



Medical Biology
1stSemester 2023-2024

Coordinator: Shatha Mhmood Hasan

Theory: 3 hour/week Credits: 3 credit
Practical: 3 hour/week Credits: 1.5 credit

Learning objectives

Cell biology, Biosafety, human anatomy, lower organisms

Cell biology and Lower organisms

The course is designed to enable the student to:

- 1 .Understand the concept of cell Biology and different types of living cells
- 2 .This course provides an in-depth exploration of the structure, and function of eukaryotic cells. It covers the fundamental principles of cell biology, including cell structure, organelles, and membrane transport, cell division, and cell signaling.
- 3-Identify the pathogenic lower organisms and their classification
- 4 -Correlate the lower organisms with the disease

Biosafety: theoretical, general definition of biohazards and risk assessment with universal safety precaution

Risk group classification and biosafety level

Biological agents

Biosafety cabinet

Aims: to enable the students to deal with and protect themselves and the environment from the possible risk of different microorganisms

Introduction to anatomy

The course is designed to enable the student to:

- 1 -Understand different anatomical terms used in describing: different regions of the body, directions, position, and movement.
- 2 -Give brief descriptions of the basic structures that compose the body.
- 3 -Describe the topography of skin, fascia, and body cavities of the human body.
- 4 -Understand the main structures that contribute in: the locomotor, CVS, Nervous systems, and skin formation

•The practical cell biology sessions include the study of the ultrastructure of cells by using photos electron microscopy, and the demonstration of already prepared stained

Biosafety practical: personal protective equipment. Types of biosafety cabinets

Lecture	Topics	Description
1	Introduction to cell biology	Introduction to cells and their significance. •The historical development of cell biology The cell theory Chemical composition of the cell.
2	type of living cells	There are two main types or categories of cells: prokaryotic cells and eukaryotic cells. Structures and differences between them
3	Molecular organization of plasma membrane & and functions	The plasma membrane, also known as the cell membrane, is a crucial component of all cells in living organisms. Its selective permeability. Study the structure of plasma membrane and its function
4	Transport Across Cell Membranes	Principles of transmembrane Transport> with a medical applied
5	Bulk Transport	Exocytosis and endocytosis are cellular processes involved in the transport of materials across the plasma membrane, with a medical applied
6	The cytoplasm	Cytoplasm is a semi-fluid, gel-like substance that fills the interior of a cell with a medical applied
7	Cytoskeleton	The cytoskeleton is a dynamic network of protein filaments and tubules found in the cytoplasm of eukaryotic cells. With a medical applied
8	the powerhouse of the cell (mitochondria)	Structure and function of mitochondria and cellular respiration
9	Mitochondrial disease	Mitochondrial disease, or mitochondrial disorder, refers to a group of disorders that affect the mitochondria, which are tiny compartments that are present in almost every cell of the body.
10	Structure and functions of the endomembrane system	The endomembrane system is a complex network of membrane-bound organelles within eukaryotic cells that work together to carry out essential cellular functions, including protein synthesis, modification, transport, lipid metabolism, and waste management. This system is crucial for maintaining the overall function and health of the cell.
11	The endomembrane system	The components of the endomembrane system include: endoplasmic reticulum, lysosomes, Golgi apparatus, and vesicles, with a medical applied
12	Cell junctions. Cell adhesion.	Study the types of connecting junctions, that bind the cells together. occluding junctions (zonula occludens or tight junctions) adhering junctions (zonula adherens).

13	Cell junctions. Cell adhesion.	desmosomes (macula adherens). There are also hemidesmosomes and medical applied in cell junction
14	The nucleus	Structure and functions of the nucleus (nuclear envelope, and nuclear matrix)
15	Nucleolus and chromatin	Nucleolus structure and function. Chromatin structure and types, with a medical applied
16	Cell cycle	A cell cycle is a series of events that take place in a cell as it grows and divides. Studies the different stages called G1, S, G2
17	Nuclear division (mitosis)	Mitosis is a process of cell duplication or reproduction. And studies the different stages of mitosis. With a medical applied
18	Sexual reproduction, I (Meiosis I)	Meiosis is a type of cell division in sexually reproducing organisms that reduces the number of chromosomes in gametes. The students will be identified with different stages of meiosis I
19	Sexual reproduction, II	The students will be identified with different stages of meiosis II. With a medical applied
20	Cell Aging	Study the hypotheses on why humans age .and the effects of aging on the organ systems of the body
21	Midterm theory exam	
22	Midterm practical exam	
21	Human anatomy; definitions, types, and imaging techniques	Define anatomy / types of anatomy / anatomical position / methods and techniques used to know about living anatomy
22	Different body planes and terminology	Describing different types of planes and lines and their clinical correlation / terms of direction, reclining and movement
23	Body cavities and abdomino- pelvic regions	Classification of body cavities / parts and membranes / divisions of the abdomino-pelvic region (9 and 4 quadrants)
24	Locomotor system: body skeleton	Types of bones / anatomy of long bones / classification of human body skeleton; axial and appendicular skeleton
25	Locomotor system; muscles	Types of muscles / types of muscle action / tendon and tendon sheath / muscles name
26	Locomotor system; the joints	Definition / classification and examples / characteristics of body joints
27	Locomotor system; synovial joints	Definitions / types and examples / anatomy and movements
28	Cardiovascular system; The heart	Anatomy and location of the heart / circulation

