

Course title	Biology with Elements of Biochemistry				
Course Code	BIOL100				
Course Type	Theoretical and Laboratory				
Level	Diploma				
Year / Semester	1st Year / 1st Semester				
Teacher's Name	Dr. Andreou Savanna and Dr. Miliotou Androulla				
ECTS	8	Lectures / week	3	Laboratories / week	1
Course Purpose and Objectives	The aim of the course is to cover key aspects of cell biology so that the student can adequately understand the structure and function of the cell. Emphasis is placed on the biochemical structure of the cell as well as on biomolecules (proteins, carbohydrates, lipids and nucleic acids), learning their structure and function. In addition, emphasis will be placed on intracellular transport pathways, metabolism reactions of biomolecules and energy production.				
Learning Outcomes	<p>Upon completion of the course, students are expected to:</p> <p>Knowledge</p> <ol style="list-style-type: none"> Determine the differences between eukaryotic and prokaryotic cells. Recognize the structure, characteristics, functions of biomolecules: carbohydrates, proteins, lipids and nucleic acids. Recognise biological oxidations, the Krebs cycle, and carbohydrate metabolism. Describe the analysis of cellular processes during laboratory exercises. <p>Skills</p> <ol style="list-style-type: none"> Analyse the structure and functions of cells and tissues. Apply the analysis of cellular processes during laboratory exercises. Apply the basic laboratory techniques of isolation and qualitative and/or quantitative analysis of biomolecules. <p>Competences</p> <ol style="list-style-type: none"> Be able to appreciate the importance and relationship that the course has with pharmaceutical science and the profession of Medical Representative 				
Prerequisites	-	Required:	-		
Course Content	<p><u>Fundamentals of Biology:</u></p> <ul style="list-style-type: none"> Cell theory (cell definition) Cell size and shape Parts of the cell / cellular organelles Structural elements of the cell Cellular or plasmatic membrane Permeability of the cell membrane Eukaryotic and prokaryotic cells Nucleus Mitochondria and Chloroplasts Nucleus: DNA Chromatin, chromosomes Cell Division: Mitosis and Meiosis <p><u>Elements of Biochemistry:</u></p> <ul style="list-style-type: none"> Biomolecules: carbohydrates, proteins, lipids and nucleic acids. Biomolecule monomers and intramolecular bonds 				

	<ul style="list-style-type: none"> • Proteins: Structure and functions of proteins. Peptide bond - Amino acids as ampholytes. Isoelectric point, Classification of amino acids. Levels of protein organization. Denaturation of proteins. • Enzymes: Enzymatic Structure, Categories, Name, Factors that affect the action of enzymes. Agonists-Antagonists. • Carbohydrates: Sugars, the main source of energy, photosynthesis. Structure and functions of carbohydrates. Building blocks: Monosaccharides, Disaccharides, Polysaccharides. Carbohydrate Classification. Glycosidic bond. Physical and chemical behaviour of carbohydrates. • Anabolism and Catabolism: Flow of energy in an ecosystem. Substances from which energy is produced. Basics of metabolism. Carbohydrate metabolism, from food intake to mitochondria. Aerobic-anaerobic carbohydrate metabolism. • Lipids: Structure and functions of lipids, classification. Basic sources of lipids, usefulness in nutrition. Lipid energy efficiency. Normal role of lipids in the body. Fatty acids: saturated and unsaturated. Cis- and trans-unsaturated fatty acids and their biological significance. Omega-3 fatty acids, lipoproteins. Rancid. Phospholipids • Nucleic acids: Structure and functions. DNA and RNA differences. Hydrogen bonds in the double helix. Complementarity. Gene expression. <p>Laboratory Exercises:</p> <ol style="list-style-type: none"> 1] Laboratory rules and safety. 2] Microscopy Laboratory - DNA / RNA Observation and Discussion: Human Chromosome (Male and Female) 3] Isolation of DNA derived from epithelial cells from buccal and plant organism (strawberry) 4] DNA quantification. Measurement OD_{260/280} 5] Measurement of the cell population (erythrocytes) 6] Isolation and quantification of casein from milk 7] Quantification of protein concentration by Bradford method
<p>Teaching Methodology</p>	<p>The course content will be taught through: Power Point presentations, guided discussions with the active participation of students, individual and team work by students and the use of a variety of audiovisual media and other teaching tools as required for the delivery of each module.</p> <p>The lectures are accompanied by various laboratory exercises, carried out in the Laboratory of Microscopy, Chemistry and Biology of the College.</p>
<p>Bibliography</p>	<p>Greek Bibliography</p> <ul style="list-style-type: none"> • Κεβρεκίδης, Θ. Δ. (2018). <i>Βιολογία: Δομή και λειτουργία των οργανισμών</i>. 2^η Έκδοση. University Studio Press, ISBN 978-960-12-2389-6. • Καστρίτσης, Κ. Δ., Δημητριάδης, Β. Κ., Σιβροπούλου, Α. Θ. (2015). <i>Εισαγωγή στη βιολογία</i>. Αφοί Κυριακίδη Εκδόσεις Α.Ε., ISBN: 978-960-602-002-5. • Campbell, N. A. (2015). <i>Βιολογία: Η χημεία της ζωής - το κύτταρο – γενετική</i>. Πανεπιστημιακές Εκδόσεις Κρήτης, ISBN: 9789605243067. • Χατζημόσχου, Α. (2015). <i>Βιολογία</i>. Smart Learn, ISBN: 9789609892643. • Διαμαντίδης, Γ. Χρ. (2015). <i>Εισαγωγή στη βιοχημεία</i>, University Studio Press, ISBN: 9789601216249. • Καλογιάννης, Σταύρος (2018), <i>Εισαγωγή στη βιοχημεία</i>, Τζιόλα, ISBN 978-960-418-722-5.

	<ul style="list-style-type: none"> Gregory, J. L., J. Jr., Gatto, S. L. (2017), <i>Βιοχημεία</i>, Πανεπιστημιακές εκδόσεις Κρήτης, ISBN: 978-960-524-495-8. <p>English Bibliography</p> <ul style="list-style-type: none"> Norman, R. I. (2007). <i>Flesh and Bones of Medical Cell Biology</i>, Publisher Mosby, ISBN: 9780723433675. Alberts B. (2014). <i>Essential Cell Biology</i>, Publisher Garland Science, ISBN: 9780815344551. Papachristodoulou, D. (2014). <i>Biochemistry & molecular biology</i>, Oxford University Press, ISBN: 9780199609499. Champe, Pamela C. (2005), <i>Biochemistry: Lippincotts' illustrated reviews</i>, Lippincott Williams & Wilkins, ISBN: 0-7817-2265-9. Gaw, A. (2013). <i>Clinical biochemistry</i>, Churchill Livingstone, ISBN 9780702051791. Jewell, C. K. (2018). <i>Fundamentals of Biochemistry</i>. New Delhi: Astral International Pvt. ISBN: 9789386595928. EBSCOHost
<p>Assessment</p>	<ul style="list-style-type: none"> Attendance and participation: 10% Assignments / Essays: 10% Laboratory Exercises 10% Midterm Written Examination: 20% Final Written Examination: 50% <p><i>Written examination has two parts that are examined as part of one exam paper. The first part includes closed-ended questions, such as multiple choice questions, true or false, matching exercises, complete the gaps exercises, etc. The first part is usually worth 40% - 50% of the total marks of the exam paper. The second part includes open-ended questions that are meant to assess the students' abilities to analyse, reflect, explain, recall etc. The second part is usually worth 50% - 60%. The total marks of the exam paper are 100.</i></p>
<p>Language</p>	<p>Greek or English</p>