaryotic and prokaryotic cell types. Furthermore,

the student must demonstrate knowledge of the structure and function of different biological tissues, the mechanisms that allow their formation and the relationships between them. Finally, the student must learn to recognize the morpho-functional alterations of cells and tissues in relation to environmental stimuli.

Applying knowledge and understanding
The student must demonstrate that they are able to use the basic notions learned during the course to be able to analyze and recognize biological cells and tissues through observation under an optical microscope. The student will also have to apply the knowledge acquired during the course to understand the more complex cellular mechanisms such as proliferation, differentiation, metabolism, and cell death. The student must demonstrate that he/she has acquired appropriate scientific language and that he/she has acquired the ability to connect the different topics of the course.

COURSE CONTENT/SYLLABUS

The cell as the basic unit of biology. Study techniques in cytology. The optical and electronic microscope. The prokaryotes. Differences and similarities between prokaryotes and eukaryotes. The peculiar characteristics of eukaryotic cells. 0.5 CFU

The plasma membrane. The macromolecular components of membranes: structure and functions of lipids, proteins, and carbohydrates. Properties of membranes. Membrane transport. Passive transport and active transport. Simple diffusion. Facilitated diffusion. Glucose transport. Ion channels. Direct and indirect active transport. The sodium-potassium pump: structure and function. Proton pumps. 1 CFU

The extracellular matrix (ECM). General characteristics. The glycocalyx. The properties of the extracellular matrix: proteoglycans, structural proteins, and adhesive proteins. ECM functions. The proteins of the extracellular matrix. Structure and function of the basal lamina. Matrix cell adhesions: focal adhesions and hemidesmosomes. Cell-cell adhesions. Cellular junctions. Cellular communication. 0.5 CFU

The cytoskeleton. General properties of microtubules, microfilaments, and intermediate filaments. Microtubules: structure and functions. Polymerization and shortening. Microtubule organizing centers. Cilia and flagella: structure and function. Actin microfilaments. Polymerization kinetics and typical characteristics of microfilaments. The intermediate filaments: structure and functions. Classification of intermediate filaments. Assembly and polymerization. 0.5 CFU

Cellular metabolism. Anabolic and catabolic reactions. Glycolysis. Fermentation. The mitochondrion. Morphology, structure, and functions. The mitochondrial compartments (membranes, intermembrane space, mitochondrial matrix). The Krebs cycle. The electron transport chain. Oxidative phosphorylation. The synthesis of ATP. 0.5 CFU

The endomembrane system. The smooth endoplasmic reticulum: structure and functions. The rough endoplasmic reticulum: structure and functions. The synthesis of proteins and glycoproteins in the RER. Morphology and structure of ribosomes: major and minor subunits. RNA molecules: tRNA, rRNA and mRNA. The mechanism of protein synthesis: initiation, elongation, and termination. The Golgi apparatus: structure and functions. The secretory pathway: exocytosis and endocytosis. The coated vesicles. Receptor-mediated endocytosis. Lysosomes and peroxisomes: structure and functions. 0.5 CFU

The nucleus. General structure. The nuclear envelope. The nuclear lamina. The nuclear pores. Nuclear import and export mechanisms. The DNA. Structure and functions. Chromatin compaction. Histones. The nucleolus: structure and functions. The karyotype. The cell cycle: interphase and mitosis. The phases of interphase: G1, S and G2 phase: main characteristics. Mitosis: prophase, pro-metaphase, metaphase, anaphase, and telophase. Cytokinesis. Notes on meiosis. 1 CFU

Fabrics: general characteristics. Epithelial tissue: classification and general characteristics. The lining epithelial tissue: morphological characteristics and localization. The pseudostratified tissue: morphological characteristics and localization. Multilayered lining epithelia. Transitional epithelium. Glandular epithelial tissues. The exocrine glands. Methods of classification of exocrine glands. Unicellular and multicellular exocrine glands. The endocrine glands. General characteristics and classification: cord, follicular, insular, and interstitial. Structure and functions of the cord glands: pituitary, epiphysis, adrenal glands, parathyroid. Structure and functions of the thyroid. Structure and functions of the endocrine pancreas. 1 CFU

The connective tissues themselves. General characteristics. The extracellular matrix of connective tissue: fibers and amorphous substance. The cellular component. Autochthonous cells: fibroblasts and adipose cells. The migrating cells of the connective tissue. Types of connective tissue proper (mucous, fibrillar, reticular, elastic, adipose). 0.5 CFU

The blood. Plasma, chemical composition. The figured elements of blood: cellular morphological characteristics and functions. Red blood cells. White blood cells (granulocytes, lymphocytes, and monocytes) and platelets. 0.5 CFU

Cartilage tissue: general properties, anatomical position, and functions. Classification of cartilaginous tissue. Cartilage cells: chondroblasts and chondrocytes. Properties and composition of the cartilaginous matrix. General characteristics, structures and functions of hyaline, elastic, and fibrous cartilage. Chondroid tissue. Cordoid tissue. 0.5 CFU

Bone tissue. General characteristics. Classification, morphological characteristics, and properties. The lamellar bone tissue: compact and spongy; general characteristics. Structures of compact bone tissue: osteons, circumferential systems, interstitial systems, periosteum, and endosteum. Bone tissue cells: osteoblasts, osteocytes, osteoclasts: structure and functions. Characteristics of the bone matrix: organic and inorganic component. The acellular bone tissue: dentin. The ossification processes. Direct or intramembranous ossification: morphological and functional characteristics. Matrix mineralization mechanisms. 0.5 CFU

Muscle tissue. Skeletal striated muscle tissue. The mechanism of muscle contraction. The neuromuscular junction. Red fibers and white fibers. The cardiac striated muscle tissue. Cardiomyocytes: structure and functions. Structure of the intercalated discs. The conduction tissue of the myocardium. Smooth muscle tissue. Morphology and structure of fibrocells. The mechanism of smooth muscle contraction. 0.5 CFU

The nervous tissue. General characteristics of the neuron. Specific characteristics and properties of the cell body. The dendrites: morphological characteristics; the dendritic spines. The axon: morphological and functional characteristics. Classification of neurons. Structure of the nerves. The formation of the myelin sheath and the role of Schwann cells and oligodendrocytes. Glial cells (ependymocytes, astrocytes, satellite cells, microglia). 0.5 CFU

Laboratory exercises: basic histological techniques: embedding, slicing and staining. Observation of the preparations under the optical microscope. Basic cytological techniques. 2 CFU

As part of the topics covered during the course, the teacher will delve into topics relating to his own research activity.

READINGS/BIBLIOGRAPHY

Cell Biology, Edited by Thomas D. Pollard, William C. Earnshaw, Graham T. Johnson, Elsevier
Textbook of Histology, Gartner, Elsevier
Color Atlas of Cytology, Histology and Microscopic Anatomy, by Wolfgang Kuehnel George Thieme Verlag

TEACHING METHODS

The teacher will use a) lectures with the aid of PowerPoint presentations for approximately 85% of the total hours, b) laboratory exercises to deepen applied knowledge for approximately 10% of the total hours, c) seminars on his/her own research activity research for approximately 5% of total hours. The teaching material will be made available to students enrolled in the course via the teacher's website.

EXAMINATION/EVALUATION CRITERIA

b) Exam type:

Exam type	
written and oral	x
only written	
only oral	
project discussion	
other	

COURSE DETAILS

" ZOOLOGY FOR ONE HEALTH (WITH LABORATORY)"

SSD BIOS-03/A

DEGREE PROGRAMME: BIOLOGY FOR ONE-HEALTH
ACADEMIC YEAR: 2025-2026

GENERAL INFORMATION – TEACHER REFERENCES

TEACHER: MICHAEL KUBA
PHONE: 081679075
EMAIL: MICHAEL.KUBA@UNINA.IT

GENERAL INFORMATION ABOUT THE COURSE

TEACHING LANGUAGE: ENGLISH
YEAR OF THE DEGREE PROGRAMME: I
ANNUAL
CFU: 10

REQUIRED PRELIMINARY COURSES (IF MENTIONED IN THE COURSE STRUCTURE "REGOLAMENTO")

None

PREREQUISITES (IF APPLICABLE)

None

LEARNING GOALS

The objectives of the course "Zoology for One Health" aim to integrate the study of animal biology with the principles of One Health, emphasizing the fundamental interconnection between human, animal, and environmental health. Additionally, the course aims to provide students with a comprehensive understanding of the complex relationships between animals, humans, and the environment. Finally, the course seeks to prepare students for future careers in various fields, including research, conservation, public health, and related sectors, by equipping them with the skills and knowledge necessary to address global challenges in these areas.

EXPECTED LEARNING OUTCOMES (DUBLIN DESCRIPTORS)

Knowledge and understanding

For the course "Zoology for One Health," the student must demonstrate knowledge and understanding of issues related to the main taxonomic groups of animals, including scientific nomenclature, classification, and the structural, morphological, and functional differences of systems within various taxa. They must be able to formulate arguments regarding the relationships and connections between different groups of animals, based on the learned notions about their distinctive characteristics and evolutionary adaptations. The educational path

aims to provide students with the foundational knowledge and methodological tools necessary to analyze and understand the complex interactions between animals, humans, and the environment. These tools will enable students to describe the causal connections between animal and human health and grasp the implications and consequences of environmental changes and alterations in ecological systems. Furthermore, the course aims to help students understand the main relationships that exist between various taxa and their mutual influences, preparing them to tackle global challenges in the fields of health and conservation.

