



UNIVERSITÀ DEGLI STUDI DI PALERMO

DEPARTMENT	Scienze e Tecnologie Biologiche, Chimiche e Farmaceutiche		
ACADEMIC YEAR	2023/2024		
MASTER'S DEGREE (MSC)	CHEMISTRY AND PHARMACEUTICAL TECHNOLOGIES		
INTEGRATED COURSE	ANIMAL AND PLANT BIOLOGY - INTEGRATED COURSE		
CODE	01591		
MODULES	Yes		
NUMBER OF MODULES	2		
SCIENTIFIC SECTOR(S)	BIO/05, BIO/02		
HEAD PROFESSOR(S)	TROIA ANGELO	Ricercatore a tempo determinato	Univ. di PALERMO
OTHER PROFESSOR(S)	TROIA ANGELO	Ricercatore a tempo determinato	Univ. di PALERMO
	VECCHIONI LUCA	Ricercatore a tempo determinato	Univ. di PALERMO
CREDITS	9		
PROPAEDEUTICAL SUBJECTS			
MUTUALIZATION			
YEAR	1		
TERM (SEMESTER)	1° semester		
ATTENDANCE	Not mandatory		
EVALUATION	Out of 30		
TEACHER OFFICE HOURS	TROIA ANGELO Monday 15:00 17:00 Sede del Consorzio Universitario, corso Vittorio Emanuele, 92, 93100 Caltanissetta Tuesday 10:00 12:00 Dipartimento STEBICEF, via Archirafi 20, V piano (previo appuntamento). - NB: Il docente e' pienamente disponibile a concordare giorni od orari diversi da quello specificato, sempre previo appuntamento (per appuntamento, scrivere a: angelo.troia@unipa.it) VECCHIONI LUCA Monday 11:00 12:00 Via Archirafi 18 - Primo piano, stanza P1011 Wednesday 10:00 11:00 Via Archirafi 18 - Primo piano, stanza P1011 Friday 09:00 10:00 Via Archirafi 18 - Primo piano, stanza P1011		

DOCENTE: Prof. ANGELO TROIA

PREREQUISITES	Basic knowledge in Biology (acquired in high school)
LEARNING OUTCOMES	Knowledge and understanding Acquisition of the ability to describe the fundamental biological structures and processes of the cell and of living organisms using appropriate scientific terminology. Ability to apply knowledge and understanding. Ability to autonomously apply the acquired knowledge to the solution of problems related to biology and genetics. Judgment autonomy Ability to critically evaluate the implications and results of innovative discoveries in the field of cell biology and living organisms. Communication skills Ability to expose the fundamental biological processes of the cell and of living organisms to a non-expert audience, describing experiments for example purposes. Learning ability Ability to use the knowledge on the basic mechanisms that regulate living matter and living organisms (animals and plants) as a substrate for the study of other biological subjects of their degree course. Ability to follow innovative discoveries in the field of cell biology and living organisms by consulting the scientific literature.
ASSESSMENT METHODS	The tests that contribute to the evaluation of the student consist of a quiz test and an oral test: (i) the written test to be held at the end of the course (ii) the oral test to be held on the day set for the exam session. The quiz will consist of 20 questions (12 relating to the Animal Biology module and 8 relating to the Plant Biology module) with 4 choice answers of which only one is correct. The duration of the written test is 60 minutes. The final mark out of thirty will take into account the evaluation obtained in the written test and the oral test. The student has the right not to take the written test or not to accept the evaluation obtained. In this case, the final grade will only take into account the oral exam. For the oral exam, the examinee will have to answer three/six questions per module on broad topics covered in the program; further secondary questions may arise from these, useful for assessing the student's understanding of the topic and reasoning ability. The final assessment aims to assess whether 1) the student has knowledge and understanding of the topics covered and 2) has acquired interpretative competence and independent judgement. The examinee will have to demonstrate that she/he possesses adequate knowledge and interpretative competence of general and specific contents, ability to link and elaborate contents, as well as pertinent and correct language properties and presentation skills. The threshold of sufficiency will be reached when the student has shown an acceptable knowledge and understanding of the topics and acceptable presentation skills. The greater presentation ability and the greater knowledge of the topics covered will be evaluated more and more positively up to the maximum judgment of thirty cum laude, which is obtained in the case of excellent mastery of the contents covered by the course, associated with a good presentation ability. The evaluation of the exams will be structured as follows. Excellent (30-30 cum laude) - excellent knowledge of the topics, excellent language skills, good analytical skills; the student knows how to apply the acquired knowledge to answer the proposed questions. Very good (27-28) - good command of the topics and full command of the language; the student is able to apply the knowledge to answer the proposed questions. Good (24-26) - basic knowledge of the main topics, good command of the language, with limited ability to autonomously apply knowledge to the solution of the proposed questions. Satisfactory (21-23) - the student does not have full command of the main topics of the program; poor ability to independently apply the acquired knowledge, satisfactory language skills. Sufficient (18-20) - minimum basic knowledge of the main topics of the program, reduced but acceptable language properties, technical language, very little or no ability to independently apply the acquired knowledge. Insufficient - the student does not have an acceptable knowledge of the contents of the topics covered in the program.
TEACHING METHODS	Frontal lessons, lessons with experimental "active learning"

MODULE PLANT BIOLOGY

Prof. ANGELO TROIA

SUGGESTED BIBLIOGRAPHY

- Ferruccio Poli (2019) *Biologia farmaceutica. Biologia vegetale, botanica farmaceutica, fitochimica*. 2° ed. • con MyLab - Pearson Ed.
- Urry L.A. et al. (2021) *Campbell. La forma e la funzione nelle piante*. 12° ed. Con MyLab. Pearson Ed.
- Pancaldi S. et al. (2023) *Fondamenti di botanica generale*, 3° ed. - McGraw Hill Ed.

