



# UNIVERSITÀ DEGLI STUDI DI PALERMO

<b>DEPARTMENT</b>	Biomedicina, Neuroscienze e Diagnostica avanzata		
<b>ACADEMIC YEAR</b>	2021/2022		
<b>BACHELOR'S DEGREE (BSC)</b>	SPEECH THERAPY (QUALIFYING FOR THE PROFESSION OF SPEECH THERAPIST)		
<b>INTEGRATED COURSE</b>	BIOCHEMISTRY, APPLIED BIOLOGY AND GENETICS - INTEGRATED COURSE		
<b>CODE</b>	01575		
<b>MODULES</b>	Yes		
<b>NUMBER OF MODULES</b>	2		
<b>SCIENTIFIC SECTOR(S)</b>	BIO/10, BIO/13		
<b>HEAD PROFESSOR(S)</b>	CARLISI DANIELA	Professore Associato	Univ. di PALERMO
<b>OTHER PROFESSOR(S)</b>	CARLISI DANIELA RAIMONDO STEFANIA	Professore Associato Ricercatore a tempo determinato	Univ. di PALERMO Univ. di PALERMO
<b>CREDITS</b>	6		
<b>PROPAEDEUTICAL SUBJECTS</b>			
<b>MUTUALIZATION</b>			
<b>YEAR</b>	1		
<b>TERM (SEMESTER)</b>	1° semester		
<b>ATTENDANCE</b>	Mandatory		
<b>EVALUATION</b>	Out of 30		
<b>TEACHER OFFICE HOURS</b>	<p><b>CARLISI DANIELA</b> Monday 08:30 16:30 Sono disponibile per il ricevimento ogni giorno previo appuntamento, presso la Sezione di biochimica del Policlinico. Accanto la biblioteca di Medicina. Contatto: daniela.carlisi@unipa.it</p> <p><b>RAIMONDO STEFANIA</b> Thursday 15:00 17:00 BIND, sez. Biologia e Genetica, Via DIVISI 83, Palermo Oltre all'orario di ricevimento, sono disponibile anche gli altri giorni previo appuntamento via e-mail.</p>		

<p><b>PREREQUISITES</b></p>	<p>The prerequisites concern the knowledge acquired in the previous school path; the student must have basic knowledge of chemistry, biology and biochemistry. These prerequisites are those established at national level for access to Healthcare Professional Courses.</p>
<p><b>LEARNING OUTCOMES</b></p>	<p>Knowledge and understanding          - Acquisition of the specific language of Biology, Genetics and Biochemistry topics;          - to Know and understand the basic biological and biochemical processes of living organisms, the way in which hereditary characteristics are transmitted to the offsprings.          - to know and understand the genetic basis of the most common human diseases or those diseases with an high incidence in the territory.</p> <p>Applying knowledge and understanding          Ability to distinguish, organize and implement, in a independent way:          - the knowledge of basic biological and biochemical processes of cells and organisms;          - The laws which regulate the transmission of hereditary characteristics in living species;          - The main methods of cell biology, biochemistry and molecular genetics.</p> <p>Making judgments          Being able to evaluate and integrate, in an autonomous manner:          - The acquired knowledge in biology, biochemistry and genetics in the study of organisms and in particular human ones;          -the consequences of the alterations of biological processes on human diseases.</p> <p>Communication skills          Ability to communicate and explain, in a simple way, even to a non-expert public, the biological, biochemical and genetic processes.</p> <p>Learning ability          Capacity to deepen, not in a notional way but rather with a critical and quantitatively founded approach, the concepts presented during the course, even through the study of different texts. Ability to properly use the scientific literature for a continuous update of knowledge in the biomedical field.Ability to learn and follow appropriately, using the knowledge acquired in the course, the subsequent teaching courses of the curriculum for the final degree in Logopedia.</p>
<p><b>ASSESSMENT METHODS</b></p>	<p>he exam consists of a written test possibly followed by an oral test. This modality may be subject to variations according to the health emergency and the Rectoral indications. The written test will consist of multiple choice and open answer tests. The test will cover all parts of the program. This test aims to assess whether the student has knowledge and understanding of the arEssa is passed if the candidate obtains a score of at least 15/30.          During the oral exam, the exam candidate will have to answer questions posed orally on all parts of the program. This test aims to assess whether the student has knowledge and understanding of the topics and has acquired interpretative and communicative skills. The oral test is compulsory if the score of the written test is less than 18/30.          The oral test is at the discretion of the Commission in the event that the score of the written test is greater than 18/30. It can be requested by the student only if he has obtained a score higher than 18/30 in the written test.</p> <p>The questions will tend to verify a) the knowledge acquired and b) the processing and synthesis skills. As regards the verification of knowledge, the ability to contextualize the topic within a specific process will be required. As regards the verification of the processing skills, the ability to extrapolate the minimum information of the process in a clear and concise way and the understanding of the implications within the discipline will be assessed.          The evaluation scheme is as follows:          30-30 and praise          Excellent knowledge of the teaching content; the student demonstrates high analytical-synthetic ability and is able to apply knowledge to solve highly complex problems.          27-29          Excellent knowledge of teaching content and excellent language skills; the student demonstrates analytical-synthetic ability and able to apply knowledge to solve problems of medium complexity and, in some cases, even high.          24-26          Good knowledge of teaching content and good language properties; the student is able to apply knowledge to solve medium complexity problems.          21-23          Fair knowledge of the teaching content, in some cases limited to the main topics; acceptable ability to use the specific language of the discipline and to independently apply the knowledge acquired.</p>

