



UNIVERSITÀ DEGLI STUDI DI PALERMO

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| DEPARTMENT | Biomedicina, Neuroscienze e Diagnostica avanzata | | |
| ACADEMIC YEAR | 2020/2021 | | |
| BACHELOR'S DEGREE (BSC) | PHYSIOTHERAPY | | |
| INTEGRATED COURSE | BIOMOLECULAR SCIENCES - INTEGRATED COURSE | | |
| CODE | 15191 | | |
| MODULES | Yes | | |
| NUMBER OF MODULES | 2 | | |
| SCIENTIFIC SECTOR(S) | BIO/13, BIO/10 | | |
| HEAD PROFESSOR(S) | CARLISI DANIELA | Professore Associato | Univ. di PALERMO |
| OTHER PROFESSOR(S) | DI BELLA MARIA ANTONIETTA | Ricercatore | Univ. di PALERMO |
| | CARLISI DANIELA | Professore Associato | Univ. di PALERMO |
| CREDITS | 6 | | |
| PROPAEDEUTICAL SUBJECTS | | | |
| MUTUALIZATION | | | |
| YEAR | 1 | | |
| TERM (SEMESTER) | 1° semester | | |
| ATTENDANCE | Mandatory | | |
| EVALUATION | Out of 30 | | |
| TEACHER OFFICE HOURS | <p>CARLISI DANIELA Monday 08:30 16:30 Sono disponibile per il ricevimento ogni giorno previo appuntamento, presso la Sezione di biochimica del Policlinico. Accanto la biblioteca di Medicina. Contatto: daniela.carlisi@unipa.it</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> | | |

DOCENTE: Prof.ssa DANIELA CARLISI

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| PREREQUISITES | Students must have a background of chemistry in order to understand the interaction of molecules within the cells, biology and biochemistry . |
| LEARNING OUTCOMES | <p>-Knowledge and understanding: To have acquired the specific terminology of the basic disciplines:, Biology, Genetics, and Biochemistry. 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 biology and biochemistry to understand disease processes. Critically analyse and interpret data, evaluating it in light of current literature</p> <p>-Communication: Capacity of effectively communicate scientific information explaining in a simple way the main 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 current literature, as well as by attending I level Masters, specific courses and/or seminars pertinent to their expertise.</p> |
| ASSESSMENT METHODS | <p>Students will take oral exams and will be minimum proposed three questions on all parts of each module program .</p> <p>The final examination aims to evaluate: a) knowledge and understanding of principal topics. To verify whether the student has reached interpretative competence. b) analytical and synthetic capabilities; the students must show their ability to apply knowledge in the professional context and to solve complex problems. c) the ability of the student to interact with the examiner, with his presentation and argumentative skills, d) if he has acquired the specific terminology of the basic disciplines.</p> <p>The grades are on a scale from 18 to 30 for each presentation; the final grade will be the average of the result of the two modules. It will be assigned as the following evaluation grid:</p> <p>A – A+= Excellent Excellent knowledge of teaching contents; students should show high analytical and synthetic capabilities and should be able to apply their knowledge to solve highly complex problems. Ability to express ideas clearly and effectively. Ability to listen.</p> <p>B =Very good Very good knowledge of the teaching contents and excellent language control; students should show analytical and synthetic skills and be able to apply their knowledge to solve problems of medium and, in some cases, even higher complexity.</p> <p>C= Good Good knowledge of teaching contents and good language control; the students should be able to apply their knowledge to solve problems of medium complexity</p> <p>D=Satisfactory Average knowledge of the teaching contents, in some cases limited to the main topic; acceptable ability to use the specific discipline language and independently apply the acquired knowledge.</p> <p>E= Sufficient Minimum teaching content knowledge, often limited to the main topic; modest ability to use the subject specific language and independently apply the acquired knowledge.</p> <p>F= Fail Lack of an acceptable knowledge of the main teaching content knowledge; very little or no ability to use the specific subject language and apply independently the acquired knowledge.</p> |
| TEACHING METHODS | lectures will be offered by the teacher using power point slides |

**MODULE
BIOCHEMISTRY AND CLINICAL BIOCHEMISTRY**

Prof.ssa DANIELA CARLISI

SUGGESTED BIBLIOGRAPHY

"Chimica e Biochimica" di Bertoldi M, Colombo D, Magni F, Marin O, Palestini P; ed EdiSES.

"Le basi della biochimica" di Denise R Ferrier; ed. Zanichelli.

