UNIVERSITÀ DEGLI STUDI DI PALERMO

DEPARTMENT	Scienze e Tecnologie Biologiche, Chimiche e Farmaceutiche		
ACADEMIC YEAR	2017/2018		
BACHELOR'S DEGREE (BSC)	BIOTECHNOLOGIES		
INTEGRATED COURSE	BIOLOGY - INTEGRATED COURSE		
CODE	01586		
MODULES	Yes		
NUMBER OF MODULES	3		
SCIENTIFIC SECTOR(S)	BIO/05, BIO/01, BIO/13		
HEAD PROFESSOR(S)	SCIALABBA ANNA	Cultore della Materia	Univ. di PALERMO
OTHER PROFESSOR(S)	FONTANA SIMONA	Professore Associato	Univ. di PALERMO
	SCIALABBA ANNA	Cultore della Materia	Univ. di PALERMO
	VIZZINI AITI	Professore Associato	Univ. di PALERMO
CREDITS	15		
PROPAEDEUTICAL SUBJECTS			
MUTUALIZATION			
YEAR	1		
TERM (SEMESTER)	1° semester		
ATTENDANCE	Mandatory		
EVALUATION	Out of 30		
TEACHER OFFICE HOURS	**FONTANA SIMONA** Thursday 15:30 16:30 Dipartimento di Biomedicina, Neuroscienze e Diagnostica avanzata, Sezione di Biologia e Genetica - Via Divisi, 83. A causa di possibili altri impegni istituzionali o riunioni di lavoro potrebbe non essere possibile ricevere gli studenti nel giorno e alle ore indicate. Per questo e preferibile comunque fissare un appuntamento via e-mail. **SCIALABBA ANNA** Wednesday 10:00 14:00 Dipartimento STEBICEF. Sezione Botanica ed Ecologia Vegetale. Via Archirafi. 38A previo appuntamento via e-mail. **VIZZINI AITI** Monday 09:00 13:00 Dipartimento Scienze e tecnologie Biologiche, Chimiche Farmaceutiche Via Archirafi, 18 Palermo.		

DOCENTE: Prof.ssa ANNA SCIALABBA

PREREQUISITES	Fundamentals of Biology, General and Organic Chemistry.
LEARNING OUTCOMES	Knowledge and comprehensive ability: To know and to understand the basic concepts of molecular and cell biology. To know and to understand the origin and evolution at the cellular and organismic levels. Recognition of the main animal species in relation to their use in the biotechnology field. Understanding of the biology of the issues in the plant cell level, organ and even body in relation to their use in the biotechnology field. Ability to apply knowledge and understanding: To apply the gained knowledge to understand the human impact on gene and genetic level on animal biodiversity in order to perform the diagnostic detection of cells, tissues and organs of plant through microscopic observations or images and diagrams. Making judgments: Ability to analyze and synthesize for elaborating critical thinking on the issues studied and to evaluate the changes induced by the environment on organisms and animals. Communicative ability: To express in understandable way, even for a non-expert audience, the importance of knowledge of the cell biology and molecular basic concepts and processes affecting biodiversity animal and plant structure. Learning ability: To integrate the knowledge of classical zoology with those of molecular and phylogenetic zoology, cell biology knowledge with histology and vegetable anatomy to investigate issues of animal and plant biotechnology at the cellular, organ and organismic level.
ASSESSMENT METHODS	At the end of each didactic unit, a discussion in order to verify the students' understanding, also using questions that may be asked to the final exam will be proposed. Learning evaluation will be based on written and oral tests. The written tests are represented by an ongoing evaluation and a final test lasting ninety minutes on topics reported in the program, referring to the suggested basic texts and the teaching material if provided by the teacher. The written tests are semi-structured and consist of a minimum of thirty questions. The recognition of schemes and figures aims to evaluate the knowledge gained during laboratory activity. Closed questions tend to test the knowledge of the disciplinary scope of the course while the open questions tend to verify the mastery of the subjects, the properties of language and the ability to apply knowledge and skills to solve issues proposed. The written test is passed with the evaluation of 18/30 when the student is in possession of the minimum basic knowledge of the main topics of teaching and the technical language and minimal ability for independently applying the gained knowledge. The evaluation of 30/30 applies when the student shows full knowledge of the topics of the program. The oral test consists of an interview that test the abilities and an adequate exhibition capacity of the students who passed the written test. The 30/30 vote with any praise is given when the knowledge/skills are excellent and student is able to elaborate and express judgments based on acquired knowledge. The final exam score results from the average of the votes in the written and oral tests and is expressed in thirtieth.
TEACHING METHODS	Lectures and exercises.

