



# UNIVERSITÀ DEGLI STUDI DI PALERMO

<b>DEPARTMENT</b>	Ingegneria
<b>ACADEMIC YEAR</b>	2021/2022
<b>BACHELOR'S DEGREE (BSC)</b>	BIOMEDICAL ENGINEERING
<b>SUBJECT</b>	ELEMENTS OF BIOCHEMISTRY AND CELL BIOLOGY
<b>TYPE OF EDUCATIONAL ACTIVITY</b>	C
<b>AMBIT</b>	10657-Attività formative affini o integrative
<b>CODE</b>	18410
<b>SCIENTIFIC SECTOR(S)</b>	BIO/10
<b>HEAD PROFESSOR(S)</b>	DE BLASIO ANNA      Professore Associato      Univ. di PALERMO
<b>OTHER PROFESSOR(S)</b>	
<b>CREDITS</b>	6
<b>INDIVIDUAL STUDY (Hrs)</b>	96
<b>COURSE ACTIVITY (Hrs)</b>	54
<b>PROPAEDEUTICAL SUBJECTS</b>	
<b>MUTUALIZATION</b>	
<b>YEAR</b>	1
<b>TERM (SEMESTER)</b>	2° semester
<b>ATTENDANCE</b>	Not mandatory
<b>EVALUATION</b>	Out of 30
<b>TEACHER OFFICE HOURS</b>	<p><b>DE BLASIO ANNA</b></p> <p>Monday 14:00 16:00 Dipartimento STEBICEF, ed. 16 viale delle Scienze, Palermo</p> <p>Tuesday 13:00 14:00 Aula Teams "ricevimento studenti" link di accesso: <a href="https://teams.microsoft.com/channel/19%3a960f6e49ef91459b83d5f0dae1c43718%40thread.tacvGenerale?groupId=7981a70a-4c99-4814-883f-721b8bac75b6&amp;tenantId">https://teams.microsoft.com/channel/19%3a960f6e49ef91459b83d5f0dae1c43718%40thread.tacvGenerale?groupId=7981a70a-4c99-4814-883f-721b8bac75b6&amp;tenantId</a></p> <p>Thursday 12:00 13:00 Ingegneria Biomedica-Sede di Caltanissetta (via Real Maestranza)</p> <p>Friday 10:00 11:00 Dipartimento FISICA E CHIMICA, aula AP4, ed. 18 viale delle Scienze, Palermo</p>

DOCENTE: Prof.ssa ANNA DE BLASIO

<b>PREREQUISITES</b>	Basic knowledge of general and organic Chemistry
<b>LEARNING OUTCOMES</b>	<p>Knowledge and understanding</p> <ul style="list-style-type: none"> <li>• At the end of the course the student should have acquired the basic knowledge on biology and cell biochemistry; the structure-function of proteins with particular reference to the enzymes; of cell signaling mechanisms; main metabolic pathways and biomedical implications..</li> <li>• The student has to know specifically communicate about scientific arguments.</li> </ul> <p>Applying knowledge and understanding</p> <ul style="list-style-type: none"> <li>• The student will know the biochemical transformations in cell biology and their potential use in the application-experimental field.</li> </ul> <p>Making judgments</p> <ul style="list-style-type: none"> <li>• The student will acquire skills in critical and competent learning of the contents of the discipline, in proposing new topics and establishing interrelationships between the topics being studied.</li> </ul> <p>Communication skills</p> <ul style="list-style-type: none"> <li>• The student will acquire ability to report on specific biology and biochemistry topics through appropriate terminology.</li> </ul> <p>Learning ability</p> <ul style="list-style-type: none"> <li>• The learning ability will be monitored during the course, through ongoing tests aimed at self-assessment by the student. For correct learning, the student must have a solid foundation of inorganic and organic general chemistry, as well as basic knowledge of mathematics and physics.</li> </ul>
<b>ASSESSMENT METHODS</b>	<p>The learning is assessed through an interview. In this oral examination the students must answer to at least three questions on the topics of the course, and they have to show an adequate knowledge, acquisition of interpretative skills, capacity of connecting and processing the arguments, as well as a relevant presentation capacity. The final grade will be expressed in thirtieth and will be judged insufficient when the student will demonstrate: difficulty to focus on the proposed topics, a shallow knowledge of the arguments and extreme limited exposure ability. As the degree of details of the proven knowledge increase will proportionally increase the positivity of the grade. The maximum score is obtained in case of excellent mastery and critical-interpretative jurisdiction of the subject content of the course and a good exposition proved by the use of proper scientific terminology.</p> <p>The assessment will be based on the following score table:</p> <p>30 Excellent 27-29 Optimal 24-26 Good 23-18 Limited/superficial</p>
<b>EDUCATIONAL OBJECTIVES</b>	Give the basic knowledge on biology and biochemistry, particularly on structure and function of proteins, enzymatic processes, the main metabolic pathways.
<b>TEACHING METHODS</b>	Lessons
<b>SUGGESTED BIBLIOGRAPHY</b>	<p>Voet, Voet e Pratt. Principi di Biochimica. Zanichelli. edizione 2017. ISBN: 8808974561</p> <p>Tymoczko, Berg &amp; Sayer. Principi di Biochimica. Zanichelli. edizione 8. ISBN: 8808520285</p> <p>Campbell &amp; Farrell Biochimica EdiSES. edizione 5. ISBN: 8833190501</p> <p>Nelson Cox. Introduzione alla biochimica di Lehninger. edizione 6. ISBN: 8808723283</p> <p>Nelson Cox. Principles of Biochemistry. Freeman &amp; Co Ltd. 2021 edition. ISBN 978-1319381493</p>

## SYLLABUS

Hrs	Frontal teaching
18	Characteristics of living organisms. Basic concept of evolution. The composition of living organisms. Cell: functions of organelles. Cell differentiations. protein synthesis. Significance of weak interactions for macromolecules three-dimensional and cellular structures. Amino-acids, common characteristics and classifications. Proteins: levels of protein structures. Protein domains. Simple and conjugated proteins (glycoproteins and proteoglycans). Post-translational modifications of proteins. Classification of proteins. Myoglobin and Hemoglobin (oxygenation Curve, Hill Chart; Meaning of P50; Bohr effect and 2.3 BPG oxygenation. Fetal and pathological hemoglobins. Models for the allosteric behavior of proteins.
12	Enzymes: general information and their mechanism of action. Coenzymes, prosthetic groups and water soluble vitamins. Kinetic steady-state ( $V_{max}$ ; $V_0$ , $K_m$ ). Double reciprocal plot. Kinetics of enzymes with more substrates. Turnover number and international measures of activity enzyme. Activities specification. multienzyme systems and regulatory enzymes. The covalent modulation. Isoenzymes. Allosteric enzymes. Competitive enzyme inhibitors, and non-competitive and the graph of the double reciprocal.
24	Structure and function of cell membranes. Passive and active transport mechanisms. Membrane receptors and signal transduction mechanisms. Signal transduction through cell-cell and cell-matrix interactions. Lipidic and hydrophilic hormones and signal transduction. Growth Factors and cell cycle control. Major metabolic pathways. Cancer cell and invasiveness. Basics of blood composition and immune system. Notes on the main biochemical laboratory methodologies.