



# UNIVERSITÀ DEGLI STUDI DI PALERMO

DEPARTMENT	Scienze e Tecnologie Biologiche, Chimiche e Farmaceutiche		
ACADEMIC YEAR	2023/2024		
MASTER'S DEGREE (MSC)	CHEMISTRY AND PHARMACEUTICAL TECHNOLOGIES		
SUBJECT	BIOCHEMISTRY		
TYPE OF EDUCATIONAL ACTIVITY	B		
AMBIT	74747-Discipline Biologiche e Farmacologiche		
CODE	01542		
SCIENTIFIC SECTOR(S)	BIO/10		
HEAD PROFESSOR(S)	ALLEGRA MARIO	Professore Ordinario	Univ. di PALERMO
OTHER PROFESSOR(S)			
CREDITS	10		
INDIVIDUAL STUDY (Hrs)	170		
COURSE ACTIVITY (Hrs)	80		
PROPAEDEUTICAL SUBJECTS	01900 - GENERAL AND INORGANIC CHEMISTRY		
MUTUALIZATION			
YEAR	2		
TERM (SEMESTER)	2° semester		
ATTENDANCE	Not mandatory		
EVALUATION	Out of 30		
TEACHER OFFICE HOURS	<b>ALLEGRA MARIO</b> Monday 10:00 12:00 Via Archirafi, 28 Wednesday 10:00 12:00 Via Archirafi, 28 Friday 10:00 12:00 Via Archirafi, 28		

<b>PREREQUISITES</b>	The student must possess knowledge on the chemical interactions between functional groups, the chemistry of biomolecules and the structure and function of the cell.
<b>LEARNING OUTCOMES</b>	<p>Knowledge and comprehension abilities. By the end of the course, students should be able to demonstrate knowledge and understanding of:</p> <ul style="list-style-type: none"><li>- biomolecules in terms of the structure-function binomial;</li><li>- biochemical architecture of cells;</li><li>- mechanisms that allow cells to exchange solutes, energy and informations with external environment;</li><li>- metabolic pathways in the biochemical context in which they maybe activated;</li><li>- regulatory mechanisms through which energetic metabolism is strictly integrated at molecular, cellular and organismic level.</li></ul> <p>Ability to apply knowledge and comprehension Student should be able to apply biochemical knowledge to the mechanism of action of pharmacological molecules.</p> <p>Autonomy of judgement The student must show the ability to formulate judgments on the basis of limited or incomplete information.</p> <p>Communicative abilities The student must present biochemical concepts in a clear way to both general and professional audience.</p> <p>Learning abilities Students should develop the learning skills that allow them to continue studying for the most part in a self-directed or autonomous.</p>
<b>ASSESSMENT METHODS</b>	<p>The student is evaluated through an oral examination. He/she must answer at least three questions covering all aspect of the program.</p> <p>The oral examination tends to evaluate whether the student has developed knowledge, understanding and the ability to integrate the topics within the program. In detail, a first question will be related to both structure and function of biomolecules and to the molecular mechanisms through which they take part to the most significant physiological phenomena in the human body. The second question will be related to metabolism, paying attention to the chemistry and the thermodynamic of the reactions; their compartmentalisation within cells, tissues and human body and their correlations. The third question will cover signal transduction mechanisms.</p> <p>The assessment is carried out of thirty.</p> <p>The threshold of sufficiency will be achieved if the student shows knowledge and understanding of the topics at least in general terms with sufficient communicative skills. Below this threshold the exam will be unsatisfactory and student will not pass it. On the contrary, the more the student will interact with the examining board with better expositive skill and deeper knowledge, the more the evaluation will be positive. In particular, to get a score of 30/30 with laude, student must demonstrate to have achieved the objectives in an excellent manner. This term refers to full knowledge of all aspects of the program to be applied in more different, complex and advanced contexts than those of the proper discipline.</p>
<b>EDUCATIONAL OBJECTIVES</b>	<p>The Biochemistry course aims to provide the student with an integrated view of the biochemical systems that allow life in the cells, evaluating pathways and mechanisms that allow cells to exchange solutes, energy and informations with external environment. Single biochemical event will be constantly correlated to its more ample and general physiological meaning within the organism.</p> <p>To this end the following topics will be covered: structure and function of the biomolecules; molecular architecture of the cell; enzymes and bioenergetics; biochemical pathways involved in the energetic metabolism, related mechanisms and integration; signal transduction mechanisms.</p>
<b>TEACHING METHODS</b>	Frontal lessons
<b>SUGGESTED BIBLIOGRAPHY</b>	David L Nelson, Michael M Cox - I PRINCIPI DI BIOCHIMICA DI LEHNINGER - VIII edizione - 2022 - Zanichelli Jeremy M Berg, John L Tymoczko, Gregory J. Gatto, Lubert Stryer - BIOCHIMICA - VIII edizione - 2020 - Zanichelli

## SYLLABUS

Hrs	Frontal teaching
1	Introduction to the Biochemistry course and the assessment methods. General overview of Biochemistry.
5	Lipid structure, function and transport in the bloodstream.
2	Protein structure and function.
4	Enzymes: structure and function.
2	Enzymatic inhibition
4	Allosteric proteins.
4	Structure and function of Haemoglobin and other Haem-proteins.
5	Membrane structure and function.
3	Membrane transport systems.
4	Bioenergetics applied to living systems.
6	Oxidative phosphorylation
6	Glycolysis, Fructolysis Pentose Phosphate Pathway: biochemical pathways, molecular mechanisms, hormonal control and integration with energetic metabolism.
3	Gluconeogenesis: biochemical pathways, molecular mechanisms, hormonal control and integration with energetic metabolism.
5	Glycogen metabolism: biochemical pathways, molecular mechanisms, hormonal control and integration with energetic metabolism.
6	Metabolism of lipids: fatty acid biosynthesis and degradation. Cholesterol biosynthesis. Biochemical pathways, molecular mechanisms, hormonal control and integration with energetic metabolism.
6	Catabolism of amino acids. Urea cycle. Krebs cycle. Biochemical pathways, molecular mechanisms, hormonal control and integration with energetic metabolism. Gluco and cheto-genic amino acids
7	Integration and regulation of the metabolic pathways
7	Signal Transduction mechanisms