Applying knowledge and understanding

The student must demonstrate the ability to apply the acquired knowledge to analyze the relationships between animal health and human health, solve problems related to the evolutionary adaptation of animals, and apply the learned methodological tools in practical contexts. They must be able to use the obtained skills to formulate arguments concerning the connections between different taxa and their implications for public and environmental health. The educational path is oriented towards imparting the capabilities and methodological and operational tools necessary to concretely apply the knowledge and foster the ability to use the acquired tools to solve complex problems and tackle global challenges in fields beyond the traditional ones.

COURSE CONTENT/SYLLABUS

Basic Concepts of Zoology: definition, history, and goals.
One Health Concept: history, development, and key principles of One Health.
Classification and Diversity of Animals: overview of the animal kingdom, major phyla, and their characteristics.
Structure and function of different animal systems: homeostasis, metabolism, reproduction, and development in animals.
Concepts of Animal Ecology: habitat, niche, population dynamics, and community interactions; animal behavior, communication, mating systems, and social structures.
Principles of Evolution: mendelian genetics, molecular genetics, and population genetics; natural selection, adaptation; sexual selection; artificial selection.
Conservation zoology: biodiversity conservation; importance of biodiversity, threats, and conservation strategies; endangered species, and sustainable use of wildlife resources; climate change and its impact on animal conservation; role of genetics in conserving breeds and preventing inbreeding.
Ethical considerations in animal research and the development of policies for health management.
Interaction humans and other species:
a) Parasite relationships with humans: types, life cycles and impact on animal health (protozoan, plathelminths; nematodes; arthropods); zoonotic diseases (transmission dynamics between animals and humans, examples of major zoonoses); role of animals in the spread of antimicrobial resistance and strategies for mitigation.
b) Communicative strategies: behavioral traits of domesticated species, the domesticated species in the human social structure, learning and communication; human-animal bond (psychological and emotional relationships between humans and their pets or livestock); animal welfare; ethical considerations and legal regulations related domesticated animals...

Laboratory activities: 2 CFU

READINGS/BIBLIOGRAPHY

Appunti di Zoologia Adattativa; D'Aniello, EdiSES.
Zoologia; autori: Casiraghi M. et al., UTET 2018
Zoologia; autori: Mitchell, Mutchmor, Dolphin; editore: Zanichelli
Zoologia, autori: Hickman, Roberts, Kean, Eisenhour, Larson, L'Anson, 18 ed, McGraw Hill, 2020
Zoologia. Diversità animale; autori: Argano R., Boero F., Bologna M. A., Dallai R., Lanzavecchia G., Luporini P., Melone G., Sbordoni V., Scalera Liaci L. 2007; editore: Monduzzi. Bologna. 612 pp

Zoologia; autori: Miller and Harley. Curatori dell'edizione italiana: De Bernardi F., Balsamo M., Bolzern A.M., Corrado M.U., Rastogi R.K., Rossaro B., Vinciguerra M.T. editori: Idelson-Gnocchi
Additional material:
Recent scientific articles, handouts provided during the course, and specific online resources.

TEACHING METHODS

The course include:
a) Lectures for 8 CFU credits
b) Practical exercises to deepen theoretical aspects for 2 CFU credits

EXAMINATION/EVALUATION CRITERIA

c) Exam type:

Exam type	
written and oral	**X**
only written	
only oral	
project discussion	
other	

In the case of a written exam, the questions are (*):	**Multiple choice**	**X**
	Open-ended	
	Numerical exercises	

d) Evaluation pattern:

The final grade will be weighted based on the results of the written exam (50%) and the oral exam (50%). The outcome of the written exam is mandatory for access to the oral exam.

COURSE DETAILS

" ORGANIC CHEMISTRY AND PRINCIPLES OF CHEMICAL BIOLOGY (WITH LABORATORY)"

SSD CHEM-05/A

DEGREE PROGRAMME: BIOLOGY FOR ONE-HEALTH
ACADEMIC YEAR: 2025-2026

GENERAL INFORMATION – TEACHER REFERENCES

TEACHER:
PHONE:
EMAIL:

ENERAL INFORMATION ABOUT THE COURSE

TEACHING LANGUAGE: ENGLISH
YEAR OF THE DEGREE PROGRAMME: II
ANNUAL
CFU: 12

REQUIRED PRELIMINARY COURSES (IF MENTIONED IN THE COURSE STRUCTURE "REGOLAMENTO")

None

PREREQUISITES (IF APPLICABLE)

None

LEARNING GOALS

Chemistry has changed rapidly in recent decades, and techniques that were once applied exclusively to macromolecules are now routinely used with small molecules, such as physiological mediators, probes and drugs, to understand the chemical and biological mechanisms at play. The course lays the foundations for understanding the role of organic chemistry in complex biological systems and about how chemical tools are used to study and regulate these processes
In addition to fundamental organic chemistry concepts related to chemical bonding, reactivity, structure, and the nature of low molecular weight organic compounds, students will be gradually introduced to concepts and practical advances in the area at the intersection of chemistry and biology with a training course that will address various topics such as the chemical basis of cellular mechanisms, an introduction to spectroscopic and spectrometric techniques for applications in biological contexts, biosynthesis and the rational use of organic compounds to manipulate, understand and/or imitate cellular processes. In the absence of previous formation in Chemistry, the course includes initial notes on atoms and molecules, stoichiometry, solutions and principles of thermodynamics and chemical kinetics.

EXPECTED LEARNING OUTCOMES (DUBLIN DESCRIPTORS)

Knowledge and understanding

The course aims to provide students with basic knowledge of organic compounds and their function in biological systems. The student must be able to demonstrate that they have learned the connection between chemical transformations and cellular mechanisms, starting from the link between chemical structure and the role of individual compounds, and be able to understand the notions regarding chemical reactions in biological systems, the implications of their role in the development and regulation of biochemical pathways, as well as to handle the main techniques used to study small organic molecules in biological contexts. At the end of the course, students should be able to understand:

1. the reactivity and nature of organic compounds
2. chemical synthesis and derivatization strategies of organic compounds
3. the role and evolution of natural products, physiological lipid mediators and biosynthetic pathways
4. the physical and chemical principles underlying cellular mechanisms and metabolic processes
5. the rudiments of spectroscopic and spectrometric techniques for the study of complex biological systems.

Applying knowledge and understanding

The course is inherently interdisciplinary and aims to combine knowledge and techniques used in organic chemistry with other disciplines such as biochemistry, cell and system biology. The student must be able to draw consequences from the acquisition of chemical information in cellular contexts to address questions that concern the understanding or use of this knowledge in complex biological systems. The training course is aimed at providing the logical methodologies and basic tools for the study and concrete application of these notions.
Students will have to demonstrate that they have acquired critical reasoning skills and the ability to identify the correlation of the chemical and structural properties of organic compounds with their biological function.

COURSE CONTENT/SYLLABUS

The course aims to provide basic knowledge of organic chemistry and the connection between the chemical and structural properties of compounds, such as mediators and small organic molecules, with their biological functions. To this end, the lessons are divided into the following modules with the respective values in CFU:

- Introduction to general chemistry and basic organic chemistry (5 CFU),
- Introduction to biosynthesis and metabolism (1 CFU)
- Role and characterization of natural compounds and lipid mediators (2 CFU)
- Notions of chemical biology (2 CFU)
- Introduction to fluorescence, mass spectrometry and nuclear magnetic resonance techniques for the study of biological systems and processes (2 CFU)

Both in frontal teaching and in guided exercises, the ability to express the constituent elements and typical processes of organic chemistry and its implications in the biological field is strongly stimulated in terms that are as rigorous as they are understandable in English. In guided exercises we will address the exercises in a collective manner, stimulating group discussion and the ability to design, study and analyse the results. In particular, the ability to describe in oral form, with linguistic properties and terminological rigour, the structure, chemical behaviour, origin and biological function of organic compounds will be stimulated.

READINGS/BIBLIOGRAPHY

Basic organic chemistry texts together with articles and scientific material provided by the teacher.

TEACHING METHODS

The course includes 80 hours of lectures and 16 hours of exercises with practical tests for the introduction to advanced chemical techniques. In general, the teacher/teachers will use a) lectures for approximately 65% of the total hours, b) practical in-depth exercises on theoretical aspects for 20% of the total hours c) other, including seminars and laboratory internships, for 15% of total hours.

The course includes lectures with classroom exercises. At the beginning of the course, an overview will be presented with the description of the topics that will be covered in class. If teaching is provided in mixed mode, the necessary variations may be introduced with respect to what was previously stated. The teacher will guarantee fixed office hours and will be available for meetings by appointment.

EXAMINATION/EVALUATION CRITERIA

e) Exam type:

Exam type	
written and oral	X
only written	
only oral	
project discussion	
other	X

a) In case of a written exam, questions refer to: (*)	Multiple choice answers	X
	Open answers	X
	Numerical exercises	

b) Evaluation pattern:

The exam consists of a two-hour written test and followed by an oral test on all the topics of the course. Both tests will be in English. To access the oral test, a minimum score of 10/20 is required in the written test. The interview will aim to ascertain the level of learning and understanding of the topics contained in the course program. In particular, the relevance of the answers to the questions asked, the quality of the contents, the ability to connect with the other topics covered by the program, the ability to provide examples, the technical language and the overall expressive ability of the student will be evaluated.