	18-20. Minimum knowledge of teaching content, often limited to the main topics; modest ability to use the specific language of the discipline and to independently apply the knowledge acquired. Insufficient Does not have an acceptable knowledge of the main contents of the teaching; very little or no ability to use the specific language of the discipline and to independently apply the knowledge acquired.
<b>TEACHING METHODS</b>	Lessons in the classroom

## MODULE BIOCHEMISTRY

*Prof.ssa DANIELA CARLISI*

### SUGGESTED BIBLIOGRAPHY

"Introduzione alla biochimica di Lehninger" di Nelson D. L e Cox MM, ed. Zanichelli; Sesta edizione; ISBN: 9788808723284  
 "Fondamenti di biochimica umana" Mauro Maccarrone ed. Zanichelli; 2021 ISBN: 9788808420190  
 "Biochimica Medica" di Siliprandi. Tettamanti, Ed. Piccin; 2018; ISBN 978-88-299-2791-3  
 "Le basi della biochimica" di Denise R Ferrier; ed. Zanichelli. 2015 ISBN: 9788808354006

<b>AMBIT</b>	10319-Scienze biomediche
<b>INDIVIDUAL STUDY (Hrs)</b>	45
<b>COURSE ACTIVITY (Hrs)</b>	30

### EDUCATIONAL OBJECTIVES OF THE MODULE

The objective of the biochemistry module is to provide students with the knowledge necessary to understand the main biochemical processes that allow cell life and the functioning of the organism as a whole. To this end, The student must know the structure and function of the main biological macromolecules; understand the main metabolic processes; know the mechanisms that regulate and integrate biochemical processes and connect them with some pathological conditions.

