UNIVERSITÀ DEGLI STUDI DI PALERMO

DEPARTMENT	Ingegneria
ACADEMIC YEAR	2019/2020
BACHELOR'S DEGREE (BSC)	BIOMEDICAL ENGINEERING
SUBJECT	ELEMENTS OF BIOCHEMISTRY AND CELL BIOLOGY
TYPE OF EDUCATIONAL ACTIVITY	C
AMBIT	10657-Attività formative affini o integrative
CODE	18410
SCIENTIFIC SECTOR(S)	BIO/10
HEAD PROFESSOR(S)	GHERSI GIULIO Professore Associato Univ. di PALERMO
OTHER PROFESSOR(S)	
CREDITS	6
INDIVIDUAL STUDY (Hrs)	96
COURSE ACTIVITY (Hrs)	54
PROPAEDEUTICAL SUBJECTS	
MUTUALIZATION	
YEAR	1
TERM (SEMESTER)	2° semester
ATTENDANCE	Not mandatory
EVALUATION	Out of 30
TEACHER OFFICE HOURS	**GHERSI GIULIO** Tuesday 14:00 15:30 Dipartimento STEBICEF, Viale delle Scienze ed.16 - 90128 PalermoSTUDIO

DOCENTE: Prof. GIULIO GHERSI

PREREQUISITES	basic knowledge of general and organic chemistry
LEARNING OUTCOMES	Knowledge and understanding • At the end of the course the student should have acquired the basic knowledge on the structure and function of proteins with particular reference to the enzymes. It must be well aware of the mechanisms of transport and tasduzione cell signal. • The student has to know scientifically communicate about the amino acid composition and the structural features / functionality of the protein. Applying knowledge and understanding • The student must be clear how to determine the chemical / physical characteristics of polypeptides. Which direct and indirect methods used to purify and saggiarle in their native conformation. Making judgments • The student must be able to tell if it is better to use a particular enzyme over another in an experimental application. If you take advantage of the chemical properties and / or physical to purify a particular polypeptide. As it is best to proceed to evaluate the functional structural characteristics of the proteins. communication skills • The student must have properties of language on protein, their classification and structural / functional characteristics. learning ability • For a correct learning the student must have a solid foundation of general inorganic and organic chemistry; as well, at least basic knowledge of mathematics and elementary physics.
ASSESSMENT METHODS	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.
EDUCATIONAL OBJECTIVES	Give the basic knowledge on the structure and function of proteins, enzymatic processes, the main metabolic pathways. Also, give the first experimental skills in biochemistry.
TEACHING METHODS	Lessons
SUGGESTED BIBLIOGRAPHY	Garrett & Grisham .Principi di BiochimicaPiccin Tymoczko, Berg & stayer Principi di Biochimica Zanichelli Campbell & Farrell BiochimicaEdiSES Branden C & Tooze J.Struttura delle ProteineZanichelli

SYLLABUS

Hrs	Frontal teaching
14	Characteristics of living organisms. The composition of living organisms. Significance of weak interactions for the acquisition of three-dimensional structure of macromolecules and for the formation of cellular structures. Amino-acids, common characteristics and division into groups. Proteins: primary, secondary, supersecondaria, tertiary and quaternary structure of proteins. structural domains. simple proteins and conjugated proteins (glycoproteins and proteoglycans) post-translational modifications of proteins. Classification of proteins. conjugated proteins: structure and role of glycoproteins and proteoglycans. The evolution of proteins: p.e.u. gene and protein families duplication. Recombination of exons and mosaic proteins. Myoglobin and Hemoglobin (oxygenation Curve, Hill Chart; Meaning of P50; Bohr effect and effect of pH and 2.3 BPG oxygenation del1'emoglobina. Fetal hemoglobin and pathological hemoglobins. Models for the allosteric behavior of proteins.
14	Enzymes: general informatiuon andtheir mechanism of action. Mechanism of Action: Lysozyme Mechanism of action: Chymotrypsin (serine protease). Mechanism of action: transaminases. Coenzymes, prosthetic groups and water soluble vitamins. Kinetic steady-state (V max .; Divo Meaning, Km). 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.
18	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. Lypidic and idrofyflic hormones, their mechanisms in signal trasduction. Growth Factors and molecular mechanism of signal transduction. Cell motility and invasiveness.
8	Extractive methods for proteins. Solubilization and precipitation. Homogenization. Protein analysis using colorimetric methods. Centrifugation, general principles. Differential centrifugation, on gradient and isopycnic. Chromatographic methods, general principles. Molecular exclusion chromatography, ion exchange and affinity. Electrophoretic methods. Electrophoresis on cellulose acetate. SDS-PAGE. immunological methods for the identification and quantification of proteins. Immunoblotting and ELISA.