COURSE DETAILS

"PLANT BIOLOGY (WITH LABORATORY)"

SSD BIOS-01/A

DEGREE PROGRAMME: BIOLOGY FOR ONE-HEALTH
ACADEMIC YEAR: 2025-2026

GENERAL INFORMATION – TEACHER REFERENCES

TEACHER:
PHONE:
EMAIL:

GENERAL INFORMATION ABOUT THE COURSE

TEACHING LANGUAGE: ENGLISH
YEAR OF THE DEGREE PROGRAMME: I
ANNUAL
CFU: 10

REQUIRED PRELIMINARY COURSES (IF MENTIONED IN THE COURSE STRUCTURE "REGOLAMENTO")

None

PREREQUISITES (IF APPLICABLE)

None

LEARNING GOALS

The main objective of this course is to allow the acquisition of basic knowledge on the structure, function and diversity of plant organisms:

1. Study of the structure of a corm plant: from the cytological and histological characteristics to the anatomical ones of the root, stem and leaves.
2. Definition of the cytological structures characterizing a plant cell and related functions: wall, vacuole, plastid.
3. Study of the main plant tissues and related functions
4. Knowledge of problems relating to the evolution of plants
5. Knowledge of the main biological and reproductive characteristics of Cyanobacteria and the main groups of Algae, Fungi, Bryophyta and Tracheophyta.
6. Basic knowledge on plant-human-environment interaction. The use of plants as food and as medicines.

EXPECTED LEARNING OUTCOMES (DUBLIN DESCRIPTORS)

Knowledge and understanding

Know the morphological organization of plants at the cellular, tissue and organ level. Know the functional and reproductive organization of plants.

Applying knowledge and understanding

The student must demonstrate that he is able to recognize the main groups of plant organisms and correlate them based on evolutionary processes.
Any further expected learning outcomes relating to:

Making judgements

Essential and effective tools will be provided to allow students to analyze the morphology and main anatomical structures of plants independently.

Communication abilities

The student must be able to explain to non-expert people the basic notions of morphology, structure, plant anatomy and the main characteristics that distinguish the main groups of plants.
Moreover, he must know how to use technical language correctly by familiarizing yourself with the terms specific to the discipline.

Knowledge ability

The student learns to expand their knowledge by independently drawing on texts and scientific articles specific to the sector. The acquisition of these skills is ascertained and verified through checks on the autonomous and application activities planned during the laboratory.

COURSE CONTENT/SYLLABUS

CYTOLOGY
Morphology and ultrastructure of the plant cell. The cell wall. The vacuole. The cytoskeleton and endomembrane systems. Plastids: endosymbiotic theory. Photosynthetic pigments. The photosynthetic process. Origin of the eukaryotic plant cell. CFU 1
HISTOLOGY
Plant tissues: primary and secondary meristems; parenchymatous tissues; integumental tissues; mechanical tissues, xylem and phloem. CFU 0.5
ANATOMY
Concept of thallus and corm. Evolution of the stem, root and leaves. Main types of stele (protostele, eustele, atactostele and actinostele). Ontogeny, primary and secondary structure of the stem and root. Modifications of the stem and root. Ontogeny, morphology and anatomy of the leaf. CFU 1.5 PHYSIOLOGY
Absorption and transport of water and nutrients; phloem and xylem transport. Transpiration. CFU 1 BIODIVERSITY
Mode of reproduction (agamic and sexual). Cycle of haplontic, haplodiplontic, diplontic organisms. Main characteristics, biological cycles and reproduction of the main groups of plants: algae, bryophytes, vascular cryptogams, gymnosperms and angiosperms and fungi. CFU 1
PLANT-HUMAN-ENVIRONMENT INTERACTIONS
Role of autotrophic organisms in the ecosystem and plant-environment interactions. CFU 1
Plants in human nutrition and nutritional properties OF PLANTS. CFU 1
History of the use of plants in human health. CFU 1
RELEVANT LABORATORY EXPERIENCES: CFU 2

READINGS/BIBLIOGRAPHY

Pasqua G., Abbate G., Forni C. - BOTANICA GENERALE E DIVERSITA' VEGETALE Editore:Piccin
Raven P.H., Evert R.F., Eichhorn S.E. –BIOLOGIA DELLE PIANTE –Editore Zanichelli

Rost, Barbour, Stocking, Murphy –BIOLOGIA DELLE PIANTE –Zanichelli Editore
Stern, Bidlack, Jansky, - INTRODUZIONE ALLA BIOLOGIA VEGETALE –Editore McGraw-Hill

TEACHING METHODS

Lectures and laboratory activities

EXAMINATION/EVALUATION CRITERIA

f) Exam type:

Exam type	
written and oral	X
only written	
only oral	
project discussion	
other	

In the case of a written test the	Multiple choice answers	X
questions are (*)	Open answers	
	Numerical exercises	

g) Evaluation pattern:

The evaluation will consider the following aspects:
Logical structure in the exposition of the requested topic.
Properties of scientific and botanical language.
Level of knowledge of the program.
Ability to relate the various topics covered in an organic way.
Critical exposition of the studied concepts.

COURSE DETAILS

"PHYSICS AND ELEMENT OF STATISTICS"

SSD PHYS06/A

DEGREE PROGRAMME: BIOLOGY FOR ONE-HEALTH
ACADEMIC YEAR: 2025-2026

GENERAL INFORMATION – TEACHER REFERENCES

TEACHER:
PHONE:
EMAIL:

GENERAL INFORMATION ABOUT THE COURSE

TEACHING LANGUAGE: ENGLISH
YEAR OF THE DEGREE PROGRAMME: II
ANNUAL
CFU: 6

REQUIRED PRELIMINARY COURSES (IF MENTIONED IN THE COURSE STRUCTURE "REGOLAMENTO")

None

PREREQUISITES (IF APPLICABLE)

None

LEARNING GOALS

The course aims to provide students with the basic knowledge in physics and statistics necessary to quantitatively understand natural phenomena and the physical principles underlying laboratory instruments, as well as the skills to accurately interpret experimental data.

EXPECTED LEARNING OUTCOMES (DUBLIN DESCRIPTORS)

Knowledge and understanding
The student needs to show ability to know and understand problems related to the general concepts of physics and the experimental method. He/she needs to show ability to develop quantitative discussions concerning physics and statistical analysis of experimental data. Indeed, the course provides students with knowledge and basic methodological tools necessary for understanding Physics and elements of basic Statistics in the framework of life science.

Applying knowledge and understanding
The student must demonstrate that he or she has acquired the knowledge and tools necessary to solve simple real scientific problems in the field of physics and to extend the acquired methodology to the description and analysis of phenomena in a biological context. The course delivers ability needed toward conveying familiarity with the scientific method of investigation and with the representation and analysis of experimental data)

COURSE CONTENT/SYLLABUS

Physics

a) Kinematics of a single particle
b) Dynamics of a single particle
c) Work and Energy
d) Introduction to the Dynamics of Systems of Particles and Rigid Bodies
e) Fluids: Density, Pressure and Hydrostatic Equilibrium, Stevin's Law, Atmospheric Pressure and Pressure Measurements, Archimedes' Principle, Fluid Dynamics: Flow Tube, Continuity Equation and Flow Rate, Bernoulli's Theorem, Venturi Tube
f) Thermodynamics: Thermodynamic Systems and Variables, Temperature and Heat, First Law of Thermodynamics, Introduction to the Second Law of Thermodynamics

Statistics

a) Measurement Process and Measurement Error: Graphical Representations: Histograms, Mean, Mode, Median, Variance and Standard Deviation
b) Normal Distribution: Characteristics and Properties, Central Limit Theorem, Probabilistic Significance and Z-Score
c) Probability: Fundamental Concepts, Permutations and Combinations, Binomial Distribution, Gaussian Approximation of the Binomial Distribution
d) Statistical Inference: Significance and Importance, Sampling Statistics, Hypothesis Testing, Confidence Intervals

READINGS/BIBLIOGRAPHY

Didactic material provided from the teacher

TEACHING METHODS

Lectures and exercises in the classroom, group discussions.

EXAMINATION/EVALUATION CRITERIA

h) Exam type:

Exam type	
written and oral	**X**
only written	
only oral	
project discussion	

COURSE DETAILS

" NATURAL AND MAN-MADE HABITATS (WITH LABORATORY)"

SSD BIOS-05/A

DEGREE PROGRAMME: BIOLOGY FOR ONE-HEALTH
ACADEMIC YEAR: 2025-2026

GENERAL INFORMATION – TEACHER REFERENCES

TEACHER: GIULIA MAISTO
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EMAIL: GIULIA.MAISTO@UNINA.IT

GENERAL INFORMATION ABOUT THE COURSE

TEACHING LANGUAGE: ENGLISH
YEAR OF THE DEGREE PROGRAMME: II
ANNUAL
CFU: 10

REQUIRED PRELIMINARY COURSES (IF MENTIONED IN THE COURSE STRUCTURE "REGOLAMENTO")

None

PREREQUISITES (IF APPLICABLE)

None

LEARNING GOALS

The course focuses on mechanisms linking ecological processes across different levels of organization, such as organism function, species interactions, spatial connectivity and energetic transfers across trophic levels in natural environments. Moreover, it deserves attention on the impacts of humans on nature from an ecological perspective, investigating current global issues such as global change, pollution, habitat modification and biodiversity loss.

EXPECTED LEARNING OUTCOMES (DUBLIN DESCRIPTORS)

Knowledge and understanding
The students will know the main differences in ecological processes occurring in natural and man-made habitats. The training course will provide knowledge about the methodological tools to describe and analyse the impact of humans on the environment.