- Materiale didattico fornito dal docente (material provided by the teacher)

AMBIT	74748-Attività formative affini o integrative
INDIVIDUAL STUDY (Hrs)	51
COURSE ACTIVITY (Hrs)	24

EDUCATIONAL OBJECTIVES OF THE MODULE

Goal of the module is to provide a basic knowledge of the biological characteristics of plants. Topics include cytology and histology, plant reproduction, life cycle and metabolism, both from an evolutionary and an ecological perspective.

SYLLABUS

Hrs	Frontal teaching
2	Introduction to plant biology. Differences between animal and plant organism. Approaches in the study of plants. Importance of plants, especially in the pharmaceutical field. The chemistry of plants.
2	Introduction to plant diversity and systematics: main taxonomic groups, from charophytes to vascular plants
4	Cytology. Comparison of animal and plant cells. Peculiar structures of the plant cell: plastids (chloroplasts, chromoplasts, leucoplasts), vacuole, cell wall
4	Plant metabolism. Photosynthesis. Mineral nutrition and biogeochemical cycles of the elements
4	Plant histology. Meristematic tissues (primary and secondary). Adult tissues: dermal, fundamental, vascular and secretory tissues
4	Organography of spermatophytes. Germination. Root. Stem. Leaf
4	Reproduction of plants. Life cycle of plants. Asexual and sexual reproduction. Flower. Inflorescences. Fruit. Seed

MODULE ANIMAL BIOLOGY

Prof. LUCA VECCHIONI

SUGGESTED BIBLIOGRAPHY

-Biologia, E. P. Solomon, C. E. Martin, D. W. Martin, L. R. Berg. Ed. VIII/2021. ISBN: 9788836230242.
 -Biology, E. P. Solomon, C. E. Martin, D. W. Martin, L. R. Berg. Ed. 2018. ISBN: 978-1337392938
 -Materiale fornito dal docente (material provided by the teacher)

AMBIT	74742-Discipline biologiche
INDIVIDUAL STUDY (Hrs)	102
COURSE ACTIVITY (Hrs)	48

EDUCATIONAL OBJECTIVES OF THE MODULE

The educational objectives envisaged are those of providing basic knowledge of the main biological macromolecules and the structure of the cell; defining the general principles of genetic information, mechanisms of cell division and cell homeostasis; providing knowledge on the basic mechanisms that regulate living matter and animal organisms.

SYLLABUS

Hrs	Frontal teaching
2	Introduction to the Discipline, objectives, and organization of the course.
1	Chemical composition of living matter - Structures and functions of biological macromolecules: carbohydrates, lipids, DNA - Gene and genome, RNA - Genetic code - Proteins - Main methods of isolation and analysis of macromolecules.
2	Biomembranes: structure and function. Cell-environment interactions. Transport mechanisms across the membrane: simple and facilitated diffusion, passive and active transport. Sodium-potassium pump. Coupled transport systems. Exocytosis and endocytosis. Receptor-mediated endocytosis. Cellular reporting.
1	DNA replication, repair and recombination. Various levels of DNA organization in the nucleus: histones, nucleosomes and nuclear chromatin. Structure of chromosomes. Transcription and post-transcriptional modifications of RNA. Protein synthesis. Regulation of gene expression in eukaryotes in prokaryotes and eukaryotes.
2	Cell biology. The Cell Theory. Main characteristics and functions of the prokaryotic cell. Structure and functions of the components of the animal and plant eukaryotic cell: organelles, cytoskeleton and cytosol. Cell cycle and its regulation (introduction). Mitosis and meiosis: phases and differences. Gametogenesis: main differences between spermatogenesis and oogenesis.
2	Elements of formal and molecular genetics Mendelian genetics and its extensions - Dominance, segregation of alleles, independent assortment of alleles. Concept of gene, locus, allele, genotype and phenotype. Monohybrid and hybrid crosses. Associated genes, two-point backcrosses, recombination, gene maps. Method of transmission of the characters (autosomal dominant, autosomal recessive, linked to the X chromosome). Sex determinism. Concepts of incomplete dominance, codominance, multiple alleles, epistasis, pleiotropy, gene interactions, allelic interactions. Multigenic and multifactorial inheritance. Mechanisms of genetic variability. Gene mutations: point mutations missense, nonsense, microdeletions, insertions, frameshift mutations, silent mutations. Chromosomal mutations: translocations, macrodeletions, inversions, duplications, amplifications (fragile X). Genomic mutations: aneuploidies of autosomes and sex chromosomes. Copy Number Variants Monogenic diseases transmitted in an autosomal dominant and recessive manner; sex-related diseases. Traits and diseases transmitted with multigenic and multifactorial inheritance; diseases related to mitochondrial DNA.
10	Theories of evolution: Darwinian, neo-Darwinism, other theories. The genetics of Darwinian populations and evolutionary changes. - Population genetics.
12	Elements of taxonomy Binomial nomenclature, taxonomic categories, evolutionary and cladistic systematics (phylogenetics). Animal systematics. Study cases.
16	Structure and life processes in animals Protection, support and movement. Signalling and regulation. Sensory systems. Internal transport. Immune system gas exchange. Food processing and nutrition. Osmoregulation and elimination of metabolic waste. Endocrine regulation. Reproduction Animal development. Animal behavior.