UNIVERSITÀ DEGLI STUDI DI PALERMO

DEPARTMENT	Scienze e Tecnologie Biologiche, Chimiche e Farmaceutiche		
ACADEMIC YEAR	2021/2022		
BACHELOR'S DEGREE (BSC)	BIOTECHNOLOGIES		
INTEGRATED COURSE	BIOLOGY AND CYTOLOGY - INTEGRATED COURSE		
CODE	21010		
MODULES	Yes		
NUMBER OF MODULES	2		
SCIENTIFIC SECTOR(S)	BIO/13, BIO/06		
HEAD PROFESSOR(S)	FONTANA SIMONA	Professore Associato	Univ. di PALERMO
OTHER PROFESSOR(S)	FONTANA SIMONA CANCEMI PATRIZIA	Professore Associato Professore Associato	Univ. di PALERMO Univ. di PALERMO
CREDITS	11		
PROPAEDEUTICAL SUBJECTS			
MUTUALIZATION			
YEAR	1		
TERM (SEMESTER)	1° semester		
ATTENDANCE	Mandatory		
EVALUATION	Out of 30		
TEACHER OFFICE HOURS	**CANCEMI PATRIZIA** Monday 12:00 13:00 Studio, ED 16 piano -1 Tuesday 12:00 13:00 Studio, ED 16 piano -1 Wednesday 12:00 13:00 Studio, ED 16 piano -1 **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.		

DOCENTE: Prof.ssa SIMONA FONTANA

PREREQUISITES	Fundamentals of Biology, General and Organic Chemistry
LEARNING OUTCOMES	Knowledge and understanding: to know and understand the basic concepts of cell and molecular biology and histology; ability to recognize cell and tissue structures and understand the association between structure and function at the cellular and molecular level. Ability to apply knowledge and understanding: ability to transfer knowledge of cell and molecular biology and histology in typical areas of biotechnology applications such as biomedical biotechnology. Autonomy of judgment: ability to analyze and summarize a critical think on the studied topics; ability to integrate the acquired knowledge for making judgments regarding the cell systems, molecular processes, and physio-pathology of organisms. Communication ability: to communicate clearly and unambiguously the knowledge of the basic concepts of cell and molecular biology and histology by using a proper language. Learning ability: ability to integrate the knowledge of cell and molecular biology with histology maturing information independently.
ASSESSMENT METHODS	There will be three tests: a written evaluation (also as “in itinere” test during the attendance of the integrated course) to verify the possession of disciplinary skills and knowledge of basic concepts of cell and molecular biology, and two oral tests concerning cytology and histology topics, the frist as “in itinere” test during the attendance of the integrated course). Both tests will be based on the recommended basic texts and the teaching material eventually provided. The written test of the duration of 90 minutes will be constituted by 27 questions with multiple choice with four possible solutions and three open questions and will tend to verify a) the knowledge gained, and b) the ability of elaborative and synthesis skills. The questions with multiple choice will allow determining the ability to identify the correct answer among the several proposed, and the three open questions will test the ability to contextualize the topic within a specific cellular process illustrating the properties and characteristics of the molecule and/or biological activity. As for the verification of the elaborative abilities, it will be evaluated the ability to extrapolate the minimum details of the process clearly and concisely and the understanding of their implications for the topic. This written test will receive a score from 0 to 4 with 4 the highest score and 0 the lowest score. The evaluation scheme is the following: 0: insufficient knowledge of the contents required by the specific question or the student does not answer. 1: 18-20 vote; minimum basic knowledge of the subject requested and poor elaborative capacity. 2: 21-24 vote; just enough knowledge of the subject, and limited language abilities. 3: 25-27 vote; good knowledge of the issues and good language abilities; the student is able to correlate the different topics studied. 4: 28-30 vote; more than good acquisition of the course content and excellent language abilities and synthesis abilities. Each oral examination will consist of a conversation during which the student will have to answer a minimum of three/four questions aimed to evaluate the disciplinary knowledge on topics of cytology and histology. During these oral tests, the level of knowledge and understanding of the topics, the methodological approach used, the interpretative skills for the histological recognition of tissues and organs, the synthesis and exhibition capacity will be assessed. The sufficiency threshold will be reached when the student shows an overall acceptable level of knowledge and understanding of the topics covered and the acquisition of a minimum level of application skills. The final vote will be expressed according to the following scheme: 30-30Lode: A-A+ Excellent; 27-29: B Very good; 24-26: C Good; 21-23: D Satisfactory; 18-20: E Sufficient; 1-17: F Fail. The final evaluation will consider the assessment reached in the written and oral tests as weell as in the laboratory activities .
TEACHING METHODS	Frontal lessons and practical exercises. The lessons will be carried out by the teacher by using PowerPoint presentations. During the lessons, the teacher will interact with the students, asking them questions to verify if they hold the prerequisites and to stimulate the ability to solve problems and draw conclusions based on the acquired knowledge. These activities will also strengthen and stimulate the teacher-student interaction. The practical exercises will allow the student to perform experiments to provide experimental evidence to theoretical issues, and to prepare and observe histological slides to identify the typical morphological structures of tissues and organs. Students will work both individually to stimulate the acquisition of technical-operational skills, and as a group to encourage teamwork and collaboration between colleagues. Before carrying out the experiments, the teacher will explain all the proposed activities from a theoretical and practical point of view.