Ability to apply knowledge and understanding

The students will be able to describe natural and man-made habitats and to highlight the impacts of humans on the ecological processes. Moreover, they will be able to use the main practical tools to understand the ecological processes occurring in several environments.

COURSE CONTENT/SYLLABUS

Lectures (4 CFU)

Ecological factors: resources and conditions. Tolerance range and ecological valence. 0.5 CFU

Population ecology. Population properties. Change rate and intrinsic rate of natural increases. Mechanisms of population regulations. Home range and territoriality. Spatial distribution of populations and age pyramids. Abundance and density. Population dynamics: growth and survival curves. r- and k-strategies. Ecological interactions: competition; predation; herbivory; parasitism; amensalism; commensalism; symbiosis. 1 CFU

Community ecology. Species composition and richness, diversity and dominance. Ecological succession and mechanisms. 0.5 CFU

Ecosystem processes. Primary production. Photosynthesis types. Relationships between production and biomass. Chemosynthesis. Decomposition; respiration; fermentation. Food chains and food webs; trophic levels; energy flux and matter cycle; ecological efficiencies; ecological pyramids. 1.5 CFU.

Climate: factors and drivers; climatic diagrams; biomes. 0.5 CFU

Lectures (4 CFU)

Concept of **environmental sustainability** and case studies (0.5 CFU).

Functional processes in the natural, man-made, and built environment. Alterations of matter cycle (0.5 CFU).

Biodiversity. Species composition and richness, diversity and dominance. Alfa, beta and gamma diversity. Role of biodiversity. Ecosystem functions. Ecosystem goods and services. Functional diversity. Functional traits and functional types. Functional redundancy. Natural capital. Biodiversity loss. (1 CFU).

Global changes. Climate change, Invasion of exotic species. Ecosystem risk assessment (1 CFU).

Pollution. Conventional and emergent pollutants and their impacts on ecosystem functionality (1 CFU)

Laboratory activities (2 CFU)

Laboratory activities to assess the main properties (1 CFU) and the biodiversity (1 CFU) in environmental matrices.

READINGS/BIBLIOGRAPHY

Didactic material and slides provided by the teacher

TEACHING METHODS

The teacher will use frontal lectures for 90 percent of the total hours, b) laboratory activities to deepen applied knowledge for 10 percent of the total hours

EXAMINATION/EVALUATION CRITERIA

i) **Exam type:**

Exam type	
written and oral	
only written	
only oral	X
project discussion	
other	

COURSE DETAILS

" MICROBIOLOGY AND GLOBAL HEALTH (WITH LABORATORY)"

SSD BIOS-15/A

DEGREE PROGRAMME: BIOLOGY FOR ONE-HEALTH
ACADEMIC YEAR: 2025-2026

GENERAL INFORMATION – TEACHER REFERENCES

TEACHER: EZIO RICCA
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GENERAL INFORMATION ABOUT THE COURSE

TEACHING LANGUAGE: ENGLISH
YEAR OF THE DEGREE PROGRAMME: II
ANNUAL
CFU: 10

REQUIRED PRELIMINARY COURSES (IF MENTIONED IN THE COURSE STRUCTURE "REGOLAMENTO")

None

PREREQUISITES (IF APPLICABLE)

None

LEARNING GOALS

Objective of the course is to provide students a basic knowledge on microorganisms, on their metabolic activities and their interactions with other organisms and with the environment. Information will also be provided on the main laboratory methods used for: the isolation of microorganisms from the environment, the preparation of microbial culture media and the microbial growth control.

EXPECTED LEARNING OUTCOMES (DUBLIN DESCRIPTORS)

Knowledge and understanding
The student will learn about the main structural and metabolic features of microorganisms in order to correlate the presence of microbial species in natural habitats. The training course will provide the knowledge on methodological tools necessary to isolate microorganisms from the environment, analyze microbial growth and learn about the possibilities to control microbial growth.

Applying knowledge and understanding

The student will be able to use the methods learned during the course to measure bacterial growth and evaluate growth parameters in response to different environmental conditions. The student will be also able to isolate and characterize microorganisms from natural samples.

COURSE CONTENT/SYLLABUS

General Microbiology (4 CFU) The cell of Prokaryotes. Microbial growth. Microbial metabolism and mixotrophy. Bacterial genetics. Antibiotics and mechanisms of resistance to antobiotics.
One health Microbiology (4 CFU) Interactions between bacteria. Interaction between bacteria and animals: commensals and pathogens. Interaction between bacteria and plants: commensals and pathogens. Microorganisms and the environment. Microbes as biotechnology tools.
Practicals (2CFU) Bacterial growth. Effects of temperature, pH, O_2 and antibiotics on the bacterial growth. Isolation and characterization of microorganisms from natural samples.

READINGS/BIBLIOGRAPHY

- Biologia dei Microrganismi –Dehò, Galli –C.E.A.
- Brock, Biologia dei Microrganismi –Madigan et al. –Pearson
- Prescott, Microbiologia - Willey et al. - McGraw-Hill Italia

TEACHING METHODS

The teacher will use a) lectures for about 70% of the total time, b) exercises to focus on specific aspects for about 10% of the total time; c) laboratory practicals for about 20% of the total time

EXAMINATION/EVALUATION CRITERIA

j) Exam type:

Exam type	
written and oral	X
only written	
only oral	
project discussion	
other	

In case of a written exam, questions refer to: (*)	Multiple choice answers	X
	Open answers	X
	Numerical exercises	X

k) Evaluation pattern:

Students marked a minimum of 18/30 at the written test will discuss their test

SCHEDA DELL'INSEGNAMENTO (SI)

" PHYSIOLOGY OF HEALTH AND WELL-BEING (WITH LABORATORY)"

SSD BIOS-06A

DEGREE PROGRAMME: BIOLOGY FOR ONE-HEALTH
ACADEMIC YEAR: 2025/2026

GENERAL INFORMATION - PROFESSOR

PROFESSOR: ARIANNA MAZZOLI
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GENERAL INFORMATION-ACTIVITIES

LANGUAGE OF TEACHING DELIVERY: ENGLISH
COURSE YEAR: II
ANNUAL
CREDITS: 10

PREPARATORY COURSES (if provided for by the Course Regulations)

None

ANY PREREQUISITES

None

EDUCATIONAL OBJECTIVES

The course focuses on the physiological adaptations of the human body to the environment, with particular attention to the different organs and systems. The objective is to understand the physiology of organs and tissues in standard reference conditions, to be able to understand how it changes in response to different environmental stimuli (e.g. climate). Furthermore, it will describe how nutrition affects the correct functioning of the body and what nutritional standards should be applied in different conditions.

EXPECTED LEARNING OUTCOMES (DUBLIN DESCRIPTORS)

Knowledge and understanding

Students must be able to demonstrate knowledge and understanding of organs and systems physiology, demonstrating their ability to develop even complex treatments regarding all the physiological modifications of the human body in different environmental conditions.
The student must also know the fundamental requirements of nutrition.

Ability to apply knowledge and understanding

The student must demonstrate the ability to analyze and interpret physiological parameters and the consequences of their alterations. The training course is aimed at transmitting the operational skills necessary to concretely apply physiological knowledge in basic and applied research activities and to fully use methodological tools in the industrial, food and diagnostic fields, in both production and service activities.

PROGRAMMA-SYLLABUS

Lectures (4 CFU)

Membrane physiology, nerve and muscle: transport of substances through cell membranes, membrane and action potentials, contraction of skeletal muscle, excitation of skeletal muscle (excitation-contraction coupling)

The heart and the circulation: cardiac muscle (heart as a pump), rhythmical excitation of the heart, overview of the circulation

The body fluids and kidneys: body fluids compartments (extra and intracellular fluids), urinary system, glomerular filtration, reabsorption and secretion

Respiration: general principle and regulation

The nervous system: general principle and sensory physiology. Fight or Flight" and "Tend and Be Friend" response.

Gastrointestinal physiology: motility, nervous control and blood circulation, digestion and absorption

Metabolism and temperature regulation: metabolism of macronutrients, the liver, dietary balance, energetics and metabolic rate, body temperature regulation

Endocrinology and reproduction: general principle

Lectures (4CFU)

Environmental factors that can affect human physiology: dietary habits**,** heat, cold, hypoxia, electromagnetic radiation, wind, water immersion, microgravity, air / light / noise pollution, and chemical agents.

Homeostatic and behavioural aspects of environmental physiology: short- and long-term adaptation (e.g., behavioural thermoregulation), disease development

Climate changes and human health

Laboratory activities (2 CFU)

Spectrophotometric and colorimetric assays for the determination of the plasma metabolic profile (1 CFU), determination of body composition through anthropometric and impedance measurements (1 CFU).

TEACHING MATERIALS

Guyton and Hall, Medical Physiology
John Wiley & Sons, Enviromental Physiology
Power point provided by the professor

COURSE METHOD OF CONDUCT

The teacher will use a) frontal lessons with the aid of PowerPoint presentations for approximately 90% of the total hours, b) laboratory exercises to deepen applied knowledge for approximately 10% of the total hours. The presentations projected during the lessons will be available to students registered online for the course, via download from the teacher's website.

