



UNIVERSITÀ DEGLI STUDI DI PALERMO

DEPARTMENT	Promozione della Salute, Materno-Infantile, di Medicina Interna e Specialistica di Eccellenza "G. D'Alessandro"		
ACADEMIC YEAR	2022/2023		
BACHELOR'S DEGREE (BSC)	HEALTHCARE ASSISTANCE		
INTEGRATED COURSE	BIOLOGY AND BIOCHEMISTRY - INTEGRATED COURSE		
CODE	09732		
MODULES	Yes		
NUMBER OF MODULES	2		
SCIENTIFIC SECTOR(S)	BIO/13, BIO/10		
HEAD PROFESSOR(S)	SEIDITA GREGORIO	Ricercatore	Univ. di PALERMO
OTHER PROFESSOR(S)	DI LIBERTO DIANA	Ricercatore a tempo determinato	Univ. di PALERMO
	SEIDITA GREGORIO	Ricercatore	Univ. di PALERMO
CREDITS	6		
PROPAEDEUTICAL SUBJECTS			
MUTUALIZATION			
YEAR	1		
TERM (SEMESTER)	1° semester		
ATTENDANCE	Mandatory		
EVALUATION	Out of 30		
TEACHER OFFICE HOURS	DI LIBERTO DIANA Wednesday 15:00 - 18:00 Biochimica del Policlinico di Palermo Thursday 15:00 - 17:00 Biochimica del Policlinico di Palermo. SEIDITA GREGORIO Tuesday 14:30 - 16:30 Sezione di Biologia e Genetica via divisi, 83 (Dipartimento di Biopatologia e Biotecnologie Mediche) Wednesday 11:00 - 13:00 Sezione di Biologia e Genetica via divisi, 83 (Dipartimento di BiND)		

PREREQUISITES	Students must have basic notions of chemistry and biology.
LEARNING OUTCOMES	Knowledge and understanding: Acquisition of the specific language of the disciplines of Biology and Genetics; Know the basics of the cellular organization of living organisms; know and understand basic biological processes such as growth, cell division, sexual reproduction and embryonic development; the mechanisms of replication and variability of the genetic material; the main mechanisms of gene expression, the genetic basis of heredity and the methods of transmission of hereditary characteristics. Ability to apply knowledge and understanding: Ability to autonomously recognize and apply the knowledge of the basic biological processes of cells and organisms; the laws governing the transmission of hereditary characteristics, Autonomy of judgment: Being able to independently evaluate and integrate the knowledge acquired in biology and genetics in the study of organisms and in particular of man; the implications that the alterations of biological processes have on human pathologies Communication skills: Ability to explain in a simple way and communicate clearly, the main processes of biology, genetics to interact with the medical staff. Learning ability: Ability to update knowledge in the biomedical field by consulting the scientific bibliography specific to the sector of competence; Ability to learn and follow suitably, using the knowledge acquired in these disciplines, the subsequent teachings of the curriculum of this course of study. Ability to deepen the topics also by attending specific courses or seminars or 1st level Masters.
ASSESSMENT METHODS	The evaluation of the student includes an oral test consisting of an interview that will focus on all the topics of the program, with reference to the recommended texts and the teaching material produced by the teacher. At least three questions are proposed during the interview. The interview is aimed at evaluating the "knowledge" and "know-how" acquired by the student, and to ascertain: a) the knowledge acquired in the disciplines and the ability to establish connections between the contents b) the processing skills demonstrated by the understanding of the applications and of the implications of the contents within the professional context c) the expository skills manifested in possessing adequate properties of language and ability to interact with the examiners. The final evaluation is a mark out of thirty and is assigned according to the following scheme: VOTE 30-30 and praise. Evaluation: Excellent (ECTS grade A-A + Excellent) Outcome = full possession of the teaching contents; the student demonstrates synthetic-analytical skills and is able to apply knowledge even in detail in order to solve complex problems; full command of the language of the sector. VOTE 27-29 - Evaluation: Excellent (ECTS grade B Very good). Outcome: excellent knowledge of the teaching contents; the student demonstrates analytical-synthetic ability and ability to apply knowledge to solve problems of medium complexity and, in some cases, even high; excellent language property appropriate to the professional context VOTE 24-26 - Evaluation: Good (ECTS grade C Good). Outcome: good knowledge of the teaching content; the student demonstrates the ability to apply knowledge to solve problems of medium complexity; good language property VOTE 21-23- Evaluation: Fair (ECTS grade D Satisfactory). Outcome: fair knowledge of the teaching contents, in some cases limited to the main topics; acceptable ability to use the specific language of the discipline and modest ability to independently apply the acquired knowledge VOTE 18-20- Evaluation: Sufficient (ECTS grade E Sufficient). Outcome: minimal knowledge of the teaching contents, often limited to the main topics; modest ability to use the specific language of the discipline which is not sufficiently articulated; minimal ability to autonomously apply the acquired knowledge VOTE 1-17- Evaluation: Insufficient (ECTS grade F Fail). Outcome: the student does not have a knowledge of the main teaching contents; very little or no ability

	to use the specific language of the discipline and to independently apply the acquired knowledge. Failed exam
TEACHING METHODS	Frontal or distance lessons with the aid of multimedia presentations.