MODULE
ANIMAL BIOLOGY

Prof.ssa AITI VIZZINI

SUGGESTED BIBLIOGRAPHY	
Hickman et al. Zoologia Mc GrawHill ed.	
AMBIT	50081-Discipline biotecnologiche con finalità specifiche: biologiche e industriali
INDIVIDUAL STUDY (Hrs)	98
COURSE ACTIVITY (Hrs)	52

EDUCATIONAL OBJECTIVES OF THE MODULE

The course aims to provide an integrated view evolutionary and biological of the animal world as a guideline in the study and in biotechnological applications. The contents of the module are designed to offer the basic understanding of the main biological processes and mechanisms of evolution through the analysis of animal biodiversity contextualized at level of gene, population and species. The elements and the essential tools for the analysis and phylogenetic cladistics at various levels of biological complexity will be provided. Finally this course presents the zoological systematics in a phylogenetic key. The teaching of zoological systematics will be supported by laboratory lessons.

SYLLABUS

Hrs	Frontal teaching
2	Origin of life. Biodiversity and biological evolution.
4	Theories of evolution. Population genetic. Mutation,genetic drift, gene flow, polymorphism, heterozygote advantage.
4	Species and Speciation. Microevolution and Macroevolution: Natural Selection.
2	Systematic: Numerical, classical, Evolutionary, cladistics.
2	The Taxa: Taxon monophyletic, paraphyletic, polyphyletic. Homologies and analogies. Orthologous genes. Phenotypic characters: Plesiomorfie, Apomorfie, Sinapomorfie.
4	Reproduction: indirect and direct development, the training plans of the major phyla.
12	Structure and function: support, protection and movement; homeostasis; body fluids and breathing; digestion and nutrition; nervous system and sense organs; endocrine system and systematic of Protozoa, Porifera, Cnidaria, Ctenophora, Platyhelminthes, Nematodes, Molluscs, Annelids, Arthropods (Myriapoda, Chelicerata, shellfish, hexapods).
10	Structure and function: support, protection and movement; homeostasis; body fluids and breathing; digestion and nutrition; nervous system and sense organs; endocrine system and systematic of Deuterostomia: Echinoderms, Urochordata, Cephalochordata and Vertebrates (Fish, Amphibians, Reptiles, Birds, Mammals).

Hrs	Workshops
12	Laboratory exercises aimed at acquiring basic knowledge related to the morphology and taxonomy of the main classes of invertebrates.

MODULE
PLANT BIOLOGY

Prof.ssa ANNA SCIALABBA

SUGGESTED BIBLIOGRAPHY

Testo base consigliato:
-Pasqua G., Abbate G., Forni C. 2015. Botanica generale e diversita' vegetale. Piccin.
Testi utilizzati per l'insegnamento:
-Curtis, H. 2017. Invito alla Biologia. Zanichelli.
-Mauseth J.D., 2014 – Botanica. Idelson Gnocchi. Napoli.
-Gerlach D., Lieder J.2014. Atlante di Anatomia Vegetale.Ed. Muzzio.
-Rost T.L., Barbour M.G., Stocking C.R., Murphy T.M.2008. Biologia delle Piante. Zanichelli.

AMBIT	50077-Discipline biologiche| 50081-Discipline biotecnologiche con finalità specifiche: biologiche e industriali
INDIVIDUAL STUDY (Hrs)	98
COURSE ACTIVITY (Hrs)	52

EDUCATIONAL OBJECTIVES OF THE MODULE

The course provides knowledge on structural and functional bases of plants, highlighting the differences between animal and vegetable organisms. Will be analyzed aspects relating to the characteristics of the cells, tissues and organs of the plants including in relation to its use as a system for biotechnological applications.