EVALUATION CRITERIA

I) **Exam method:**

The exam is divided into	
Writing and oral	
writing	
Oral	x
discussion of project work	
other	

COURSE DETAILS

"BASIC AND ENVIRONMENTAL BIOCHEMISTRY (WITH LABORATORY)"

SSD BIOS-07/A

DEGREE PROGRAMME: BIOLOGY FOR ONE-HEALTH
ACADEMIC YEAR: 2025-2026

GENERAL INFORMATION – TEACHER REFERENCES

TEACHER: PATRIZIA CONTURSI
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GENERAL INFORMATION ABOUT THE COURSE

TEACHING LANGUAGE: ENGLISH
YEAR OF THE DEGREE PROGRAMME: II
ANNUAL
CFU: 10

REQUIRED PRELIMINARY COURSES (IF MENTIONED IN THE COURSE STRUCTURE "REGOLAMENTO")

None

PREREQUISITES (IF APPLICABLE)

None

LEARNING GOALS

The aim of this course is to provide basic knowledge on the structural and functional characteristics of biomolecules as well as on the properties of enzymes and on the main metabolic processes involving carbohydrates, lipids and proteins. Furthermore, the course aims shed light on the effects of oxidative stress and/or xenobiotic substances on metabolism and to describe the main adaptation systems to the environmental stress sources. The training objectives also include the acquisition of knowledge regarding: 1. the analysis of amino acid sequences for the identification of biotechnologically relevant proteins/enzymes; 2. the main biochemical methodologies for the analysis of proteins/enzymes.

EXPECTED LEARNING OUTCOMES (DUBLIN DESCRIPTORS)

Knowledge and understanding

The student should have a solid knowledge of the structural/functional organization of the main biological macromolecules and of the interconnections between human, animal and environmental health in the context of basic metabolic processes and in response to stress from environmental factors.

Applying knowledge and understanding

The student must also demonstrate to be able to elaborate and argue the notions learned and to apply the main analytical and preparatory techniques for the study of proteins/enzymes. The student will develop the ability to use an adequate study method by independently drawing on scientific articles.

COURSE CONTENT/SYLLABUS

INTRODUCTION
The structure of water and its importance in biological systems
BIOLOGICAL MACROMOLECULES
Carbohydrates, Lipids, Nucleic acids: Structure, chemical-physical properties, functions (1.5 CFU)
Structural organization of proteins: primary, secondary, tertiary and quaternary structure. Structure and function relationships: denaturation/renaturation; Fibrous and globular proteins.
Enzymes. Basic concepts: kinetics of non-catalyzed and enzyme-catalyzed reactions, Michaelis-Menten kinetics; Enzyme inhibition. Enzyme regulation: pH and temperature effects, allosteric enzymes, post-translational modifications, activation of zymogens. Enzyme cofactors (1 CFU)

BIOENERGETICS AND METABOLISM
General concepts of energetics: enthalpy, entropy and free energy, the standard state, compounds with high energy content, their role in metabolism (chemical-physical bases of the free energy variations of hydrolysis) . The metabolism of carbohydrates, lipids and amino acids (3 CFU)

MOLECULAR MECHANISMS OF RESPONSE TO BIOTIC AND ABIOTIC STRESS
Environmental pollutants, metabolic detoxification pathways, environmental bioremediation. Oxidative stress and molecular damage. Scavenger enzymes. Natural antioxidants. Adaptations of biological molecules to biotic and abiotic stress conditions. Green processes for the production of biocompatible materials through enzymes/microorganisms (1.5 CFU).
Comparative analysis of amino acid sequences and consultation of databases. Rational design of ligands (0.5 CFU).
THEORETICAL PREPARATION FOR THE LABORATORY
Principles of protein purification and characterization: homogenization and cell lysis; Cell fractionation; Protein extraction and purification. Separation techniques: Centrifugation and ultracentrifugation. Chromatographic techniques: ion exchange, molecular exclusion, affinity. Electrophoretic techniques: SDS-PAGE. Spectrophotometric techniques (0.5 CFU).

Laboratory activities (2 CFU)
Purification of recombinant proteins and activity assays, search for proteins in databases and sequence analysis

READINGS/BIBLIOGRAPHY

Didactic material and slides provided by the teacher

TEACHING METHODS

The teacher will use a) lectures with the aid of PowerPoint presentations for approximately 90% of the total hours, b) laboratory exercises to deepen applied knowledge for approximately 10% of the total hours. The

presentations shown in class will be made available to students registered online for the course, via download from the teacher's website.

EXAMINATION/EVALUATION CRITERIA

m) Exam type:

Exam type	
written and oral	
only written	
only oral	X
project discussion	
other	

n) Evaluation pattern:

The evaluation of the exam will consider the general knowledge of the topics, followed by the level of depth and details of the molecular mechanisms covered during the course. The student's ability to connect the different topics together will also be assessed, highlighting the interdisciplinarity of the fundamental concepts of biochemistry.

COURSE DETAILS

" ONE HEALTH MOLECULAR FOUNDATIONS (WITH LABORATORY)"

SSD BIOS-08/A

DEGREE PROGRAMME: BIOLOGY FOR ONE-HEALTH
ACADEMIC YEAR: 2025-2026

GENERAL INFORMATION – TEACHER REFERENCES

TEACHER: ALDO DONIZETTI
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GENERAL INFORMATION ABOUT THE COURSE

TEACHING LANGUAGE: ENGLISH
YEAR OF THE DEGREE PROGRAMME: II
ANNUAL
CFU: 10

REQUIRED PRELIMINARY COURSES (IF MENTIONED IN THE COURSE STRUCTURE "REGOLAMENTO")

None

PREREQUISITES (IF APPLICABLE)

None

LEARNING GOALS

The primary aim of the course is to provide theoretical and practical knowledge of the structure of nucleic acids and the molecular mechanisms underlying the major biological processes involved in the maintenance of genetic information and its expression at different levels in microorganisms, animals and plants. Secondly, it aims to provide basic information on how these processes can be influenced by various conditions, including environmental ones, and how they can be used as tools for biomonitoring.

EXPECTED LEARNING OUTCOMES (DUBLIN DESCRIPTORS)

Knowledge and understanding
The student is expected to demonstrate a basic understanding and knowledge of the molecular mechanisms of the main biological processes involved in the maintenance and expression of genetic information in different organisms. The student will be expected to demonstrate the ability to develop arguments concerning the relationships between the structure of nucleic acids (DNA and RNA), the interaction between nucleic acids and proteins, and the above biological processes, and to understand their causal relationships. Based on this knowledge, the student should understand the relationship between these processes and the interrelationships

between human, animal and environmental health. In addition, the student should know the basic principles of the main techniques of molecular biology and their application in effective strategies for the prevention, diagnosis and treatment of human, animal and environmental diseases.

Applying knowledge and understanding

The student should be able to independently process and apply the information acquired during the course to understand the molecular perspective of One Health Biology and to propose and/or design methodological approaches, independently evaluating experimental results related to the analysis of DNA, RNA and proteins. The student should be able to apply their knowledge in diagnostic, food, environmental and industrial contexts. The student should be able to apply the acquired knowledge, to be updated using scientific texts and articles in the molecular field, and to acquire the ability to attend specialised seminars, conferences, masters, etc. in the field of Molecular Biology.

COURSE CONTENT/SYLLABUS

Structure of nucleic acids. Genome complexity and organisation of genetic material in different organisms. DNA methylation and chromatin. (1 CFU)
DNA replication. Initiation, elongation and termination. Proteins involved in replication. DNA repair mechanisms. (1 CFU)
Types of RNA and their abundance. Comparison of transcription in prokaryotes and eukaryotes. Transcription process: RNA polymerase, factors involved, promoters. Enhancers, Silencers and Insulators. Maturation of primary transcripts. Alternative splicing. (1 CFU)
Features of the genetic code and translation. Protein synthesis in prokaryotes and eukaryotes: Initiation, elongation and termination. Factors involved. (1 CFU)
Regulation of gene expression and environmental factors. Molecular memory of transcription underlying the stress response in animals and plants. Gene expression changes in pathological conditions and effects of pollutants or environmental stress. Relationship between DNA methylation and chromatin modifications under normal and pathological conditions: factors involved. Variation in RNA structure under pathological conditions and environmental changes. Codon usage bias in environmental adaptation. (2 CFU)
Molecular biology methods: Nucleic acid extraction. PCR. DNA sequencing by Sanger method and introduction to next generation sequencing. Chromatin immunoprecipitation (ChIP). Introduction to omics sciences as applied to global health. Analysis of RNA and protein levels using real-time PCR, Western blotting and their applications to biomarkers of stress and environmental contaminants that may affect human and animal health. Gene silencing and genome editing as biotechnological strategies to improve health. Approaches to nucleotide sequence comparison using bioinformatics tools. Introduction to RNA structure analysis techniques. (2 CFU)

Laboratory activities (2 CFU)
Determination of DNA methylation levels of gene promoters.

READINGS/BIBLIOGRAPHY

Fundamental Molecular Biology, John Wiley & Sons, Inc.
Teaching material of the teacher
Course notes

TEACHING METHODS

a) frontal lessons for 90% of the total hours (8 CFU)
b) laboratory for 10% of the total hours (2 CFU)

EXAMINATION/EVALUATION CRITERIA

o) Exam type:

Exam type	
written and oral	
only written	
only oral	X
project discussion	
other	

p) Evaluation pattern:

The evaluation of the examination will consider the general knowledge of the topics, the degree of depth and the level of detail of the molecular mechanisms covered during the course. The student's ability to move between the different topics of the programme, emphasising the transversality of the basic concepts of molecular biology, will be relevant to the evaluation.

