



UNIVERSITÀ DEGLI STUDI DI PALERMO

DEPARTMENT	Promozione della Salute, Materno-Infantile, di Medicina Interna e Specialistica di Eccellenza "G. D'Alessandro"		
ACADEMIC YEAR	2016/2017		
BACHELOR'S DEGREE (BSC)	PREVENTION TECHNIQUES FOR THE ENVIRONMENT AND WORKPLACE		
INTEGRATED COURSE	BASIC SCIENCES - INTEGRATED COURSE		
CODE	17590		
MODULES	Yes		
NUMBER OF MODULES	3		
SCIENTIFIC SECTOR(S)	BIO/10, BIO/13, CHIM/03		
HEAD PROFESSOR(S)	DI LIEGRO ITALIA	Professore a contratto in quiescenza	Univ. di PALERMO
OTHER PROFESSOR(S)	DI BELLA MARIA ANTONIETTA	Ricercatore	Univ. di PALERMO
	CIOFALO MAURIZIO	Ricercatore	Univ. di PALERMO
	DI LIEGRO ITALIA	Professore a contratto in quiescenza	Univ. di PALERMO
CREDITS	9		
PROPAEDEUTICAL SUBJECTS			
MUTUALIZATION			
YEAR	1		
TERM (SEMESTER)	1° semester		
ATTENDANCE	Mandatory		
EVALUATION	Out of 30		
TEACHER OFFICE HOURS	<p>CIOFALO MAURIZIO Wednesday 15:00 17:00 Dipartimento SAAF, viale delle Scienze Ed. 4, Stanza 147 (su appuntamento). L'orario di ricevimento puo comunque anche essere concordato con il docente ed avvenire da remoto su piattaforma MS Teams.</p> <p>DI BELLA MARIA ANTONIETTA Tuesday 16:00 18:00 Dip. Biomedicina, Neuroscienze e Diagnostica avanzata- Sezione di Biologia e Genetica Via Divisi,83 90133 Palermo</p> <p>DI LIEGRO ITALIA Monday 10:00 12:00 Caltanissetta, CEFPAS, padiglione 3, o Palazzo Moncada. Wednesday 15:00 17:00 Palermo, Viale delle Scienze, Edificio 16 (STEBICEF) Thursday 15:00 17:00 Palermo, Viale delle Scienze, Edificio 16 (STEBICEF) Friday 15:00 17:00 Palermo, Viale delle Scienze, Edificio 16 (STEBICEF)</p>		