SYLLABUS

Hrs	Frontal teaching
8	Introduction. General principles of plant evolution. Tallo and Corm. Difference between animal organisms and plants. Asexual and sexual reproduction. The life cycle of angiosperms. Flowers, fruits and seeds.
2	Plant cells and hierarchical compartmentalization of the plant body. Cellar membranes. Cytoskeleton and cell division. Microbodies.
2	Plastids: role within the cell, origin and structure. Chloroplasts: origin, morphology and structure. Leucoplasts, chromoplasts and etioplasts. Photosynthetic pigments.
2	Vacuole: role within plant cells, tonoplast, vacuolar content, osmotic phenomena, secondary metabolites.
2	Cell Wall: role, biogenesis, primary and secondary wall, primary pit-field and plasmodesmata.
8	Morphological and functional organization. Pseudo-tissues and tissue systems. Meristem, epidermis, periderm, parenchyma, collenchyma, sclerenchyma, xylem, phloem and secretory tissues. Totipotency, determination, differentiation and transdifferentiation. Callus.
10	Organography. Root: apex structure, primary and secondary structure, actinostele, secondary roots, adventitious, ancillary, amended. Caule: apex structure, primary and secondary structure, and eustele atactostele, omoxilo wood and eteroxilo, branching, changes. Leaf morphology and structure, modifications, foliar trace, abscission. commercial value of woody stems and fibers.
6	The role of growth and development hormones. The short and long distance transport. ecophysiological aspects of photosynthesis

Hrs	Workshops
12	- Use of morphological characters for the recognition of the plants. - Tissue sampling. Histological techniques for the anatomical recognition and diagnosis of tissues, cells, organelles and reserve substances present in the seagrass. Observations by light microscopy. - Plant-environment activities' aimed observation of specialization at the anatomical, morphological and reproductive adaptation sets with focus on the evolutionary advantages of such metamorphosis.

MODULE
CELL BIOLOGY

Prof.ssa SIMONA FONTANA

SUGGESTED BIBLIOGRAPHY	
B. Alberts ed altri autori: “L’essenziale di biologia molecolare della cellula”. Zanichelli. G. Karp: “Biologia cellulare e molecolare”. Edises. De Leo-Fasano-Ginelli: “Biologia e Genetica”. Edises	
AMBIT	10643-Attività formative affini o integrative
INDIVIDUAL STUDY (Hrs)	51
COURSE ACTIVITY (Hrs)	24
EDUCATIONAL OBJECTIVES OF THE MODULE	
The Cell Biology Course will introduce students to key concepts concerning the basic knowledge of cellular and molecular processes regulaitng prokaryotic and eukaryotic cell activities. At the end of the course each student will have to display to well know: structure and Function of biological macromolecules; plasma membrane structure and function (transoprt and signal transduction mechanisms); Mechanisms of DNA replication, transcription, translation; structure of genes and chromosomes, cell cycle control and cell division.	

SYLLABUS

Hrs	Frontal teaching
1	Characteristics and classification of living organisms; prokaryotic cell, eukaryotic cell and virus (notes). Biological macromolecules
2	chemical physical properties of water and tis interactions with biological macromolecules. Carbohydrates: monosaccharides, disaccharides, and polysaccharides (glycogen and starch). Lipids: fatty acids, glycerides, phospholipids and cholesterol.
2	Proteins: aminoacids and peptide bond. Primary, secondary, tertiary and quaternary structure.
2	Nucleic acids: nucleosides and nucleotides; DNA and RNA structures.
1	Plasma membrane structure and function
2	Membrane transport mechanisms: sample diffusion, osmosis, facilitated diffusion (passive transport); active transport.
2	Signal transduction mechanisms: receptor/ligand interaction; Ion Channel Receptors; G-protein-linked receptors; Enzyme-linked receptors.
3	DNA Replication in prokaryotes and eukaryotes
3	Transcription in prokaryotes and eukaryotes and RNA polymerases properties. Eukaryotic mRNA Processing. Alternative splicing.
3	The Genetic Code. Translation in prokaryotes and eukaryotes. Intracellular trafficking (notes).
3	Chromatin and eukariotic chromosomes structure. Cell cycle control. Mitosis and meiosis.