SCHEDA DELL'INSEGNAMENTO (SI)

" GENETICS AND GENOMICS FOR ONE-HEALTH (WITH LABORATORY)"

SSD BIOS-14/A

DEGREE PROGRAMME: BIOLOGY FOR ONE-HEALTH
ACADEMIC YEAR 2025/2026

GENERAL INFORMATION - PROFESSOR

PROFESSOR:
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GENERAL INFORMATION-ACTIVITIES

LANGUAGE OF TEACHING DELIVERY: ENGLISH
COURSE YEAR: III
ANNUAL
CREDITS: 10

PREPARATORY COURSES (if provided for by the Course Regulations)

None

ANY PREREQUISITES

None

EDUCATIONAL OBJECTIVES

The course aims to provide a solid foundation in genetics, preparing students for research and professional roles within the One Health framework. Students will learn how hereditary traits are transmitted, modified, and expressed in prokaryotic and eukaryotic cells. The molecular bases of epigenetic modifications, their inheritance, and their effects on organisms, as well as gene-environment interactions, will be analyzed. Additionally, the course will cover practical applications of genetics and molecular technologies in various fields, including an introduction to computational biology for gene and genome analysis. The course also aims to develop students' communication skills and critical analysis of biological issues, as well as the associated ethical and social concerns, to contribute to scientific dissemination in genetics within the One Health context.

EXPECTED LEARNING OUTCOMES (DUBLIN DESCRIPTORS)

Knowledge and Understanding The student must demonstrate a solid understanding of genetics and genomics. They will be able to comprehend and discuss issues related to gene expression mechanisms and the effects of epigenetic modifications on the relationship between genes and the environment. They will know recombinant DNA technologies for applications in the One Health field.

Ability to Apply Knowledge and Understanding The student must demonstrate the ability to apply genetic principles in the analysis of trait transmission. They should be able to practically apply their knowledge of formal and molecular genetics. Additionally, they must develop critical analysis skills concerning ethical and social issues, as well as communication skills, to contribute to the scientific dissemination of genetics applied to One Health.

PROGRAMMA-SYLLABUS

Basic Principles of Genetics (4 CFU): Introduction to Genetics and the Concept of One Health. Mechanisms of hereditary transmission: Fundamental principles of inheritance mechanisms, Mendel's laws of inheritance, and their applications. The concept of linkage. Genetic variation and inheritance patterns: Types of genetic variation; non-Mendelian inheritance patterns. Simple and complex traits: Structure and function of the gene. Genetic code. Genetic basis of complex traits; Polygenic inheritance. Population genetics: Polymorphisms and their significance; Genetic drift and natural selection.

Principles of Genomics (4 CFU): Introduction to genomics and transcriptomics; Mechanisms of mutation, DNA damage, and DNA repair, and their importance in the evolution of genes and genomes; Principles and mechanisms of gene regulation and epigenetics. Gene editing technologies and applications in the One Health field. Impact of stress and the environment on epigenetic changes. Genetic and epigenetic disorders in human-environment interactions; The concept of Nutrigenomics and Nutrigenetics for human and animal health. The use of genetics for the analysis and monitoring of biodiversity.

Genetics and Genomics Laboratory (2 CFU): Acquisition of bioinformatics tools for genetic analysis. Laboratory techniques for nucleic acid manipulation.

TEACHING MATERIALS:

Lecture Slides in PPT

COURSE METHOD OF CONDUCT

a) frontal lessons for 90% of the total hours (8 CFU)
b) laboratory exercises and practice for 10% of the total hours (2 CFU)

EVALUATION CRITERIA

a) Exam method:

The exam is divided into	
Writing and oral	
writing	
Oral	x
discussion of project work	
other	

The exam assessment will primarily consider the general knowledge of the topics and then the depth and level of detail covered during the course, as well as problem-solving skills. The evaluation will also focus on the student's ability to navigate between various topics, emphasizing the transversality of the basic concepts of genetics.

COURSE DETAILS

" HUMAN PATHOLOGY (WITH LABORATORY)"

SSD MEDS-02/

DEGREE PROGRAMME: BIOLOGY FOR ONE-HEALTH
ACADEMIC YEAR: 2025-2026

GENERAL INFORMATION – TEACHER REFERENCES

TEACHER: ANTONIO PEZONE
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GENERAL INFORMATION ABOUT THE COURSE

TEACHING LANGUAGE: ENGLISH
YEAR OF THE DEGREE PROGRAMME: III
ANNUAL
CFU: 6

REQUIRED PRELIMINARY COURSES (IF MENTIONED IN THE COURSE STRUCTURE "REGOLAMENTO")

None

PREREQUISITES (IF APPLICABLE)

None

LEARNING GOALS

The aim of the course is to provide students with the elements to analyze the causes (etiology) and mechanisms (pathogenesis) of diseases. At the end of the course the student must demonstrate to be able to recognize and identify the causes and mechanisms that contribute to the onset of a disease state

EXPECTED LEARNING OUTCOMES (DUBLIN DESCRIPTORS)

Knowledge and understanding
At the end of the course the student will have the necessary knowledge to understand the etiopathogenetic mechanisms underlying the response of tissues and organs to chemical, physical and biological damage. He will also have the knowledge for understanding the basic mechanisms of the immune response.
Applying knowledge and understanding
The student must acquire adequate knowledge of the methodological approaches and the experimental and analytical techniques most used to study human diseases.

COURSE CONTENT/SYLLABUS

- Cell adaptations and damage mechanisms: cell damage and death (necrosis and apoptosis); Extracellular matrix pathology. CFU=1.0
- Tissue Response to Injury: The innate immune system, Inflammation: angioflogosis (alterations of microcirculation, exudate formation, chemical mediators), histoflogosis (interstitial and granulomatous) process, steps of tissue repair. CFU=1.0
- Immune response: Cellular and molecular mechanisms for antigen recognition, antigen processing and presentation; mechanisms of immune cells activation, hypersensitivity reactions. CFU=1.0
- Neoplasms: Classification of tumors, epidemiology of cancer. Chemical and radiation environmental carcinogenesis CFU=1.0
- Environmental diseases. Air Pollution, Industrial Exposures, Chemical & Drug Injury, Tobacco Smoking, Physical Injuries CFU=1-0

Laboratory activities: CFU=1.0

READINGS/BIBLIOGRAPHY

A selection of scientific articles and supplementary monographs relating to the topics will be made available to students in the specific area of the teaching site. Recommended textbooks will be indicated, and films or other multimedia tools will be available to facilitate learning and verification of the study carried out.
(Robbins: Basic Pathology; 10th Editio; Editors: Vinay Kumar, Abul K. Abbas, Jon C. Aster. Elsevier- Language: English)

TEACHING METHODS

Frontal lessons. The teacher uses lectures and seminars by other experts in the sector. Exercises to delve deeper into some theoretical aspects of the course.

EXAMINATION/EVALUATION CRITERIA

The commission will evaluate student's skills, and the score will be given also taking into account the attendance to the course

q) Exam type:

Exam type	
written and oral	
only written	
only oral	**X**
project discussion	

COURSE DETAILS

""GENERAL AND APPLIED HYGIENE (WITH LABORATORY)"

MEDS-24/B

DEGREE PROGRAMME: BIOLOGY FOR ONE-HEALTH
ACADEMIC YEAR: 2025-2026

GENERAL INFORMATION – TEACHER REFERENCES

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GENERAL INFORMATION ABOUT THE COURSE

TEACHING LANGUAGE: ENGLISH
YEAR OF THE DEGREE PROGRAMME: III
ANNUAL
CFU: 6

REQUIRED PRELIMINARY COURSES (IF MENTIONED IN THE COURSE STRUCTURE "REGOLAMENTO")

None

PREREQUISITES (IF APPLICABLE)

None

LEARNING GOALS

The course aims to provide students with the basic notions regarding the causes of disease, direct and indirect prevention strategies and microbiological and parasitological analytical techniques with also reference to environmental toxicology. Understand analytical techniques, and have critical mastery of them, know the characteristics of disease descriptors, pollution and quality of environmental matrices

EXPECTED LEARNING OUTCOMES (DUBLIN DESCRIPTORS)

Knowledge and understanding

The student must demonstrate knowledge and ability to understand issues relating to hygiene (factors that affect the state of health of individuals and the community and prevention methodologies). Must have acquired the basic knowledge and methodological tools necessary to analyze complex single- and multifactorial case studies (etiological link, risk identification and management) with reference also to environmental toxicology. The student must be able to apply the knowledge acquired to evaluate and quantify risk factors related to human health. The training course is aimed at transmitting the operational skills necessary to concretely apply the knowledge with reference also to environmental and occupational hygiene.

Applying knowledge and understanding

Independent judgment: The student must be able to critically analyze the contents relating to the methodologies for epidemiological and hygienic analysis in the context of different exposure scenarios, demonstrating that they know how to interpret the results of the studies and know how to propose appropriate interventions quotes; must also have achieved conscious autonomy of judgment in relation to the evaluation and interpretation of the results of the analyzes and ability to compare with data existing in the literature.
Communication skills: The student will be able to express concepts clearly using appropriate technical terminology regarding the problems of health promotion with particular reference to those relating to environmental hygiene and the consequent epidemiological implications.
Learning ability: The student will have acquired adequate cognitive tools and critical skills for the in-depth and continuous updating of knowledge, being able to correctly use databases, specialist texts, scientific articles, and to approach specialist seminars, conferences, master's degree in epidemiology.