MODULE
CYTOLOGY AND HISTOLOGY

Prof.ssa PATRIZIA CANCEMI

SUGGESTED BIBLIOGRAPHY

G. Karp. Biologia Cellulare e Molecolare:Concetti ed Esperimenti (EDISES). Qualunque edizione (ISBN: 978 88 7959 8637)
I. Dalle Donne Citologia e Istologia (EDISES). Qualunque edizione (ISBN: 9788833190099)
I. Dalle Donne Istologia ed elementi di anatomia microscopica (EDISES).Qualunque edizione (ISBN: 9788879596114)
Gerald Karp. Cell and Molecular Biology: Concepts and Experiments 6th Edition (ISBN-13978-0470483374)
Leslie P. Gartner, James L. Hiatt. Color Textbook of Histology, 3e: 3th Edition (ISBN-13978-1416029458)

AMBIT	50081-Discipline biotecnologiche con finalità specifiche: biologiche e industriali
INDIVIDUAL STUDY (Hrs)	128
COURSE ACTIVITY (Hrs)	72

EDUCATIONAL OBJECTIVES OF THE MODULE

The course aims to provide morpho-functional theoretical notions in eukaryotic cells in order to understand structures and functions of tissues (both at microscopic and ultrastructural levels) and the correlations with homeostasis .

SYLLABUS

Hrs	Frontal teaching
16	Cytology: The eukaryotic cell: The plasma membrane; Nucleus: structure and function of the nuclear membrane and matrix, nuclear transport; Mitochondria: structure, function, and biogenesis Smooth and rough endoplasmic reticulum: structure and function. Proteins synthesis and segregation of. Proteins post-translation modifications Golgi apparatus: structure and function; Lysosomes: structure and function. Peroxisomes. Vesicular transport. Exocytosis and endocytosis. Pinocytosis and phagocytosis. Cytoplasm and Cytoskeleton: microtubules, cell motility, cilia and flagella; microfilaments, cell morphology; intermediate filaments. Mechanisms of signal transduction.
40	Histology: Cells and tissues: cell specializations Cell adhesions; Epithelial tissue: classification and localization; exocrine and endocrine glands, Connective tissue: cells, extracellular matrix, basement membrane, adipose tissue. Cartilaginous and bone tissue: structure and histogenesis. Blood: plasma, erythrocytes, granulocytes, monocytes, B and T lymphocytes, platelets; hematopoiesis; Innate and acquired immunity. Striated, smooth and cardiac muscle tissue: ultrastructure and muscle contraction. Nerve tissue: neurons, neuroglia cells, myelin and amylelinated fibers, synapses and neuromuscular junctions. Tegumentary system. Digestive system Liver and pancreas. Respiratory system. Urinary tract Endocrine glands

Hrs	Workshops
12	DNA extraction from the buccal epithelium cells and electrophoresis on agarose gel Oral mucosal cell preparations Blood smears Recognition of histological sections Observation of cells in culture; Methods of protein assay and SDS-PAGE electrophoresis

MODULE
CELL BIOLOGY

Prof.ssa SIMONA FONTANA

SUGGESTED BIBLIOGRAPHY

"L'essenziale di biologia molecolare della cellula", Alberts B. ed altri autori - Zanichelli IV Ed.- ISBN: 9788808151391
"Biologia cellulare e molecolare. Concetti e esperimenti", Karp G. - Edises V Ed.- EAN: 9788879598637
"Biologia e Genetica", De Leo-Fasano-Ginelli - Edises IV Ed.- ISBN:9788836230013
"Karp's Cell and Molecular Biology: Concepts and Experiments", Karp G, Iwasa J., Marshall W. WILEY 8th Edition - ISBN: 978-1-118-88614-4

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.
2	Plasma membrane structure and function
2	Membrane transport mechanisms: sample diffusion, osmosis, facilitated diffusion (passive transport); active transport.
3	DNA Replication in prokaryotes and eukaryotes
3	Transcription in prokaryotes and eukaryotes and RNA polymerases properties. Eukaryotic mRNA Processing. Alternative splicing.
4	The Genetic Code. Translation in prokaryotes and eukaryotes. Intracellular trafficking (notes).
3	Chromatin and eukariotic chromosomes structure. Cell cycle control. Mitosis and meiosis.