



UNIVERSITÀ DEGLI STUDI DI PALERMO

DEPARTMENT	Scienze della Terra e del Mare		
ACADEMIC YEAR	2021/2022		
BACHELOR'S DEGREE (BSC)	NATURAL AND ENVIRONMENTAL SCIENCE		
SUBJECT	ENVIRONMENTAL BIOCHEMISTRY AND ELEMENTS OF TOXICOLOGY		
TYPE OF EDUCATIONAL ACTIVITY	C		
AMBIT	10703-Attività formative affini o integrative		
CODE	11382		
SCIENTIFIC SECTOR(S)	BIO/10		
HEAD PROFESSOR(S)	ATTANZIO ALESSANDRO	Professore Associato	Univ. di PALERMO
OTHER PROFESSOR(S)			
CREDITS	6		
INDIVIDUAL STUDY (Hrs)	102		
COURSE ACTIVITY (Hrs)	48		
PROPAEDEUTICAL SUBJECTS			
MUTUALIZATION			
YEAR	3		
TERM (SEMESTER)	2° semester		
ATTENDANCE	Not mandatory		
EVALUATION	Out of 30		
TEACHER OFFICE HOURS	ATTANZIO ALESSANDRO Monday 11:00 13:00 Studio Docente, Dip. STEBICEF, via Archirafi 28, secondo piano. Per gli orari di ricevimento via Microsoft Teams si prega di fare riferimento a quelli in presenza. Tuesday 11:00 13:00 Studio Docente, Dip. STEBICEF, via Archirafi 28, secondo piano. Per gli orari di ricevimento via Microsoft Teams si prega di fare riferimento a quelli in presenza. Wednesday 11:00 13:00 Studio Docente, Dip. STEBICEF, via Archirafi 28, secondo piano. Per gli orari di ricevimento via Microsoft Teams si prega di fare riferimento a quelli in presenza. Thursday 11:00 13:00 Studio Docente, Dip. STEBICEF, via Archirafi 28, secondo piano. Per gli orari di ricevimento via Microsoft Teams si prega di fare riferimento a quelli in presenza.		

DOCENTE: Prof. ALESSANDRO ATTANZIO

PREREQUISITES	Basis knowledge of the structure and function of bacterial, animal and plant cells, the role of nucleic acids and the biological macromolecules, in order to understand their mechanisms of action in biochemical processes
LEARNING OUTCOMES	Knowledge and understanding skills Acquisition of the knowledge of the biomolecular mechanisms underlying the effects determined by the environment on organisms. Understanding molecular mechanisms and regulation of biotransformations, signal transduction and intra and intercellular communication through the study of the structure, property, function, interactions and metabolism of biomolecules from bacteria to animals. Ability to understand the biochemical mechanisms devolved to the defense, adaptation and detoxification of living organisms from environmental pollutants. Definition of molecular indicators, molecular understanding of the cancer / environment relationship. Acquisition of the biochemical language of the discipline. The course intends to provide the necessary basic knowledge of biochemistry and its applications, necessary for the full understanding of the disciplines in the field of life sciences and the environment. Ability to apply knowledge and understanding The course aims to make the student able to assimilate and re-elaborate in a critical way the acquired knowledge, aimed at understanding the importance of environmental protection for the maintenance of the biochemical ecosystem and the importance of the methods of investigation proper to the biochemical discipline in 'to identify conditions of risk for the environment and health Judgment autonomy Students are guided to learn critically and responsibly all that is explained to them in the classroom and to enrich their judgment skills through discussion in the classroom of scientific issues of broad media diffusion. Communicative Skills The course aims to develop the student's ability to expose the acquired knowledge in a clear and rigorous manner. At the end of the course the student must be able to properly and appropriately define definitions, problems and mechanisms regarding the contents of the course itself. Learning Skills Learning skills will be monitored throughout the course through the discussion in the classroom. The course aims to develop learning skills to undertake higher level studies and acquire tools and strategies for expanding its knowledge in the field of biological disciplines
ASSESSMENT METHODS	The learning evaluation is based on a single oral exam, and is expressed on a 18-30-point scale. The exam consists of a colloquy in which the student have to answer to a minimum of six questions designed to ascertain the knowledge and understanding of the topics, the interpretative ability and the adequacy in the oral exposition. The full possession of these requirements is evaluated with the highest mark (30 with distinction), while the lack of an acceptable understanding of the topics results in an insufficient scoring.
EDUCATIONAL OBJECTIVES	The course aims to provide the student with the appropriate knowledge on the structures and functions of biological molecules, starting from the analysis of the constitutive units, as an essential prerequisite for knowledge of the role that these molecules play in the biological world and their interactions with the abiotic world , which may be affected by the effects. Therefore, the fundamental metabolic pathways will be presented, which will be comparatively analyzed among prokaryotes, animal and plant eukaryotes, as well as the mechanisms of metabolic and hormonal regulation in the presence of environmental stress inducers (nitrogen availability, acidification, oxygen availability). , thermal stress, presence of pollutants), with the aim of developing the ability to interpret the vital processes of cells and organisms in relation to the environment and to draw from the study of processes, useful information to identify biomarkers useful in environmental investigations.
TEACHING METHODS	LECTURES
SUGGESTED BIBLIOGRAPHY	David L. Nelson Michael M. Cox I PRINCIPI DI BIOCHIMICA DI LEHNINGER (Settima edizione) ed. Zanichelli. ISBN 978-88-08-92069-0 M.Lieberman, A. Marks - Biochimica Medica – (II Edizione). Casa Editrice Ambrosiana. ISBN 978-88-08-18217-3

SYLLABUS

Hrs	Frontal teaching
4	FUNDAMENTALS OF BIOCHEMISTRY. Relations between cell biology and biochemistry. Structure and functions of biological macromolecules.
6	BIOLOGICAL MEMBRANES AND TRANSPORT. The composition and architecture of the membranes. Dynamics of membranes. Transport of solutes across membranes.
8	BIO SIGNALING. Receptors and signal transduction mechanisms. Controlled ion channels. Regulation of transcription by nuclear hormone receptors. Cell cycle regulation.
6	BIOCHEMISTRY OF CANCER. DNA damage that can cause mutations. Oncogenes. Tumor suppressor genes. Cancer and apoptosis.
10	ENERGY METABOLISM. Anabolism and catabolism. Principles of metabolic regulation. Metabolism of carbohydrates, lipids and proteins: biosynthesis and degradation.
8	HORMONAL REGULATION AND INTEGRATION OF METABOLISM IN MAMMALS. The hormones. Hormonal regulation of energy metabolism. Obesity and body mass regulation.
4	OXYGEN TOXICITY AND DAMAGE FROM FREE RADICALS. Production of reactive oxygen and nitrogen species and interaction with cellular components. Cellular defense systems against oxygen toxicity.
2	DETOXIFICATION PROCESSES. Phase I reactions. Mechanism of action of cytochrome P450 monooxygenase. Phase II reactions. Other detoxification processes.