



UNIVERSITÀ DEGLI STUDI DI PALERMO

DEPARTMENT	Scienze e Tecnologie Biologiche, Chimiche e Farmaceutiche		
ACADEMIC YEAR	2019/2020		
MASTER'S DEGREE (MSC)	CHEMISTRY AND PHARMACEUTICAL TECHNOLOGIES		
SUBJECT	ANIMAL AND PLANT BIOLOGY		
TYPE OF EDUCATIONAL ACTIVITY	A		
AMBIT	50325-Discipline Biologiche		
CODE	15545		
SCIENTIFIC SECTOR(S)	BIO/13		
HEAD PROFESSOR(S)	ROMANO VALENTINO	Cultore della Materia	Univ. di PALERMO
OTHER PROFESSOR(S)			
CREDITS	8		
INDIVIDUAL STUDY (Hrs)	136		
COURSE ACTIVITY (Hrs)	64		
PROPAEDEUTICAL SUBJECTS			
MUTUALIZATION			
YEAR	1		
TERM (SEMESTER)	1° semester		
ATTENDANCE	Not mandatory		
EVALUATION	Out of 30		
TEACHER OFFICE HOURS	ROMANO VALENTINO Wednesday 15:00 - 17:00 Studio docente Dipartimento STEBICEF - Viale delle Scienze edificio 16 piano terra corridoio docente		

DOCENTE: Prof. VALENTINO ROMANO

PREREQUISITES	Knowledge of biology acquired in High School
LEARNING OUTCOMES	Knowledge and understanding Gaining the ability to describe the structures and the fundamental biological processes of the cell and of living organisms using the appropriate scientific terminology Applying knowledge and understanding Ability to independently apply the biological and genetical knowledge. Making judgments Ability to critically evaluate the implications and results of innovative discoveries in cell biology and living organisms Communication skills Ability to expose a non-expert audience the fundamental biological processes of the cell and of living organisms by describing experiments for demonstration purposes. learning ability Ability to use the knowledge about the basic mechanisms that regulate the living matter and living organisms (animals and plants) as a substrate for the study of other biological disciplines of their academic curriculum. Ability to follow the innovative discoveries in cell biology and living organisms by consulting the scientific literature.
ASSESSMENT METHODS	The tests that contribute to the student's evaluation consists of two written quizzes and one oral exam: (i) the first written test to be held in mid-course ("test in progress"), the second written test, after the end of the course, (iii) the oral exam to be held on the day on which the final score is assigned. Each quiz consists of 31 questions with 5 answers choice of which only one correct. The duration of each test is 60 minutes. Each quiz is passed with a minimum of 18 correct answers. The final score (range = from 18 to "30 cum laude") will take into account the valuations obtained in each of the two written tests AND in the oral exam. If the student does not want to undertake the written quizzes his/her evaluation and final score will be only based on the oral examination. For the oral examination, the examinee must answer to the topics covered by the program, with reference to the provided educational materials (slides of various lectures and notes) and recommended (books, articles, websites etc.). The tests described above are intended to assess whether the student (i) has acquired knowledge and understanding of the topics treated during the course, (ii) has acquired the ability to interpret and judge autonomously specific case studies, (iii) is in possession of adequate analytical capacity (i) is able to exhibit and discuss clearly a given topic. The exam is passed with the vote of 18 which corresponds to the possession by the student of the minimum knowledge of teaching content, limited to the main topics. progressively higher scores (from 19 up to a maximum of "30 e cum laude") will be awarded on the basis of preparation and skills shown by the student in carrying out the above tests.
EDUCATIONAL OBJECTIVES	The expected learning outcomes are to: provide basic knowledge about the major biological macromolecules and structure of cell; define the general principles of the genetic information, the mechanisms of cell division and cellular homeostasis; provide knowledge on the basic mechanisms that regulate the living material and bodies of animals and plants.
TEACHING METHODS	Lectures
SUGGESTED BIBLIOGRAPHY	1) Solomon-Berg-Martin. "BIOLOGIA". VI Edizione, 2013. Edises (traduzione in italiano della IX edizione in inglese del 2011) . 2) Principi di genetica di Peter D. Snustad, Michael J. Simmons - Edises - 2014 3)Articoli scientifici (es. Le Scienze, Nature Reviews etc) 4) siti web