COURSE CONTENT/SYLLABUS

Definition and contents of HYGIENE and its disciplinary branches: prevention (primary, secondary and tertiary); epidemiology (descriptive, analytical and experimental) Historical notes on hygiene, the study and prevention of communicable diseases. Health and disease; communicable and non-communicable diseases; acute and chronic-degenerative course of diseases. Factors that influence health status; risk factors and their indicators/descriptors. Source, vehicle, vector, reservoir of disease; environmental reservoir, mechanical and biological carrier; routes of penetration and elimination of pathogens; fecal-oral, parenteral and airborne diseases; direct and indirect transmission; tropism; primary and secondary determinants; endogenous and exogenous determinants.
Prevention (prophylaxis). Generic prophylaxis: direct (notification, isolation, investigation, assessment, disinfection) and indirect (control of environmental and food matrices, disinfection. Specific prevention: active (vaccines) and passive (sera, chemoprophylaxis)
Epidemiology: The analysis of epidemiological data; information flows and surveillance of infectious diseases (DM 12/15/90, notification classes of diseases subjected to surveillance); generic rate, incidence rate, prevalence and period prevalence; descriptive, analytical (retrospective, prospective, cross-sectional investigations) and experimental epidemiology; risk analysis: relative risk (RR) and attributable risk (AR); types of transmission (common source, propagation). Rules by John Stuart Mill; Standardized rates (outlines) Sample survey and inference. Sampling techniques: non-probability and probabilistic (simple, systematic and stratified randomisation; cluster sampling). Elements of statistical analysis of epidemiological data: graphic representations of analytical data; indices of central tendency (mean, mode and median) and dispersion (deviance, variance, standard deviation, standard error, fiducial limits). Comparison between analytical data sets: significance test (Student's t, chi2). (1 CFU)
Disinfection - disinfestation: terminology (septic, aseptic, antiseptic, cleaning, detersion, disinfection (high, medium and low level), remediation, decontamination, bactericidal, bacteriostatic, etc... Technical-regulatory classification: surgical medical device, medical device, medicinal; characteristics of disinfectants; law of action of disinfectants; physical and chemical disinfectants; pest control, biological control.
Immune prevention: General characteristics of antigens (antigen, carrier, hapten, antigenic determinants); immunity (congenital, acquired, natural, induced, active, passive); humoral and cell-mediated immunity; inflammation; characteristics of antibodies (monomeric structure; classes of antibodies); the antibody response (phases and mechanisms of the primary and secondary response); immune memory; the complement (characteristics and functions); immediate and delayed hypersensitivity; anaphylactic shock. (1 CFU)
Vaccines and immune sera: General characteristics; classification of vaccines; basic principles for the preparation of vaccines depending on the vaccine class; control techniques (harmlessness, sterility/purity, effectiveness). General characteristics and classification of sera based on the different classification keys (serum-producing animal, purpose of use, mode of action). General principles for the preparation of sera and their titer (choice of animal, primary toxicity, International Unit - UI); vaccination plan. (1 CFU)

Etiology, epidemiology and prophylaxis of the main enteric diseases: cholera, hepatitis A
Etiology, epidemiology and prophylaxis of the main airborne diseases: influenza, bacterial meningitis, legionellosis
Etiology, epidemiology and prophylaxis of the main diseases transmitted parenterally or sexually: gonorrhea
Etiology, epidemiology and prophylaxis of the main zoonoses: brucellosis, toxoplasmosis
Vector-borne diseases: malaria, leishmaniasis
Platyhelminths: Taenia solium, Taenia saginata, Asian Taenia saginata Hymenolepis nana Hymenolepis diminuta, Diphyllobothrium latum, Echinococcus granulosus; b) Nematelminths: (Trichinella spiralis, Trichiuris trichiura, Oxyuris vermicularis, Ascaris lumbricoides, Strongyloides stercoralis; Ancylostoma duodenalis).
Diagnostic testing techniques: parasitological examination of feces: sampling; conservation and fixation; analysis techniques (wet and after coloring and concentration of the sample). Microbial isolation and identification: type of media (enrichment, selective, elective, identification); the phases of the analytical process: pre-enrichment/enrichment; isolation, identification (metabolic, serological, genomic, phage identification)
Factors capable of influencing health status; control of environmental matrices: definition of environment and pollution. (1 CFU)
Water: definition of pollution; water needs; water classification; collection systems. Protection of water intended for human consumption, internal and external controls); organoleptic characteristics (definition and analysis of flavour, smell, colour) and physico-chemical characteristics (definition and analysis of pH, temperature, turbidity, conductivity); indicators of organic and fecal pollution (definition and determination of organic substances, hardness, chlorides, toxic substances/elements, ammonia, nitrites, nitrates, phosphates); notes on the standardization of techniques (UNI, EN, ISO). Microbiological analysis of water intended for human consumption (total count at 22 and 37 °C, total and fecal coliforms, Escherichia coli, enterococci, sulphite-reducing clostridia) analytical techniques (inclusion in the mass, Most Probable Number: MPN); normative requirements. Potabilization treatments (passive, mixed, active): water softening (soda lime method, ion exchange), mechanical filtration, slow and rapid filters, flocculation clarification. Surface water treatments according to their polluting load. Disinfection of water intended for human consumption: chlorination (active chlorine and chlorine compounds used, chlorine dosage, chemical and bacteriological chlorine demand, the breakpoint); ozonation; UV rays. Legislation relating to the control, protection and management of water in general and that intended for human consumption: Legislative Decree. 152/06. (1 CFU)
Water and wastewater and environmental toxicology: centralization and decentralization in wastewater treatment; definition and classification of wastewater; the sewage supply chain, types of contaminants in wastewater, their origin (point and diffuse sources); fate of contaminants in the environment; natural purification (self-purification of water bodies); mechanisms and factors of self-purification. Slurry characteristics: slurry strength; determination of the main chemical and physical parameters (OD, BOD5, COD, SS, SST). Wastewater treatment/disposal systems and their control: conceptual basis of biological purification; purification phases (preliminary, primary, secondary and tertiary treatments); adhered and dispersed biomass treatments; alternative treatments, Imhoff tubs; sludge treatment. Effectiveness control of the purification process; characteristics of purification biomass; the mud biotic index (SBI). Notes on the treatment of industrial wastewater; hygienic problems connected to the disposal of wastewater in water bodies (eutrophy, dystrophy); repercussions on the balance of ecosystems and on health (bioconcentration and biological magnification). Laboratory activities: horizontal, vertical and free submerged flow constructed wetland systems. Toxicity and effects on humans and the environment (1 CFU).

READINGS/BIBLIOGRAPHY

Slides provided by the teacher. Scientific articles published in ISI journals provided in digital version (pdf) for individual case studies. Reference texts in the sector

TEACHING METHODS

The teacher will use lectures for approximately 90% of the total hours, and seminars for approximately 10%.

EXAMINATION/EVALUATION CRITERIA

r) Exam type:

Exam type	
written and oral	
only written	X
only oral	
project discussion	
other	

s) Evaluation pattern:

In case of a written exam, questions refer to: (*)	Multiple choice answers	
	Open answers	x
	Numerical exercises	x

SCHEDA DELL'INSEGNAMENTO (SI)

" PHYSIOLOGY OF CROPS AND FOOD IMPROVEMENT (WITH LABORATORY)"

SSD BIOS-02A

DEGREE PROGRAMME: BIOLOGY FOR ONE-HEALTH
ACADEMIC YEAR 2025/2026

GENERAL INFORMATION - PROFESSOR

PROFESSOR: SERGIO ESPOSITO
PHONE NUMBER: 081679124
EMAIL: SERGIO.ESPOSITO@UNINA.IT

GENERAL INFORMATION-ACTIVITIES

LANGUAGE OF TEACHING DELIVERY: ENGLISH
COURSE YEAR: III
ANNUAL
CREDITS: 10

PREPARATORY COURSES (if provided for by the Course Regulations)
None

ANY PREREQUISITES
None

EDUCATIONAL OBJECTIVES
The training objective of the course is to provide theoretical-practical knowledge relating to the regulation of crop physiology. The course will allow students to acquire in-depth knowledge on the regulation of crop physiology and food improvement. Particular attention will be paid to the role of genome editing and organic agriculture. Understanding these mechanisms will help students develop integrated specialist skills related to crop plant improvement and methodological skills on responses to climate change in crops.

EXPECTED LEARNING OUTCOMES (DUBLIN DESCRIPTORS)

Knowledge and understanding
Students must be able to demonstrate knowledge and understanding of plant physiology, demonstrating that they are able to develop even complex treatments regarding all the problems relating to the growth of plants of agronomic interest in different environmental conditions.
The student must also know the fundamental requirements of plant physiology.

Ability to apply knowledge and understanding

The student must demonstrate the ability to analyze and interpret the physiological biochemical parameters of cultivated plants and the consequences on crop yields and product quality. The training course is aimed at transmitting the operational skills necessary to concretely apply the knowledge of physiological plant physiology in basic and applied research activities and to fully use the methodological tools in the agronomic and food field in both productive and service activities.

PROGRAMMA-SYLLABUS

PART I – Elements of plant physiology for agronomic use (4 CFU)

The plant cell. Plastids; different plastids and chloroplasts. The vacuole. The cell wall.

Transmembrane transport. Transport of electrolytes and non-electrolytes. Active and passive transport. ATPase pumps; channels; transporters.

Photosynthetic pigments and structure of photosystems. Capture of light and its transmission to reaction centers. Photosynthetic electron flow and Z-scheme

Formation of proton gradients and synthesis of ATP. Photolysis of water. Cyclic and pseudocyclic electron transport.

Carbon fixation. C3 cycle and regulation.

Evolutionary and ecophysiological significance of photorespiration.

