

Jordan University of Science & Technology

Faculty of Arts and Sciences

Department of Applied Biological Sciences

Title & Instructor	
Course Title	General Biology
Course Number	BIO 104
Instructor	TBA
Office Location	
Office Phone	
Office Hours	
E-mail	
Textbook	Biology (11 th Ed.) 2018 by Campell NA, Urry LA, Cain ML, Wasserman SA, Minorsky PV and Reece JB

Course Description
General Biology (B104) is devoted to the study of the cellular and molecular basis of life. Students are expected to develop an understanding of certain core concepts of biology including cell structure and physiology, information flow, metabolism, cellular reproduction, Mendelian genetics, mammalian systems & protective mechanisms.

Student Learning Outcomes(SLOs)

Upon successful completion of this course, students should be able to:

SLOs	Related ILO(s)* (numbers only)	Evaluation Criteria (MCQ, OSCE, Homework...)	
		Type of Criteria (MCQ, OSCE, Homework...)	Weight (%)
1. Describe the structure, characteristics and functions of carbohydrates, lipids, proteins and nucleic acids.	1 , 2	MCQ	10
2. Become familiar with basic unit of life, how prokaryotes and eukaryotes are different and identify organelles and structures in animal and plant cells and how they differ from each other.	1 , 2	MCQ	15
3. Analyze and explain the processes associated with and the role of the cell membrane in the processes of osmosis, diffusion and transport.	1 , 2	MCQ	10
4. Explain how metabolic pathways are performed in plants and animals in the form of cellular respiration.	1 , 2	MCQ	10
5. Describe the molecular bases of cell cycle and how mitosis and meiosis are differentiated in addition to their goals and outcomes.	1 , 2	MCQ	15
6. Define and apply the principles of Mendelian genetics and its modern extensions to the unity and diversity of life	1 , 2	MCQ	15
7. Understand the molecular and chromosomal basis of heredity	1 , 2	MCQ	10
8. Describe the anatomical structure and physiological functions of tissues and organ systems of the human body	1 , 2	MCQ	15
* From the list of Program Student Outcomes (see the end of this sheet)			100

Course Contents

WK #	Title of Activity	Type of Activity (Lecture, Lab, Round rotation, etc...)	Outline
1 + 2	Biological Macromolecules and Lipids	Lecture	<ol style="list-style-type: none"> 1. Macromolecules are polymers, built from monomers 2. Carbohydrates serve as fuel and building material 3. Lipids are diverse group of hydrophobic molecules 4. Proteins include a diversity of structures, resulting in a wide range of functions 5. Nucleic acids store, transmit and help express hereditary information 6. Genomics and proteomics have transformed biological inquiry and applications
3 + 4	Cell Structure and Function	Lecture	<ol style="list-style-type: none"> 1. Biologists use microscopes and biochemistry to study cells 2. Eukaryotic cells have internal membranes that compartmentalize their functions 3. The eukaryotic cell's genetic instructions are housed in the nucleus and carried out by the ribosomes 4. The endomembrane system regulates protein traffic and performs metabolic functions 5. Mitochondria and chloroplasts change energy from one form to another 6. The cytoskeleton is a network of fibers that organizes structures and activities in the cell 7. Extracellular components and connections between cells help coordinate cellular activities
5	Cell Membranes	Lecture	<ol style="list-style-type: none"> 1. Cellular membranes are fluid mosaics of lipids and proteins 2. Membrane structure results in selective permeability 3. Passive transport is diffusion of a substance across a membrane with no energy investment 4. Active transport uses energy to move solutes against their gradients 5. Bulk transport across the plasma membrane occurs by exocytosis and endocytosis
6	Cell Respiration	Lecture	<ol style="list-style-type: none"> 1. Catabolic pathways yield energy by oxidizing organic fuels 2. Glycolysis harvests chemical energy by oxidizing glucose to pyruvate 3. After pyruvate is oxidized, the citric acid cycle completes the energy-yielding oxidation of organic molecules 4. During oxidative phosphorylation, chemiosmosis couples electron transport to ATP synthesis