## SYLLABUS

Hrs	Frontal teaching
2	General concepts of general and inorganic chemistry
1	Carbohydrates: Definition and description of carbohydrates; generality and biological role; classification. Monosaccharides: aldoses and ketoses. Structure and configuration of D-glucose. The glycosidic bond. Disaccharides, polysaccharides.
1	Lipids: biological characteristics of lipids; physical properties. Various types of lipids and common characteristics. The fatty acids: chemical and physical properties. Triglycerides.
3	Aminoacids. Essential and no-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. Basics of Protein folding and misfolding diseases Oxygen-binding chromoproteins. Myoglobin (Mb). Hemoglobin (Hb).
2	Enzyme: General concepts. Mechanism of enzymatic catalysis. The active site. Enzyme specificity. Isoenzymes. Constitutive and inducible enzymes . Enzyme kinetics. Coenzymes and prosthetic groups.
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.
3	Membrane receptors and signal transduction mechanisms.
2	Metabolism: Introduction to metabolism: catabolic and anabolic pathway. Role of ATP and reducing power in the connection between catabolism and anabolism.
5	Metabolism of carbohydrates: digestion of polysaccharides and disaccharides; absorption of monosaccharides. Glycolysis, pentose phosphate pathway, Glycogen metabolism : glycogen synthesis and glycogen lysis. Oxidation of pyruvate. Krebs cycle. Oxidative phosphorylation: the electron transport chain and ATP synthesis. Gluconeogenesis.
3	Metabolism of lipids. Metabolism of triglycerides. Beta-oxidation of fatty acids. Biosynthesis of fatty acids. Metabolic utilization of fatty acids. Lipoprotein: general concepts . Chylomicrons, VLDL and their metabolism. LDL receptors . Atherosclerosis. Metabolism of ketone bodies.
3	Metabolism of amino acids. Digestion of protein. Amino acid catabolism. Transamination. Oxidative deamination. Ammonia metabolism. Plasmatic protein.
3	Metabolic interrelationships. Role of insulin and glucagon. The main metabolic diseases (diabetes, atherosclerosis and obesity).

**MODULE  
APPLIED BIOLOGY AND GENETICS**

*Prof.ssa STEFANIA RAIMONDO*

**SUGGESTED BIBLIOGRAPHY**

- P. Bonaldo, C. Crisafulli, R. D'Angelo, M. Francolini, S. Grimaudo, C. Rinaldi, P. Riva, M.G. Romanelli "Elementi di Biologia e Genetica- EdiSES Editore, Edizione/2019, ISBN 9788833190389.
- Bonaldo, Duga, Pierantoni, Riva, Romanelli "Biologia e Genetica" EdiSES Editore, 4° edizione (2013), ISBN 9788879597685.
- David Hillis, David Sadava, Craig Heller, Mary Price "Elementi di Biologia e Genetica", Zanichelli Editore, 2013, ISBN: 9788808400857
- N. A. Campbell, J.B. Reece "Biologia e Genetica" Pearson Editrice, ISBN: 9788865189320.

<b>AMBIT</b>	10319-Scienze biomediche
<b>INDIVIDUAL STUDY (Hrs)</b>	45
<b>COURSE ACTIVITY (Hrs)</b>	30

**EDUCATIONAL OBJECTIVES OF THE MODULE**

Distinguish viruses, prokaryotic and eukaryotic cell.  
 Identify the main biological structures, the organization and functioning of a eukaryotic cell.  
 Analyze the flow of the genetic information and the mechanisms of gene expression in prokaryotes and eukaryotes.  
 Analysis and comparison of genomic stability and variability. Main mutation type.  
 Understanding genetic inheritance modes and genotype-phenotype relationship.  
 Genetic inheritance in humans. Modes of transmission of wild type and mutated genes.

**SYLLABUS**

Hrs	Frontal teaching
4	Biological macromolecules: phospholipids, protein and nucleic acid structures and functions.
4	Structural and functional cell organization. Prokaryotic and eukaryotic cells. Cytoplasm: organization and functional examples.
2	Human gene and genome organization. DNA replication.
4	"Transcription" and maturation of eukaryotic mRNA. The genetic code. Protein synthesis.
4	Cell cycle, mitosis. Meiosis and gametogenesis in humans.
4	Mendelian inheritance rules: dominant and recessive phenotypes, Law of Segregation, Law of Independent Assortment. Punnett square. Non-Mendelian inheritance: co-dominance, incomplete dominance, multiple alleles, polygenic traits.
4	Human genetics: genotype and phenotype. Genetic inheritance in humans. Modes of transmission. Chromosomal and genomic aberrations.
4	Genotype and phenotype relationship: penetrance and expressivity, allelic and non allelic heterogeneity. Genetic mosaicism: X-inactivation. Examples of inheritance disease.