SYLLABUS

Hrs	Frontal teaching
1	Course introduction, goals and organization
5	Atomic and molecular composition of living matter - Structure and functions of biomolecules: sugars, lipids, DNA - Gene and genome, RNA - Genetic code - Proteins. Methods of analysis (overview)
3	Biomembranes: structure and functions. Interactions cell-environments. Transport mechanisms across membrane: simple and facilitated diffusion, passive and active transport. Na/K pump - Coupled transport systems. Exocytosis and endocytosis. Endocytosis-mediated receptors. Cell signalling . Second messengers and signal transduction. Cell junctions
5	DNA replication, repair and recombination. Organization of DNA in cell nucleus (chromatin). Chromosomes. Transcription e RNA processing Protein synthesis. Regulation of gene expression in prokaryotes and eukaryotes.

SYLLABUS

Hrs	Frontal teaching
7	Cell biology The cell theory. Structure and function of eukaryotic cell: organelles, cytoskeleton and cytosol of eukaryotic cells Cell cycle and its regulation (introduction). Mitosis and meiosis. Differentiation of gametic cells, main differences between spermatogenesis and oogenesis. The prokaryotic cell.
4	Energy metabolism Flow and transformations of 'energy in living organisms. First and second laws of thermodynamics. Role of ATP . Energy transfer in redox reactions. Enzyme reactions. Heterotrophes, chemioautotrophes and photoautotrophes. Carbon cycle. Ecosystems. Introduction to energy metabolism. Cellular respiration: glycolysis, Krebs' cycle and oxidative phosphorylation. Anaerobic respiration, fermentation. Photosynthesis: Light-dependent reactions and carbon fixation. C4 and CAM plants.
10	Formal and molecular genetics Mendelian genetics and its extensions Dominance, alleles, genotypes, segregation of alleles. Genotypes and phenotypes. Monohybrids and di-hybrids crosses. Linkage and associations. Backcross. Frequency of recombination. Two-points crosses. Genetic maps. Modes of inheritance of monogenic characters. X-linked). Sex determination, Lyonization. Incomplete dominance. Codominance, multiple alleles, epistasis, pleiotropy, genetic interactions, allelic interactions. Multifactorial inheritance. Mutation: SNPs missense, nonsense, InDels, frameshift, same sense and silent. Chromosomal aberrations: translocations, deletions, inversions, duplications, amplifications. Genomic mutations: aneuploidies, Copy Number Variants Inheritance of monogenic (autosomal, sex-linked and mitochondrial) and multifactorial disorders
4	Theories of evolution: Darwin, neodarwinism, other theories. Population genetics
1	Introduction to taxonomy Binomial nomenclature, taxonomic categories, evolutionary systematics and cladistics (phylogenesis). Sistematica vegetale ed animale
12	Structure and life processes in animals Protection, support, movement Neural signalling and regulation Sensory systems Internal transport Immune system Gas exchanges Nutrition Osmoregulation and disposal of metabolic waste Endocrine regulation Reproduction Development Behavior
12	Structure and life processes in plants Plant Histology: structure, growth and differentiation in plants. Definition and classification of tissues. Meristematic and adult tissues. Tegumental fabrics, waxes, parenchymal, mechanical and secretory. organography Plant Form and structure of the leaf; stomata, transpiration, guttation, abscission. Modifications of the leaves. Growth and structure of the stem. Drums of Monocotyledons and Dicotyledons. Secondary growth. function Transportation: xylem and phloem. Cap and root hairs. Roots of Monocotyledons and Dicotyledons. Secondary growth. Mineral nutrition. Functions. Associations. Reproduction in angiosperms Life cycle. Pollination, fertilization, seed development and the fruit. Growth and development Germination of plants. Phytochrome. nastici movements and tropisms. Plant hormones.