



Philadelphia University
Faculty of Science - Department of Biotechnology and Genetic Engineering
GENERAL BIOLOGY – 1 - Syllabus

Week	Ch.	Topics	Pages
1	2	INTRODUCTION & Orientation	29-30
		THE CHEMICAL CONTEXT OF LIFE 2.1. Matter consists of chemical elements in pure form and in combinations called compounds.	
2	3	WATER AND LIFE 3.1. Polar covalent bonds in water molecules results in hydrogen bonding 3.2. Four emerging properties of water contribute to Earth's suitability for life.	44-49
	4	CARBON AND THE MOLECULAR DIVERSITY OF LIFE 4.2. Carbon atoms can form diverse molecules by bonding to four other atoms. Figure 4.9 Exploring some biologically important chemical groups.	58-60 63
3-4	5	THE STRUCTURE AND FUNCTION OF LARGE BIOLOGICAL MOLECULES 5.1. Macromolecules are polymers built from monomers 5.2. Carbohydrates serves as fuel and building material 5.3. Lipids are a diverse group of hydrophobic Molecules 5.4. Proteins include a diversity of structures, resulting in a wide range of functions 5.5. Nucleic acids store, transmit, and help express hereditary information.	66-89
5-6	6	A TOUR OF THE CELL 6.2. Eukaryotic cells have internal membranes compartmentalize the functions 6.3. The eukaryotic cell's genetic instructions are housed in the nucleus and carried out by the ribosomes 6.4. The Endomembrane system regulates protein traffic and performs metabolic functions in the cell. 6.5. Mitochondria and chloroplasts change energy from one form to another 6.6. The Cytoskeleton is a network of fibers that organizes structures and activities in the cell (In Brief). 6.7. Extracellular components and connections between cells help coordinate cellular activities.	97-121
7	7	MEMBRANE STRUCTURE AND FUNCTION 7.1. Cellular membranes are fluid mosaics of lipids and proteins. 7.2. Membrane structures results in selective permeability 7.3. Passive transport is diffusion of a substance across a membrane with no energy investment 7.4. Active transport uses energy to move solutes against their gradients 7.5. Bulk transport across the plasma membrane occurs by exocytosis and endocytosis	124-138
8	8	AN INTRODUCTION TO METABOLISM 8.1. An Organism's metabolism transforms matter and energy subject to the laws of thermodynamics. 8.2 The Free energy change of a reaction tells us whether or not the reaction occurs spontaneously: Free energy and metabolism; Equilibrium and Metabolism. 8.3. ATP powers cellular work by coupling exergonic to endergonic reactions. 8.4. Enzymes speed up metabolic reactions by lowering energy barriers. 8.5. Regulation of enzyme activity helps control metabolism.	141-159

9	9	CELLULAR RESPIRATION AND FERMENTATION 9.1. Catabolic pathways yield energy by oxidizing organic fuels 9.2. Glycolysis harvests chemical energy by oxidizing glucose to pyruvate 9.3. After pyruvate is oxidized, the citric acid cycle completes the energy-yielding oxidation of organic molecules 9.4. During oxidation phosphorylation, chemiosmosis couples electron transport to ATP synthesis 9.5. Fermentation and anaerobic respiration enables cells to produce ATP without the use of oxygen 9.6. Glycolysis and citric acid cycle connect to many other metabolic pathways	162-182
10	10	PHOTOSYNTHESIS 10.1. Photosynthesis converts light energy to the chemical energy of food 10.2. The light reactions convert solar energy to the chemical energy of ATP and NADPH 10.3. The Calvin cycle uses the chemical energy of ATP and NADPH to reduce CO ₂ to sugar.	185-200
11	12	THE CELL CYCLE 12.1. Most cell division results in genetically identical daughter cells 12.2 The mitotic phase alternates with interphase in the cell cycle	232-240
12	16	THE MOLECULAR BASIS OF INHERITANCE 16.1. DNA is the genetic material 16.2. Many proteins work together in DNA replication and repair 16.3 A chromosome consists of a DNA molecule packed together with proteins.	312-330
13-14	17	FROM GENE TO PROTEIN 17.1. Genes specify proteins via transcription and translation 17.2. Transcription is the DNA-directed synthesis of RNA: <i>a closer look</i> 17.3. Eukaryotic cells modify RNA after transcription 17.4. Translation is the RNA-directed synthesis of a polypeptide: <i>a closer look</i> 17.5. Mutations of one or few nucleotides can affect protein structure and function 17.6. While gene expression differs among the domains of life, the concept of a gene is universal.	333-357
	19	VIRUSES 19.1. A virus consists of a nucleic acid surrounded by a protein coat 19.2. Viruses reproduce only in host cells.	392-401
	20	BIOTECHNOLOGY 20.1. DNA cloning yields multiple copies of a gene or other DNA segment.	408-417

TEXT BOOK: REECE *et al* (2014). Campbell Biology 10th ed. Pearson Benjamin Cummings, USA.
www.campbellbiology.com (Use your own access code provided with the textbook).

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Attendance policy: Absence from lectures shall not exceed 15%. Students who exceed the 15% limit without a medical or emergency excuse acceptable to and approved by the Dean of the relevant college/faculty shall not be allowed to take the final examination and shall receive a mark of zero for the course.

Assessment Instruments	Mark
First examination	20%
Second examination	20%
Final examination:	40%
Quizzes & homework.	20%
Total	100%