<p>PREREQUISITES</p>	<p>The prerequisites are those established at the national level to access to the health professions courses. In order to be admitted to the course on Techniques for Prevention in the Environment and Workplaces, indeed, these students must pass a mandatory competition based on tests that include questions on basic chemistry and biology.</p> <p>In detail, the exam program (DM July 3, 2015 n. 463, Annex A) requires a basic knowledge on the following topics:</p> <p>Chemistry: The constitution of matter: the states of matter; heterogeneous and homogeneous systems; compounds and elements. Ideal Gas Laws. Atomic structure: elementary particles; atomic number and mass number, isotopes, electronic structure of atoms of the various elements. The periodic table of the elements: groups and periods; transition elements. Periodic properties of the elements: atomic radius, ionization potential, electron affinity, metallic character. Relations between electronic structure, position in the periodic table and properties of the elements. Chemical bonds: ionic, covalent and metallic. Binding energy. Polarity of bonds. Electronegativity. Intermolecular bonds. Fundamentals of inorganic chemistry: nomenclature and main properties of inorganic compounds: oxides, hydroxides, acids, salts. The chemical reactions and the stoichiometry: atomic and molecular mass, Avogadro's number, concept of mole and its application, elementary stoichiometric calculations, balancing of simple reactions, types of chemical reaction. The solutions: properties of solvents, solubility, main ways of expressing solution concentration. Equilibria in aqueous solution. Basics of chemical kinetics and catalysis. Oxidation and reduction: oxidation number. Balancing simple reactions. Acids and bases: basic concepts. Acidity, neutrality and basicity of the aqueous solutions. The pH. Hydrolysis. Buffer solutions. Fundamentals of organic chemistry: bonds between carbon atoms, structure formulas; concept of isomerism. Aliphatic, alicyclic and aromatic compounds. Functional groups: alcohols, ethers, amines, aldehydes, ketones, carboxylic acids, esters, amides. Basic elements of nomenclature in organic chemistry.</p> <p>Biology: Chemistry of living organisms. The biological importance of weak interactions. The organic molecules present in organisms and their functions. The role of enzymes. The cell as the basis of life: the cell theory. Prokaryotic cell structure, and animal/plant eukaryotic cells. Viruses. The cell membrane: structure and function. Transport across biological membranes. Cell cycle and cell division: mitosis and meiosis. Chromosomes and chromosomal maps. Bioenergetics. The energy currency of cells: ATP. Redox reactions in living organisms. The energy processes: photosynthesis, glycolysis, fermentation and aerobic respiration. Reproduction and inheritance. Life cycles. Sexual and asexual reproduction. Mendelian genetics: Mendel's laws and their applications. Classical genetics: the chromosomal theory. Inheritance patterns. Molecular genetics: structure and replication of DNA, the genetic code, protein synthesis. The DNA in prokaryotes. The eukaryotic chromosome structure. Genes and gene expression regulation. Human genetics: transmission of single- and multifactorial- characters; autosomal hereditary diseases linked to chromosome X. Biotechnology: the recombinant DNA technology and its applications. Heredity and environment. Mutations. Natural and artificial selection. Evolutionary theories. The genetic basis of evolution. Anatomy and physiology of animals and humans. The animal tissues. Systematic anatomy and physiology in humans. Concept of homeostasis.</p>
<p>LEARNING OUTCOMES</p>	<p>Knowledge and understanding: To have acquired the specific terminology of the basic disciplines: Chemistry, Biology, Genetics, and Biochemistry. To know and understand the characteristics of elements and molecules, and the underlying principles of their chemical and physical behavior. To know the structure and properties of organic compound and biological molecules and to understand the main metabolic processes in which they are involved. To know and understand the basic biological processes of living organisms and the ways through which hereditary characters are transmitted.</p> <p>Applying knowledge and understanding: Capacity to choose and apply independently the tools and knowledge acquired by studying these disciplines.</p> <p>Making judgements: Capacity of evaluating and integrating autonomously the information obtained from the literature.</p> <p>Communication: Capacity of explaining in a simple way the main chemical and biological processes that underlie the properties of living organisms.</p> <p>Lifelong learning skills: Lifelong ability to update the acquired knowledge, with the help of scientific literature, as well as by attending I level Masters, specific courses and/or</p>

	seminars pertinent to their expertise.
ASSESSMENT METHODS	The final examination is oral and integrated, and consists of an interview aimed at verifying theoretic knowledge and full understanding of the topics addressed in the course, as well as the candidate personal capacity of explain and processing his/her knowledge. In particular , the Commission verifies the ability to systematically integrate acquired chemical , biological and biochemical knowledge in a general view, which allows to understand how the interactions with the environment (in particular, with mutagens , pollutants , etc.) and the lifestyle (e.g. the diet) can influence life processes. To pass the exam , the student must obtain a final mark between 18 and 30. For particularly brilliant exam results, in which the student has shown not only to have learnt the individual topics , but also to be able to explain clearly what he/she knows, and to integrate autonomously knowledge on different topics, the Commission may approve the exam cum laude.
TEACHING METHODS	Frontal lectures

MODULE GENERAL CHEMISTRY <i>Prof. MAURIZIO CIOFALO</i>	
SUGGESTED BIBLIOGRAPHY	
R. H. Petrucci, F. G. Herring, J. D. Madura, C. Bissonnette, Chimica generale (3a Ed.), Piccin, 2013 E. Santaniello, M. Alberghina, M. Coletta, S. Marini, Principi di Chimica generale e organica (2a Ed.), Piccin, 2014	
AMBIT	10357-Scienze propedeutiche
INDIVIDUAL STUDY (Hrs)	45
COURSE ACTIVITY (Hrs)	30
EDUCATIONAL OBJECTIVES OF THE MODULE	
This course goal is to make available the base knowledge needed to understand the chemical aspects of chemical, biochemical, biological and ecological methods and processes.	

