UNIVERSITÀ DEGLI STUDI DI PALERMO

DEPARTMENT	Fisica e Chimica - Emilio Segrè		
ACADEMIC YEAR	2021/2022		
BACHELOR'S DEGREE (BSC)	OPTICS AND OPTOMETRY		
INTEGRATED COURSE	BIOCHEMISTRY AND PHYSIOLOGY - INTEGRATED COURSE		
CODE	01567		
MODULES	Yes		
NUMBER OF MODULES	2		
SCIENTIFIC SECTOR(S)	BIO/10, BIO/09		
HEAD PROFESSOR(S)	DE BLASIO ANNA	Professore Associato	Univ. di PALERMO
OTHER PROFESSOR(S)	DE BLASIO ANNA GAMBINO GIUDITTA	Professore Associato Ricercatore a tempo determinato	Univ. di PALERMO Univ. di PALERMO
CREDITS	10		
PROPAEDEUTICAL SUBJECTS			
MUTUALIZATION			
YEAR	2		
TERM (SEMESTER)	Annual		
ATTENDANCE	Not mandatory		
EVALUATION	Out of 30		
TEACHER OFFICE HOURS	**DE BLASIO ANNA** Monday 14:00 16:00 Dipartimento STEBICEF, ed. 16 viale delle Scienze, Palermo Tuesday 13:00 14:00 Aula Teams "ricevimento studenti" link di accesso: https://teams.microsoft.com/l/channel/19%3a960f6e49ef91459b83d5f0dae1c43718%40thread.tacv2/Generale?groupId=7981a70a-4c99-4814-883f-721b8bac75b6&tenantId Thursday 12:00 13:00 Ingegneria Biomedica-Sede di Caltanissetta (via Real Maestranza) Friday 10:00 11:00 Dipartimento FISICA E CHIMICA, aula AP4, ed. 18 viale delle Scienze, Palermo **GAMBINO GIUDITTA** Tuesday 10:30 12:30 Istituto di Fisiologia Umana, corso Tukory 129 Thursday 10:30 12:30 Istituto di Fisiologia Umana, corso Tukory 129		

DOCENTE: Prof.ssa ANNA DE BLASIO

PREREQUISITES	Knowledge of the basics of general chemistry and organic chemistry. Knowledge of the structure of the eukaryotic cell and its compartments.
LEARNING OUTCOMES	The student should learn the molecules of biological interest and the main biochemical processes in which they are involved; the mode of action of the enzymes, the bases of their regulation and catalysis, the bases of Bioenergetics; He should learn the general mechanisms of extracellular signal transduction with particular reference to the biochemical mechanisms involved in the elaboration and transmission of the luminous stimulus. In addition, the student should learn the general mechanisms of neurophysiology with particular attention to the genesis of Photoreceptor transduction, the modalities of construction of retinal recipient fields and in particular the initial elements of contrast and Chromatic opposition of the light signal. In addition,he should acquire knowledge of the Anatomo-functional basis of binocular vision and cortical retinal signal processing with particular reference to how the image is constructed from a point of view of the analysis of shapes, colors and movement. Finally, the student should learn the functional relationships between the visual cortex and the other neocortical areas for the elaboration of second and third Order of the visual stimulus. The student must be able to connect the acquired concepts on ocular biochemistry and physiology with the Optometric and contactological techniques presented in the other courses; have the ability to apply the fundamental concepts of ocular biochemistry and physiology to provide the necessary specific support in optometric and contological activities; have the ability to apply their knowledge to the interaction between eye and biological matter and bio-materials up to the scope of the design of optical systems. The student must acquire the ability to clearly and rigorously expose the acquired knowledge, by discussing with the right vocabulary definitions, problems and mechanisms concerning the contents of the course itself.
ASSESSMENT METHODS	Learning is assessed through an individual interview. During this oral test the student will have to answer at least three questions for each module of the integrated Course (biochemistry and physiology), related to the topics developed during the course, proving to possess an adequate knowledge and competence Interpretative of the general and specific contents, capacity of linking and elaboration of the contents, as well as a clear exhibition ability. The evaluation of the test is expressed in thirtieth with an integrated evaluation of the two modules and is considered insufficient if the student proves: difficulty in focusing the proposed topics, knowledge strongly lacking in the topics and extreme exposure limitation. In order to pass the exam the candidate has to be evaluated with a mark between 18 and 30. Evaluation and criteria: -Excellent (ECTS grade A/A+, excellent): Excellent knowledge of the topics of the Integrated Course and their possible applications in the lab. The student shows high analysis-synthesis capability and is able to apply his/her knowledge to solve complex problems. Mark: 30- 30 cum laude -Very good (ECTS grade B, very good): Very good knowledge of the topics of the Course and speaking ability. The student shows good analysis-synthesis capability, and is able to apply his/her knowledge to solve middle-high level problems. Mark: 27-29 -Good (ECTS grade C, good): good knowledge of the topics of the course and goof speaking ability. The student is able to apply his/her knowledge to solve middle level problems. Mark: 24 – 26 -Satisfactory (ECTS grade D satisfactory): knowledge of the topics of the course is satisfactory but, in most cases, limited to the principal subjects. Acceptable capability to employ the specific language of the matter and to apply knowledge. Mark: 21 – 23 -Sufficient (ECTS grade E sufficient): Minimal knowledge of the topics of the Course, often limited to principal subjects. Modest ability to employ the specific language on the matter and to apply knowledge. Mark: 18-20 Insufficient: (ECTS grade F, fail): The student does not have an acceptable knowledge of the topics of the Course. The ability to employ the specific language of the matter and to apply knowledge is scarce. Exam failed.
TEACHING METHODS	The course includes frontal lectures iand laboratory activities of physiology According to what was established in the meeting of the Organizing Committee on 05/07/2019, the laboratory hours are mandatory. The organizing committee has set the maximum admissible limit for absences occurred during mandatory laboratory hours at 25%.

