



UNIVERSITÀ DEGLI STUDI DI PALERMO

DEPARTMENT	Scienze della Terra e del Mare		
ACADEMIC YEAR	2021/2022		
BACHELOR'S DEGREE (BSC)	NATURAL AND ENVIRONMENTAL SCIENCE		
SUBJECT	CELL BIOLOGY		
TYPE OF EDUCATIONAL ACTIVITY	B		
AMBIT	50170-Discipline biologiche		
CODE	01597		
SCIENTIFIC SECTOR(S)	BIO/06		
HEAD PROFESSOR(S)	SANTULLI ANDREA	Ricercatore	Univ. di PALERMO
OTHER PROFESSOR(S)			
CREDITS	6		
INDIVIDUAL STUDY (Hrs)	86		
COURSE ACTIVITY (Hrs)	64		
PROPAEDEUTICAL SUBJECTS			
MUTUALIZATION			
YEAR	1		
TERM (SEMESTER)	2° semester		
ATTENDANCE	Not mandatory		
EVALUATION	Out of 30		
TEACHER OFFICE HOURS	SANTULLI ANDREA Thursday 14:30 15:30 DISTEM		

DOCENTE: Prof. ANDREA SANTULLI

PREREQUISITES	Notions of physics, inorganic and organic chemistry, biochemistry.
LEARNING OUTCOMES	Knowledge and ability to understand Knowledge of the structural and functional organization of the cell. Ability to understand the biological terminology related to this discipline. Ability to apply knowledge and understanding Ability to interpret complex biological and ecological mechanisms starting from the structure and functioning of the cell. Autonomy of judgment Self-assessment capacity of the learning level, through in itinere checks consisting in questionnaires related to already completed teaching units. Communication skills Ability to describe in a clear and rigorous way the morpho-functional aspects of cells using biological terminology properly. Learning skills Acquisition, through the use of university level texts, of the essential theoretical notions related to the morpho-functional characteristics of cells, necessary to understand the latest scientific knowledge as well as for
ASSESSMENT METHODS	Learning will be assessed by individual final exam. Students have to prove to possess an adequate knowledge and interpretative competence of the general and specific contents of the course, a capacity of linking and processing information, as well as a relevant, clear and correct exhibition capacity. The evaluation of the test will be expressed in 30/30 and it will be formulated on the basis of the following considerations: 1) Sufficient knowledge of the topics dealt with and limited capacity for elaboration and presentation of the topics of the discipline (vote 18-21). 2) Good knowledge of the topics and good ability to draw up and present them (vote 22-24). 3) Thorough knowledge of the topics and in-depth presentation (vote 25-27) 4) Excellent knowledge of the topics, excellent ability to develop and present the topics of the discipline (vote 28-30) 5) Excellent knowledge of the topics covered, excellent ability to elaborate and present the topics of the discipline (vote 30 and honour).
EDUCATIONAL OBJECTIVES	transfer to the students the knowledge of the animal cell from a morphological-functional point of view, ultrastructural and molecular, indispensable for the interpretation of biological and ecological processes Provide students with the knowledge for the application of basic cell biology techniques necessary for the study of structural and functional properties of differentiated cells and ways of cell association in different tissues, integrating already acquired knowledge related to: laboratory instrumentation used, Laboratory security measures associated with manipulation, cell culture techniques and use of cell cultures as an experimental model, collection, processing and return of experimental data.
TEACHING METHODS	Presence and on line classes, laboratory
SUGGESTED BIBLIOGRAPHY	Karp – Biologia cellulare e molecolare - Edises M. Maccarrone 2019 - Metodologie biochimiche e biomolecolari Strumenti e tecniche per il laboratorio del nuovo millennio. Zanichelli ISBN: 9788808520555 Cooper - "La cellula. Un approccio molecolare". Ed. Piccin ISBN: 8829921335 Becker - Il mondo della cellula". Ed. PEARSON ISBN-10. 889190449X Alberts - L'essenziale di biologia molecolare della cellula. Zanichelli Isbn: 9788808151391

SYLLABUS

Hrs	Frontal teaching
4	Introduction to the study of cell biology: Origin of life. Cell shape and size. General organization of the animal cell. Chemical composition of the cell: Glucides. Lipids. Proteins: amino acids, peptide bond, primary, secondary, tertiary and quaternary structure. Nucleic acids: nucleosides and nucleotides, phosphodiesteric bond, DNA and RNA structure. Vegetal cell. Analytical and microscopic techniques for the study of cells
4	Plasma membrane: Structure and functions. Fluid mosaic. Membrane Lipids. Membrane proteins. Mobility of membrane proteins. Membrane carbohydrates. Membrane asymmetry. Transport through membranes: passive transport; active transport. Membrane potentials and nerve impulse transmission.
4	Perossisomi. Cellular partitioning: rough endoplasmic reticulum (RER), protein synthesis associated with membranes. Smooth endoplasmic reticulum (REL). Golgi apparatus. Compartmentalization, vesicle transport. Regulated and constitutive secretion. Lysosomes. Exocytosis. Specific phagocytosis. Clatrine and coated vesicles. Membrane recycling. Peroxisomes.
3	Mitochondrion: Shape, size, distribution and number. Ultrastructure. Chemical composition. Synthesis and localization of mitochondrial proteins. Origin. Aerobic Metabolism and formation of ATP in the Mitochondrion

SYLLABUS

Hrs	Frontal teaching
4	Cytoskeleton and cellular motility: Microtubules. Stable and stable microtubules, MTOC and polarity of microtubules. Polymerization and depolymerization, dynamic instability. MAP; cellular motors, cilia and flagella. Actin microfilaments: Chemical composition and organization. Associated proteins. Muscle contractility. Non-muscular motility. Lamellipods, phyllopods. Intermediate filaments: Classes, structure
4	Cellular interactions: Extracellular matrix. Collagen, structure, function and synthesis. Fibronectins, integrins and other proteins of the matrix. Proteoglycans and glucosaminoglycans. Cellular adhesion: Caderine, NCAM, Selectine. Cell junctions: Tight junction, Zonula occludens, Zonula adherens, Macula adherens, Desmosoma, hemidesmosomes, focal contact, gap junctions.
5	The nucleus: morphology and composition. Nuclear envelop, chromatin. nucleolus. DNA duplication and transcription.
4	Cellular cycle: Phases of the cell cycle. Cycle control. Mitosis. Meiosis.
Hrs	Workshops
6	Basic techniques for the cell biology laboratory
6	Microscopy techniques
12	Maintenance and experimental treatment of cell cultures, case study: fibroblast cultures, cancer cells and pre adipocyte cultures, induction of preadipocyte differentiation
4	Evaluation of molecular markers related to cell cycle and apoptosis by immunofluorescence and western blotting
4	Analysis of gene expression of markers involved in the mechanism of apoptosis by RT-PCR