SYLLABUS

Hrs	Frontal teaching
4	Introduction. Electron structure. Bonds.
4	Chemical formulas and equations
2	States of matter, mixtures and solutions. Concentrations
2	Chemical equilibrium
5	Acids and bases
3	Heterogeneous and redox equilibria
2	Electrochemistry
2	Basic inorganic chemistry. Nomenclature
2	Basic organic chemistry. Nomenclature
2	Organic molecules
2	Biological molecules

MODULE BIOCHEMISTRY

Prof.ssa ITALIA DI LIEGRO

SUGGESTED BIBLIOGRAPHY

Stefani M e Taddei N. Chimica, Biochimica e Biologia applicata. Ed. Zanichelli.

Inoltre, potranno essere consigliati sommari scientifici (reviews) aggiornati su specifici argomenti non trattati nel libro di testo e/o di particolare interesse per il raggiungimento degli obiettivi formativi.

In addition, a few updated scientific reviews could be suggested on specific topics not covered in the textbook and/or of special interest to the achievement of the educational goals.

AMBIT	10358-Scienze biomediche
INDIVIDUAL STUDY (Hrs)	45
COURSE ACTIVITY (Hrs)	30

EDUCATIONAL OBJECTIVES OF THE MODULE

Acquisition of the specific terminology of Biochemistry; knowing and understanding the characteristics of biological molecules and the main metabolic processes in which they are involved; knowing and understanding the basic biological mechanisms that underlie the interactions of individual cells and organisms with their environment .

SYLLABUS

Hrs	Frontal teaching
2	Chemical properties of the water molecules: hydrophilicity and hydrophobicity .
4	Lipids: properties. Biological membranes: composition and functions. Energy of trans-membrane transport .
4	Oxygen binding proteins: structure and function of myoglobin and hemoglobin. Cooperative effects. Allosteric effectors.
4	Enzymes: Vmax and Km; enzyme specificity and affinity; activation energy. Enzyme regulation.
4	Introduction to the basal metabolism. Role of ATP and coupled reactions. Hormonal regulation of metabolism: general concepts.
2	Oxidative phosphorylation (OxPhos). Uncoupling agents and uncoupling proteins (UCPs). Cyanides. Vesicant gases.
6	Transduction of extracellular signals: introductory concepts. G protein-coupled receptors. Second messengers. Tyrosine kinase receptors. Oncogenes and proto-oncogenes. Tumor suppressor genes.
4	Xenobiotic receptors. Dioxins: distribution and effects. Detoxifying function of liver. Cytochromes p450 and metabolism of xenobiotics. ABC transporters. General elements of neurotransmission: nerve gases.

**MODULE
BIOLOGY AND GENETICS**

Prof.ssa MARIA ANTONIETTA DI BELLA

SUGGESTED BIBLIOGRAPHY

De Leo, Ginelli, Fasano "Biologia e Genetica" EdiSes, ed 3a, 2013
Sadava, Heller, Purves, Hillis "Elementi di Biologia e Genetica" Zanichelli, 2013
Campbell, Reece, Simon "L'Essenziale di BIOLOGIA" Pearson, ed 3a, 2008

AMBIT	10358-Scienze biomediche
INDIVIDUAL STUDY (Hrs)	45
COURSE ACTIVITY (Hrs)	30

EDUCATIONAL OBJECTIVES OF THE MODULE

To understand the cell structure and function that are the essence of life;
To know the fundamental processes of molecular biology
To know the mechanisms of genetic expression
To know the main patterns of genetic inheritance.

SYLLABUS

Hrs	Frontal teaching
2	Living organisms, common fundamental properties. Internal organization of the cell. Similarities and differences between Eukaryotic, Prokaryotic cells, and Viruses
4	Cell chemistry and biological macromolecules; The structure and functions of Proteins;
4	The structure and functions of nucleic acids; Replication of DNA
2	Expression of genetic information, Transcription
4	The genetic code; Translation
2	Chromatin structure and Chromosomes; The cell cycle and Mitosis
2	Meiosis, genetic features of mitosis and meiosis; human Gametogenesis
1	Fertilization and sexual reproduction; some concepts of multicellular organisms' Development
3	Principles of genetic variation; Repair of DNA damage; Point mutations, Chromosome abnormalities, Aneuploidies
6	The basics of mendelian inheritance, Autosomal dominant and Autosomal recessive inheritance: some examples of inherited characters and common diseases; linkage; X-linked and Y-linked inheritance; molecular basis of human pathologies; genetic basis of sex character