MODULE
BIOCHEMISTRY

Prof.ssa ANNA DE BLASIO

SUGGESTED BIBLIOGRAPHY

David L. Nelson, Michael M. Cox Introduzione alla biochimica di Lehninger. Quarta edizione Zanichelli Editore Isbn: 9788808621184

Siliprandi N., Tettamanti G. Biochimica Medica, Quinta edizione Piccin Editore ISBN: 8829927910

AMBIT	50161-Sperimentale e applicativo
INDIVIDUAL STUDY (Hrs)	85
COURSE ACTIVITY (Hrs)	40

EDUCATIONAL OBJECTIVES OF THE MODULE

We aims to provide the knowledge of the structure and function of biomolecules, the mode of action of enzymes, the basis of their regulation and catalysis, the basis of bioenergetics. We also aim to provide the knowledge of the molecular mechanisms of extracellular signal transduction with particular reference to the biochemical mechanisms involved in the elaboration and transmission of the luminous stimulus.

SYLLABUS

Hrs	Frontal teaching
2	Chemical basis of life and biological molecules. Carboidrates. Lipids and proteins.
2	Proteins: Primary, secondary, supersecondary, tertiary and quaternary structure of proteins. Structural domains. Simple proteins and conjugated proteins (glycoproteins and proteoglycans) post-translational modifications of proteins.
4	Structure and composition of the biological membranes. Fluid mosaic model. Membrane transport. Osmosis. Simple and facilitated diffusion. Primary and secondary active transport.. Sodium-glucose simport. Sodium/potassium-dependent ATPase. Calcium-dependent ATPase. Other transport systems for calcium.
6	Signal transduction mechanisms. Membrane and cytosolic receptor classification. Adenylate cyclase System. Phosphoinositides System. Calcium/calmodulin Systems. Nitric oxide synthase (NOS). Membrane and cytosolic guanylate cyclase. Process of vision. Transducin.
8	Enzymes: generalities. Mechanism of enzymatic catalysis. Active site. Specificity. Kinetic of Menten and Kinetic parameters (Vmax and Km). Enzyme inhibition. Allosteric enzymes. Enzyme inhibition mechanisms. Mechanisms for regulating enzymatic activity (gene induction, post-translational events, covalent modifications).
2	Vitamins general considerations. Properties and functions of liposoluble and water-soluble vitamins. Vitamin A.
4	Cellular metabolism. Role of energy transporters in metabolism. ATP production mechanisms: oxidative phosphorylation and phosphorylation at the substrate level. Electron transport and respiratory chain complexes. ATP synthase.
4	Nervous system and neurotransmission: Blood-brain barrier, nerve transmission, electrical and chemical synapses, main neurotransmitters and their receptors.
4	Mechanism of neurotransmission. Sodium and potassium channels. Calcium channels. Propagation of the action potential and release of the neurotransmitters.
4	Biochemical mechanism of vision.

MODULE
GENERAL AND EYE PHYSIOLOGY

Prof.ssa GIUDITTA GAMBINO

SUGGESTED BIBLIOGRAPHY	
"Fisiologia Umana: un approccio integrato, 8a edizione" Dee Silverthorn, Pearson Education ISBN:8891909734"	
AMBIT	50161-Sperimentale e applicativo
INDIVIDUAL STUDY (Hrs)	81
COURSE ACTIVITY (Hrs)	44

EDUCATIONAL OBJECTIVES OF THE MODULE

Educational objectives of the course will provide students with the general knowledge necessary for the understanding of the physical, chemical and molecular mechanisms of physiological cellular processes such as the membrane electrical potential,the genesis of the action potential (excitability), neuronal properties, the signal transduction of physiological stimuli into electrical signals by sensory receptor cells. Students will be provided with information related to general physiology focusing on nervous system, in particular as regards perception and movement. Furthermore, students will acquire knowledge on the physiology of vision, in terms of cortical elaboration of visual information, cortical areas devoted to vision and the related pathway implicated, on the description of visual sensitivity and functional components of the eye, on visual fields and on oculo-motor system.

SYLLABUS

Hrs	Frontal teaching
2	Byophysics of membranes. Neuronal properties.
2	Introduction to Nervous System: functional organization of central and peripheral nervous system.
4	Functional organization of perception and movement
2	Integration of somatosensory, visual and auditory associative areas
2	Sensory coding: visual sense
2	Creation of visual image
4	Physiology of functional components of the eye. Refractive media of the eye. Visual processing by the retina.
4	Central Visual Pathways: optic chiasm, lateral geniculate bodies, visual cortex. Pathways of the "What" and "Where". Collateral visual pathways.
4	Visual perception. Perception of movement, depth and form (vision of images in movement).
3	Visual fields. Color vision.
3	The oculo-motor system. Eye movements: voluntary and reflex. Optokinetic and vestibulo-ocular reflexes. Function of the visual exploration.

Hrs	Workshops
12	Pattern electroretinogram (PERG). Visual evoked potentials (VEPS)