UNIVERSITÀ DEGLI STUDI DI PALERMO

DEPARTMENT	Scienze e Tecnologie Biologiche, Chimiche e Farmaceutiche
ACADEMIC YEAR	2021/2022
BACHELOR'S DEGREE (BSC)	BIOTECHNOLOGIES
SUBJECT	BIOCHEMISTRY
TYPE OF EDUCATIONAL ACTIVITY	B
AMBIT	50078-Discipline biotecnologiche comuni
CODE	01542
SCIENTIFIC SECTOR(S)	BIO/10
HEAD PROFESSOR(S)	GHERSI GIULIO Professore Associato Univ. di PALERMO
OTHER PROFESSOR(S)	
CREDITS	12
INDIVIDUAL STUDY (Hrs)	196
COURSE ACTIVITY (Hrs)	104
PROPAEDEUTICAL SUBJECTS	01933 - ORGANIC CHEMISTRY
MUTUALIZATION	
YEAR	2
TERM (SEMESTER)	1° semester
ATTENDANCE	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	Knouledgement of inorganic 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 transport mechanisms and the tasduzione cellulare.Come signal well for the main metabolic pathways. • 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. You should know to follow a pathway in its early stages. Making judgments • The student must be able to tell if it is better to use a particular enzyme over another in a metabolic or 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. Evaluation: - Excellent: 30 - 30 cum laude Outcome: excellent knowledge of the topics, excellent language properties, good analytical ability, the student can apply knowledge for solve the proposed problems - Very good: 26-29 Outcome: good knowledge of the topics, full ownership of language, good analytical ability, the student can apply knowledge for solve the proposed problems Good: 24-25 Outcome: good knowledge of the topics, good language properties, limited ability to independently apply knowledge to solve the problems proposed Satisfactory: 21-23 Outcome: the candidate does not have complete mastery of the main topics but neither possesses the knowledge, satisfactory language properties, low ability to independently apply the acquired knowledge for the resolution of problems Sufficient: 18-20 Outcome: basic knowledge of the main topics and the technical language, little or no ability to autonomously apply the acquired knowledge insufficient. Outcome: the candidate does not have an acceptable knowledge of the topics treated during the course.
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 by the laboratory.
TEACHING METHODS	Lessons and Experimental laboratory
SUGGESTED BIBLIOGRAPHY	Garrett & Grisham .Principi di BiochimicaPiccin Tymoczko, 5° ed. Berg & stayer Principi di Biochimica Zanichelli Campbell & Farrell. BiochimicaEdiSES Branden, 4° ed. C & Tooze J.Struttura delle ProteineZanichelli, 3° ed. Pamela C. Champe and Richard A. Harvey. Biochemistry Lippincott - Raven 2° edition

SYLLABUS

Hrs	Frontal teaching
104	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. Enzymes: generality and 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 the enzymes with most substrates. Turnover number and international measures of enzyme activity. specific activity. multienzyme systems and regulatory enzymes. The covalent modulation. Isoenzymes. Allosteric enzymes. Competitive enzyme inhibitors, and non-competitive and the graph of the double reciprocal. Structure and function of cell membranes. passive and active transport mechanisms. Membrane receptors and signal transduction mechanisms. Metabolism, anabolism and catabolism. The main metabolic pathways. sugar metabolism: Digestion of polysaccharides. glucose transport in cells and its phosphorylation. Glycogenolysis. Glycolysis. anaerobic fermentation. hormonal regulation and feed-back of glycogenolysis and glycolysis. Oxidative phosphorylation. Gluconeogenesis and glycogen synthesis and their regulation. Lipid metabolism: digestion, absorption, translocation, storage and mobilization of lipids. Role of plasma proteins. Metabolism of phospholipids and sphingolipids. Synthesis of fatty acids. Degradation of cholesterol synthesis of bile acids. hormonal regulation and feed-back of lipid metabolism. Protein metabolism: Digestion of dietary protein and amino acid uptake. Turnover of proteins. And ubiquitin-mediated degradation by lysosomes. Catabolism of the carbon skeleton of amminoaacidi: amino acids glucogenic and ketogenic. Laboratory 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.