**Al-Nahrain University Department of Human Anatomy**

**College of Medicine**

**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

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| **Theory** | | | |
| lecture | Topics | Description | Lecturer |
| 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. | ا.م.شذى محود حسن |
| 2 | type of living cells | There are two main types or categories of cells: prokaryotic cells and eukaryotic cells. Structures and differences between them | ا.م شذى محمود حسن |
| 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 | ا.م شذى محمود حسن |
| 4 | Transport Across Cell Membranes | Principles of transmembrane  Transport> with a medical applied | ا.م شذى محمود حسن |
| 5 | Bulk Transport | Exocytosis and endocytosis are cellular processes involved in the transport of materials across the plasma membrane, with a medical applied | ا.م شذى محمود حسن |
| 6 | The cytoplasm | Cytoplasm is a semi-fluid, gel-like substance that fills the interior of a cell with a medical applied | ا.م.شذى محمود حسن |
| 7 | Cytoskeleton | The cytoskeleton is a dynamic network of protein filaments and tubules found in the cytoplasm of eukaryotic cells. With a medical applied | ا.م شذى محمود حسن |
| 8 | the powerhouse of the cell (mitochondria) | Structure and function of mitochondria and cellular respiration | ا.م.شذى محمود  حسن |
| 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. | أ.م.شذى محمود |
| 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. | ا.م شذى محمود حسن |
| 11 | The endomembrane system | The components of the endomembrane system include: endoplasmic reticulum, lysosomes, Golgi apparatus, and vesicles, with a medical applied | ا.م شذى محمود حسن |
| 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). | أ.م. شذى محمود |
| 13 | Cell junctions. Cell adhesion. | desmosomes (macula adherens). There are also hemidesmosomes and medical applied in cell junction | أ.م. شذى محمود |
| 14 | The nucleus | Structure and functions of the nucleus (nuclear envelope, and nuclear matrix) | ا.د.حيدر عبد ارسول |
| 15 | Nucleolus and chromatin | Nucleolus structure and function. Chromatin structure and types, with a medical applied | أ..د.حيدر عبد الرسول |
| 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 | أ.م. شذى محمود |
| 17 | Nuclear division (mitosis) | Mitosis is a process of cell duplication or reproduction. And studies the different stages of mitosis. With a medical applied | أ.م. شذى محمود |
| 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 | أ.م. شذى محمود |
| 19 | Sexual reproduction, II | The students will be identified with different stages of meiosis II. With a medical applied | أ.م. شذى محمود |
| 20 | Cell Aging | Study the hypotheses on why humans age. and  the effects of aging on the organ systems of  the body | ا. د. حيدر عبد الرسول |
| 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 | م.د.حسين جارالله |
| 22 | Different body planes and terminology | Describing different types of planes and lines and their clinical correlation / terms of direction, reclining and movement | م.د.حسين جارالله |
| 23 | Body cavities and abdomino- pelvic regions | Classification of body cavities / parts and membranes / divisions of the abdomino-pelvic region (9 and 4 quadrants**)** | م.د.حسين جارالله |
| 24 | Locomotor system: body skeleton | Types of bones / anatomy of long bones / classification of human body skeleton; axial and appendicular skeleton | م.د.حسين جارالله |
| 25 | Locomotor system; muscles | Types of muscles / types of muscle action / tendon and tendon sheath / muscles name | م.د.حسين جارالله |
| 26 | Locomotor system; the joints | Definition / classification and examples / characteristics of body joints | م.د.حسين جارالله |
| 27 | Locomotor system; synovial joints | Definitions / types and examples / anatomy and movements | م.د.حسين جارالله |
| 28 | Cardiovascular system;  The heart | Anatomy and location of the heart / circulation | م.د.حسين جارالله |
| 29 | Cardiovascular system;  Blood vessels | Classification and definition of blood vessels examples on upper and lower limb vessels/anastomosis | م.د.حسين جارالله |
| 30 | Nervous system; CNS | Classification of the nervous system/anatomy of the brain, brain stem, spinal cord and cerebellum **/** | م.د.حسين جارالله |
| 31 | Nervous system; PNS | Anatomy of the peripheral nervous system / spinal nerves / cranial nerves / ANS | م.د.حسين جارالله |
| 32 | Skin and fascia, | Anatomy of integumentary system/definition and types of fascia | م.د.حسين جارالله |
| 33 | lymphatic system | Description of lymphatic drainage/anatomy of lymphatic vessels and nodes / clinical importance | م.د.حسين جارالله |
| 34 | Introduction to biosafety and security and biosafety barriers in bio labs | Biosafety and security refer to a set of measures and practices designed to protect researchers, the environment, and the public from potential risks associated with biological materials, including microorganisms, toxins, and genetically modified organisms (GMOs). | ا.م.د.قاسم شرهان |
| 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. | ا.م.د.قاسم شرهان |
| 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. | ا.م.د.قاسم شرهان |
| 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. | ا.م.د.قاسم شرهان |
| 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. | ا.م.د.قاسم شرهان |
| 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. | ا.م.د.قاسم شرهان |
| 40 | seminar |  |  |
| Practical | | | |
| No. | Topics | | Hours |
| 1 | Bio safetyCompound light microscope | | 3 |
| 2 | Microtechnique, epithelial cells(Barr Body) | | 3 |
| 3 | Type of cells in the human body | | 3 |
| 4 | Fixation of cytology specimen | | 3 |
| 5 | Staining methods in cytology | | 3 |
| 6 | Other types of the microscope(Electron microscopy) and ultrastructure of eukaryotic cells | | 3 |
| 7 | Ultrastructure of the eukaryotic cell | | 3 |
| 8 | mitosis | | 3 |
| 9 | Midterm exam | | 3 |
| 10 | Cell division ,meiosis | | 3 |
| 11 | Terminology, Planes, and Body cavities | | 3 |
| 12 | Locomotor system | | 3 |
| 13 | Heart, blood vessels and lymphatics | | 3 |
| 14 | Nervous system | | 3 |
| 15 | Biosafety | | 3 |

**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)