MODULE BIOLOGY <i>Prof. GREGORIO SEIDITA</i>	
SUGGESTED BIBLIOGRAPHY	
P. Bonaldo, Crisafulli C., D'Angelo R., Francolini M., Grimaudo S., Rinaldi C., Riva P., Romanelli M.G. Elementi di Biologia e Genetica Edises (2019);	
AMBIT	10358-Scienze biomediche
INDIVIDUAL STUDY (Hrs)	45
COURSE ACTIVITY (Hrs)	30
EDUCATIONAL OBJECTIVES OF THE MODULE	
Understanding the biological organization that underlies living organisms. Know the fundamental biological processes of molecular biology. Knowing the processes of expression of the activity of genes and the methods of transmission of hereditary traits.	

SYLLABUS

Hrs	Frontal teaching
2	Living organism concept. The cell: structural and functional organization. Differences between eukaryotic, prokaryotic and virus
4	Chemical composition of living matter; Biological macromolecules; Proteins: structure and function. Biological membranes
2	Nucleic acids: structure and function; DNA as a genetic material; Main classes of RNA in eukaryotes.
2	DNA duplication in prokaryotes and eukaryotes.
3	Expression of genetic information, Transcription The maturation of primary transcripts in eukaryotes.
4	Genetic code; ribosome structure and translation: translation initiation, elongation and termination phases
2	Chromatin and Chromosomes; Cell cycle and Mitosis.
2	Meiosis and Gametogenesis of the human species; Sexual reproduction; Elements of developmental biology
3	Variability and Mutation; Mutations meaning and occurrence; DNA repair mechanisms; Gene mutations, chromosomal mutations and tumors; Genomic mutations
6	Formal genetics; Mendel and his experiments; Extensions of the Mendelian inheritance; Inheritance of dominant and recessive autosomal traits of the human species: significant examples of normal and pathological traits; Heredity associated with sex chromosomes; Biological basis of hereditary pathologies

MODULE BIOCHEMISTRY

Prof.ssa DIANA DI LIBERTO

SUGGESTED BIBLIOGRAPHY

"Le basi della biochimica" di Denise R Ferrier; ed. Zanichelli ISBN: 9788808354006

"Introduzione alla biochimica" di Lehninger di David L.Nelson Michael M.Cox; ed. Zanichelli ISBN: 9788808729774

"Principi di biochimica" di Donald Voet, Judith G Voet, Charlotte W Pratt; ed. Zanichelli ISBN: 9788808974563

AMBIT	10358-Scienze biomediche
INDIVIDUAL STUDY (Hrs)	45
COURSE ACTIVITY (Hrs)	30

EDUCATIONAL OBJECTIVES OF THE MODULE

The objective of the biochemistry module is to illustrate the main classes of biomolecules, their structure and function in the cellular context. Acquiring this knowledge is the key to understanding the complex phenomena at the base of physiology, cellular metabolism and intracellular biochemical cycles.

In particular, the student must know the biological molecules and the main metabolic processes in which they are involved; knowing and understanding the mode of action of enzymes, the fundamentals of their regulation. Finally, he/she should have to know the molecular mechanisms of action of chemical messengers and the main modes of extracellular signal transduction.

SYLLABUS

Hrs	Frontal teaching
2	Chemical properties of water, chemical bonds and functional groups, pH.
3	Aminoacids. Essential and not-essential amino acids. Chemical characterization. peptide bond: alfa-amino acids structure, classification according to the polarity of the side chain R. Peptide bond. Protein structure and different levels of molecular organization. Protein folding and misfolding pathologies.
3	Enzyme: General concepts. Enzyme kinetics. Coenzymes and prosthetic groups. Oxygen-binding chromoproteins. Myoglobin (Mb). Hemoglobin (Hb).
2	Structure and composition of biological membranes. Membrane transport. Osmosis. Simple and facilitated diffusion. Glucose transporters (GLUTs). Primary and secondary active transport. Sodium-glucose symporter. Sodium/potassium –dependentATPase.
2	Metabolism: Introduction to metabolism: catabolic and anabolic pathway. Role of ATP and reducing power in the connection between catabolism and anabolism.
4	Metabolism of carbohydrates: generality and biological role of carbohydrates; classification. Monosaccharides: aldoses and ketosis. The glycosidic bond. Disaccharides, polysaccharides. digestion of polysaccharides and disaccharides; absorption of monosaccharides. Glycolysis, Gluconeogenesis, pentose phosphate pathway, Glycogen metabolism : glycogen synthesis and glycogen lysis. Oxidation of pyruvate. Krebs cycle. Oxidative phosphorylation: the electron transport chain and ATP synthesis.
3	Metabolism of lipids.biological characteristics of lipids. Various types of lipids and common characteristics. The fatty acids: chemical and physical properties. Cholesterol. Triglycerides. Metabolism of fatty acids. Lipoprotein: general concepts . Chylomicrons, VLDL and their metabolism. LDL receptors . Atherosclerosis. Metabolism of ketone bodies.
3	Oxidative phosphorylation (OXPHOS): electron transport chain and ATP synthesis. Agents which interfere with oxidative phosphorylation. Physiological and non-physiological uncoupling agents. UCPs. Oxidative stress. Cell metabolic specializations: the cancer cell; the markers oncological diagnostics
2	Metabolism of aminoacids. Digestion of protein. Amino acid catabolism. Transamination. Oxidative deamination. Ammonia metabolism.
3	Membrane receptors and signal transduction mechanisms. Insuling, glucagon. The main metabolic disorders (diabetes, atherosclerosis and obesity)
3	Xenobiotic receptors. Detoxifying function of the liver. Cytochromes P450. ABC conveyors. Outlines of neurotransmission.