			5. Fermentation and anaerobic respiration enable cells to produce ATP without the use of oxygen
7	Mitosis	Lecture	<ol style="list-style-type: none"> 1. Most cell division results in genetically identical daughter cells 2. The mitotic phase alternates with interphase in the cell cycle 3. The eukaryotic cell cycle is regulated by a molecular control system
8	Sexual Life Cycles and Meiosis	Lecture	<ol style="list-style-type: none"> 1. Offspring acquire genes from parents by inheriting chromosomes 2. Fertilization and meiosis alternate in sexual life cycles 3. Meiosis reduces the number of chromosome sets from diploid to haploid 4. Genetic variation produced in sexual life cycles contributes to evolution
9	Mendelian Genetics	Lecture	<ol style="list-style-type: none"> 1. Mendel used the scientific approach to identify two laws of inheritance 2. Probability laws govern Mendelian inheritance 3. Inheritance patterns are often more complex than predicted by simple Mendelian genetics 4. Many human traits follow Mendelian patterns of inheritance
10	Nucleic Acids and Inheritance	Lecture	<ol style="list-style-type: none"> 1. DNA is the genetic material 2. Many proteins work together in DNA replication and repair 3. A chromosome consists of a DNA molecule packed together with proteins
11	Animal Digestive Systems [Mammalian]	Lecture	<ol style="list-style-type: none"> 1. Organs specialized for sequential stages of food processing form the mammalian digestive system 2. Feedback circuits regulate digestion, energy storage, and appetite
12+13	Animal Transport Systems [Mammal Concepts 43.2, 43.3, 43.4] 43.5 (<u>Lungs only</u>) 43.6 (<u>How mammal breathes only</u>) 43.7 (<u>Adaptation</u>)	Lecture	<ol style="list-style-type: none"> 1. Coordinated cycles of heart contraction drive double circulation in mammals Concept 43.3 Patterns of blood pressure and flow reflect the structure and arrangement of blood vessels 2. Blood components function in exchange, transport, and defense 3. Breathing ventilates the lungs 4. Adaptations for gas exchange include pigments that bind and transport gases
14+15	Animal Defenses Against Infection Concepts 47.1, 47.2 & 47.3	Lecture	<ol style="list-style-type: none"> 1. In innate immunity, recognition and response rely on traits common to groups of pathogens 2. In adaptive immunity, receptors provide pathogen-specific recognition 3. Adaptive immunity defends against infection of body fluids and body cells

Assessment		
Assessment Type	Expected Due Date	Weight
First Exam		--
Second Exam		--
Midterm Exam		--
Evaluation		--
Quizzes		--
Research activity		--
OSCE		--
Mini-OSCE		--
Final Exam (Theory)		--
Final Exam (Oral)		--
Total		100

List of Intended Learning Outcomes (ILOs):

- 1) Demonstrate a sufficient understanding of the structural organization and functions of the following systems of the human body: circulatory, respiratory, gastrointestinal, endocrine, hematopoietic & lymphatic, musculoskeletal, nervous, and genitourinary systems.
- 2) Conceptualize the cellular, molecular, genetic, and biochemical mechanisms that maintain body's homeostasis and their derangements in disease states.
- 3) Apply their knowledge of human anatomy and function to solve questions regarding major clinical cases and diseases.
- 4) Attain appropriate and systematic clinical history of different medical conditions and settings.
- 5) Demonstrate proficiency in performing clinical skills and procedures.
- 6) Perform relevant physical examination on patients professionally and ethically.
- 7) Identify the major signs and symptoms of disease states, recognizing risk factors and etiologies, in an interdisciplinary approach to differentially diagnose patients.
- 8) Order and interpret results of relevant basic diagnostic procedures, such as laboratory investigations and conventional imaging procedures.
- 9) Apply safe and accurate methods of pharmacotherapy of major disease states.
- 10) Critically appraise research studies guided by evidence-based medicine.
- 11) Demonstrate ability to work in diverse settings and communities.