29	Cardiovascular system; Blood vessels	Classification and definition of blood vessels examples on upper and lower limb vessels/anastomosis
30	Nervous system; CNS	Classification of the nervous system/anatomy of the brain, brain stem, spinal cord and cerebellum /
31	Nervous system; PNS	Anatomy of the peripheral nervous system / spinal nerves / cranial nerves / ANS
32	Skin and fascia,	Anatomy of integumentary system/definition and types of fascia
33	lymphatic system	Description of lymphatic drainage/anatomy of lymphatic vessels and nodes / clinical importance
34	Introduction to biosafety and security and biosafety barriers in bio labs	Biosafety and security refer to a set of measures and pra designed to protect researchers, the environment, and th from potential risks associated with biological materials microorganisms, toxins, and genetically modified organ (GMOs).
35	Biosafety level and Biological agents	BSL is a classification system that categorizes laboratories based on the level of containment and safety precautions required for handling specific biological agents, including microorganisms and toxins. BSL levels ensure that laboratories match safety measures to the potential risk posed by biological agents, preventing accidents and outbreaks.
36	Biorisk and Biohazard and management system	Biorisk refers to the potential risk associated with biological materials, such as microorganisms, toxins, or genetic materials, which can harm human health, the environment, or biosecurity. A biohazard is a biological substance or agent that poses a threat to human health, animals, plants, or the environment. It can include microorganisms, toxins, and other biological materials.
37	Types of biological wastes	Waste that contains pathogens (e.g., bacteria, viruses, fungi) capable of causing diseases in humans or animals. Effective management and disposal of these types of biological wastes are essential to prevent the spread of infections, protect the environment, and ensure public safety. Proper segregation, containment, and disposal methods are critical in handling biological waste safely.
38	Transportation of biological materials	Transportation of biological materials involves the movement of living organisms, tissues, blood, cultures, or other biological substances from one location to another for research, diagnostic, medical, or commercial purposes. Properly managed transportation of biological materials is essential to safeguard public health, protect the environment, and

		facilitate scientific and medical research while complying with regulatory requirements.
39	Accident response	Accident response refers to the set of actions and procedures implemented in the event of an unexpected incident or emergency to mitigate its consequences and protect lives, property, and the environment. Accident response is a critical aspect of emergency management that aims to minimize harm, save lives, and restore normalcy following unexpected incidents. Preparedness, coordination, and effective communication are key to a successful response.
40	seminar	
No.	Topics	
1	Bio safetyCompound light microscope	
2	Microtechnique, epithelial cells(Barr Body)	
3	Type of cells in the human body	
4	Fixation of cytology specimen	
5	Staining methods in cytology	
6	Other types of the microscope(Electron microscopy) and ultrastructure of eukaryotic cells	
7	Ultrastructure of the eukaryotic cell	
8	mitosis	
9	Midterm exam	
10	Cell division ,meiosis	
11	Terminology, Planes, and Body cavities	
12	Locomotor system	
13	Heart, blood vessels and lymphatics	
14	Nervous system	
15	Biosafety	

Student assessment:

The minimum requirement for a student to pass is to achieve at least 50% of the total 100 marks assigned for the course.

The marks are distributed as follows:

Mid-term Theory	Mid-term Practical	Quiz	total
15%	10%	5%	30%
Final Practical	Final Theory		total
20%	50%		70%

Students who fail cut-off mark mustard are required to re-sit for a second trial examination similar to the final one.

Books and references:

1-Dalley KL & Dalley AF (2006): Clinically oriented Anatomy. 5th Ed Lippincott Williams& Wilkins. Philadelphia

2- Molecular Biology of the cell, Bruce Albert,6th Edition (2017)

3-Human Biology, Sylvia S. Mader. fifteenth Edition (2017)