Adaptations of photosynthetic metabolism. C4 plants. CAM metabolism. Evolution of photosynthetic systems.

Synthesis of sucrose. Starch synthesis. Synthesis of lipids.

Mobilization of starch and other reserve sugars. Carbon oxidative pathways in plant cells and their relationship with nitrogen metabolism. Significance of the Krebs cycle in plant cells. Peculiarities of plant mitochondria. Mobilization of lipids in oilseeds.

Nitrogen cycle. Nitrogen absorption systems. Assimilative reduction of nitrate. Nitrogen organication. Transamination. Biological fixation of N2. Fixation by rhizobia and other nitrogen fixers.

Sulfur cycle. Absorption, sulfate reduction and cysteine synthesis.

Soil structure and dynamics. Distribution of water and nutrients. Macro and micronutrients. Symplast and Apoplast. Flow of water and nutrients into the root. Xylem structure. Composition and flow of xylem sap. Transpiration and regulation of the opening of the stomata.

Phloem flow. Loading, transport and discharge of sucrose and other sugars in the phloem.

Plant growth regulators; Auxins. Gibberellins. Cytokinins. Abscisic acid. Ethylene. Other plant growth regulators: Brassinosteroids. Jasmonic acid. Salicylic acid. Polyamines. Agronomic application of synthetic phytohormones and plant growth regulators. Roles of plant growth regulators in biotic stress.

Photoperiodism. Phytochrome. Cryptochromes and phototropins. Phytochrome/cryptochrome interactions. UV light perception: UVR8.

Part II – Crop modification and food improvement. Organic agriculture (4CFU)

Elements of plant cell cultures. Micropropagation. Somaclonal variants and sources of variation for crops.

Synthesis of secondary products from plant cells for pharmacological and cosmetic purposes. Immobilized cultures

Genetic modification of plants. Basics of classical genetic selection. Principles of genetic modification of plants. The *Agrobacterium* system. Gene Gun and other modification methods. Recent advances in the genetic modification of plants. Genome editing and the CRISPR-CAS9 system.

Environmental stressors. Abiotic stress. Effects of climate change and biotic stress. The effects of climate change on agricultural production

What is organic farming and organic food. Advantages and disadvantages of organic farming. Influence of agricultural yield on the development of emerging countries. The debate on GMOs. The green revolution. Environmental awareness.

Laboratory activities (2 CFU)

Photosynthesis and respiration measurements. Determination of maturation parameters. Genetic modification with Agrobacterium.

TEACHING MATERIALS

Lecture notes provided FREE on the website https://www.docenti.unina.it/SERGIO.ESPOSITO to students enrolled in the course.
Taiz – Zeiger - Plant Physiology.

COURSE METHOD OF CONDUCT

The teacher will use a) frontal lessons with the aid of PowerPoint presentations for approximately 90% of the total hours, b) laboratory exercises to deepen applied knowledge for approximately 10% of the total hours. The presentations projected during the lessons will be available to students registered online for the course, via download from the teacher's website.

EVALUATION CRITERIA

t) **Exam method:**

The exam is divided into	
Writing and oral	
writing	
Oral	x
discussion of project work	
other	

SCHEDA DELL'INSEGNAMENTO (SI)

" DISEASE DYNAMICS AND MODELS IN A CHANGING WORLD (WITH LABORATORY)"

SSD MVET-02A

DEGREE PROGRAMME: BIOLOGY OF ONE HEALTH
ACADEMIC YEAR: 2025/2026

GENERAL INFORMATION - PROFESSOR

PROFESSOR: POWER KAREN
PHONE NUMBER:
EMAIL: KAREN.POWER@UNINA.IT

GENERAL INFORMATION-ACTIVITIES

LANGUAGE OF TEACHING DELIVERY: ENGLISH
COURSE YEAR: III
ANNUAL
CREDITS: 8

PREPARATORY COURSES (if provided for by the Course Regulations)

None

ANY PREREQUISITES

None

EDUCATIONAL OBJECTIVES

The course aims to provide students with basic knowledge on the etiology and pathogenetic mechanisms of so-called elementary pathological processes common to all diseases (cellular damage, inflammation, regressive and neoplastic phenomena) in an evolutionary, multidisciplinary and integrated perspective: through the study of models and case studies, students will learn mechanisms underlying the phenomena of mass mortality of animals, emerging and re-emerging animal diseases, including zoonotic ones, as well as linked to poverty, food hygiene and social and economic conditions. Furthermore, the course will describe the dynamics, drivers and host-pathogen-environment interactions underlying the spread of diseases in a rapidly changing world from a One-Health perspective

EXPECTED LEARNING OUTCOMES (DUBLIN DESCRIPTORS)

Knowledge and understanding

Students must be able to demonstrate knowledge and understanding of basic comparative pathology according to an evolutionary approach and must demonstrate that they have acquired critical skills regarding the interactions and drivers that underlie the development and spread of pathologies in the global context.

Ability to apply knowledge and understanding
The student must demonstrate that they are able to describe the results achieved clearly, completely and concisely to non-experts in the sector, using the correct terminology and technical language. The student is also encouraged to convey the principles, contents and application possibilities to non-experts with correctness and simplicity.

PROGRAMME-SYLLABUS

One Health approach to diseases: Impact of diseases on biodiversity and case studies (bees and other pollinators) (0.5 CFU).
Comparative general pathology of vertebrates and invertebrates: evolutionary aspects (Concept of disease, cellular damage, defensive phenomena, progressive phenomena, regressive phenomena) (2 CFU).
Socio-economic-cultural and environmental drivers of diseases in the context of rapid global changes (0.5 CFU).
Mass mortality phenomena: colony collapse syndrome; global mortality of amphibians; Collapse of coral reefs; mass mortality in salmon farms (1 CFU).
Emerging, re-emerging and neglected pathologies, including zoonotic ones: hosts, vectors and case studies (Rabies, Tuberculosis, Fascioliasis, Echinococcosis, Scabies, Leishmaniasis, Schistosomiasis, Filariasis, Ankylostomiasis, leprosy, Salmonellosis, Clostridiosis, Trichinosis, Cryptosporidiosis, Anisakiasis, Cholera (1,5 CFU).
Inter- and intra-species interaction and diseases, invasive species, spillover and spillback. General characteristics and case studies (African swine fever, Avian influenza, Bovine spongiform encephalopathy, Sars-Cov2, monkeypox (1 CFU).
Invertebrates as biomonitors of environmental health (0.5 CFU).
Laboratory activities: translational pathology (2D and 3D models for the study of pathology, animal models.
Histopathological techniques for the study of emerging pathologies) (1 CFU).

TEACHING MATERIALS

Elementi di patologia comparata dei molluschi- Gionata De Vico e Francesca Carella- Paolo Loffredo Iniziative Editoriali Srl
Scientific articles selected by the professor
Power points provided by the professor

COURSE METHOD OF CONDUCT

The teacher will use a) lectures with the aid of PowerPoint presentations b) seminars c) laboratory and field exercises

EVALUATION CRITERIA

u) **Exam method:**

The exam is divided into	
Writing and oral	
writing	
Oral	X
discussion of project work	X
other	

b) **Evaluation methods:**
The project work will contribute to determining 30% of the final grade while the oral examination will determine 70% of the final grade.

COURSE DETAILS

" TOPICS IN ONE-HEALTH AND CASE STUDIES (WITH LABORATORY)"

SSD BIOS-05/A

DEGREE PROGRAMME: BIOLOGY FOR ONE-HEALTH
ACADEMIC YEAR: 2025-2026

GENERAL INFORMATION – TEACHER REFERENCES

TEACHER: GIULIA MAISTO
PHONE: 081679095
EMAIL: GIULIA.MAISTO@UNINA.IT

GENERAL INFORMATION ABOUT THE COURSE

TEACHING LANGUAGE: ENGLISH
YEAR OF THE DEGREE PROGRAMME: III
ANNUAL
CFU: 6

REQUIRED PRELIMINARY COURSES (IF MENTIONED IN THE COURSE STRUCTURE "REGOLAMENTO")

None

PREREQUISITES (IF APPLICABLE)

None

LEARNING GOALS

The course introduces the One-Health approach to understand and manage complex challenges between environmental health and human health.

EXPECTED LEARNING OUTCOMES (DUBLIN DESCRIPTORS)

Knowledge and understanding
The students will know the main ecological and biological concepts at the base of the one-health approach. The training course will provide knowledge about the One-Health approach to analyse scientific problems.

Ability to apply knowledge and understanding
The students will be able to examine emerging or topical issues from a One Health perspective including ecological and biological issues.

COURSE CONTENT/SYLLABUS

Lectures (4 CFU)
Analysis of emerging environmental problems (global change, pollution) (1 CFU).
Selection of current case studies at global level (1 CFU).
Individuation of ecological issues from a One-Health perspective and identification of key concepts and components related to both environmental and human health (2 CFU).

Virtual laboratory activities (4 CFU)
Work in teams to explore, develop and address One-Health problems using an integrative and interdisciplinary approach. Topics will be chosen among emerging diseases; biodiversity and land planning; climate change and agricultural practices.

READINGS/BIBLIOGRAPHY
Material provided by the professor and bibliographic materials (scientific reviews and papers).

TEACHING METHODS
The teacher will use frontal lectures for 50 percent of the total hours, b) virtual laboratory activities to deepen applied knowledge for 50 percent of the total hours.

EXAMINATION/EVALUATION CRITERIA

v) Exam type:

Exam type	
written and oral	
only written	
only oral	
project discussion	X
other	