"Introduzione alla biochimica di Lehninger" di Nelson D. L e Cox MM, ed. Zanichelli

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| AMBIT | 10319-Scienze biomediche |
| INDIVIDUAL STUDY (Hrs) | 45 |
| COURSE ACTIVITY (Hrs) | 30 |

EDUCATIONAL OBJECTIVES OF THE MODULE

The objective of the biochemistry module is to provide students with the knowledge necessary to understand the main biochemical processes that allow cell life and the functioning of the organism as a whole.
The student must know the structure and function of the main biological macromolecules; Understand the main metabolic processes; understand the mechanisms that regulate and integrate the biochemical processes and connect them with some disease.

SYLLABUS

| Hrs | Frontal teaching |
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| 2 | General concepts of general and inorganic chemistry |
| 3 | Aminoacids. Essential and not-essential amino acids. Chemical characterization. peptide bond: alfa-amino acids structure, classification according to the polarity of the side chain R. Peptide bond. Protein structure and different levels of molecular organization. Basics of Protein folding and misfolding diseases. Oxygen-binding chromoproteins. Myoglobin (Mb). Hemoglobin (Hb). |
| 2 | Enzyme: General concepts. Mechanism of enzymatic catalysis. The active site. Enzyme specificity. Isoenzymes. Constitutive and inducible enzymes . Enzyme kinetics. Coenzymes and prosthetic groups. |
| 1 | Lipids: biological characteristics of lipids; physical properties. Various types of lipids and common characteristics. The fatty acids: chemical and physical properties. Triglycerides. |
| 2 | Structure and composition of biological membranes. Membrane transport. Osmosis. Simple and facilitated diffusion. Glucose transporters (GLUTs). Primary and secondary active transport. Sodium-glucose symporter. Sodium/potassium –dependentATPase. |
| 3 | Membrane receptors and signal transduction mechanisms. |
| 2 | Introduction to metabolism: catabolic and anabolic pathway. Role of ATP and reducing power in the connection between catabolism and anabolism. |
| 1 | Carbohydrates: Definition and description of carbohydrates; generality and biological role; classification. Monosaccharides: aldoses and ketosis. Structure and configuration of D-glucose. The glycosidic bond. Disaccharides, polysaccharides. |
| 5 | Metabolism of carbohydrates: digestion of polysaccharides and disaccharides; absorption of monosaccharides. Glycolysis, pentose phosphate pathway, Glycogen metabolism : glycogen synthesis and glycogen lysis. Oxidation of pyruvate. Krebs cycle. Oxidative phosphorylation: the electron transport chain and ATP synthesis. Gluconeogenesis. |
| 3 | Metabolism of lipids. Metabolism of triglycerides. Beta-oxidation of fatty acids. Biosynthesis of fatty acids. Metabolic utilization of fatty acids. Lipoprotein: general concepts . Chylomicrons, VLDL and their metabolism. LDL receptors . Atherosclerosis. Metabolism of ketone bodies. |
| 2 | Metabolism of aminoacids. Digestion of protein. Amino acid catabolism. Transamination. Oxidative deamination. Ammonia metabolism. Plasmatic protein. |
| 2 | Biochemical aspects of muscle function: metabolism of the skeletal and cardiac muscle cells. Actins. Myosins. Tropomyosin. Muscle contraction. |
| 2 | Metabolic interrelationships. Role of insulin and glucagon. The main metabolic diseases (diabetes, atherosclerosis and obesity). |

MODULE BIOLOGY AND GENETICS

Prof.ssa MARIA ANTONIETTA DI BELLA

SUGGESTED BIBLIOGRAPHY

Capitoli scelti dal testo-De Leo, Ginelli, Fasano "Biologia e Genetica" EdiSes, ed 4a, 2020. ISBN9788836230013; disponibile versione ebook

Helena Curtis, N Sue Barnes, Adriana Schnek, Alicia Massarini "Elementi di Biologia" Zanichelli, 2017 ISBN: 9788808773784 disponibile versione ebook

Campbell "Biologia e genetica" 10/Ed. Pearson, 2015; ISBN: 9788865189320; disponibile versione digitale

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| AMBIT | 10319-Scienze biomediche |
| INDIVIDUAL STUDY (Hrs) | 45 |
| COURSE ACTIVITY (Hrs) | 30 |

EDUCATIONAL OBJECTIVES OF THE MODULE

To understand the cell structure and functions 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; Biological membranes . |
| 4 | The structure and functions of nucleic acids; Replication of DNA: general mechanisms in prokaryotes and eukaryotes |
| 2 | Expression of genetic information, Transcription and main classes of RNAs |
| 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; 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 |