Syllabus of Medical Biology 1 (1st semester) 2025-2026

The title of the lecture	no. of lecture	Learning objectives
Introduction to Cell Biology -Introduction -Cellular Level of Organization -The characteristics of life -Modern Cell Theory -Cell size -Cell types	1	▪ To study the steps of the scientific method, and basic characteristics of living things ▪ To study the cell theory, types, size, and shape of cells.
Chemistry of a living cell (inorganic and organic components) -Cell Components -Inorganic Substances -The Importance of the Water -Acids, Bases and Salts -Proteins -Carbohydrates -Lipids -Nucleotides	2	▪ Explain the importance of water, salts, pH, and buffers (inorganic compound) to living systems. ▪ Discuss the structures and functions of carbohydrates, lipids, proteins, nucleic acids (organic compounds) and high-energy compounds.
Nucleus -Definition -Shape of nucleus -The function of the nucleus -The Structure of Nucleus -Medical application	1	▪ Definition of nucleus ▪ Explain the structure of the nucleus ▪ List medical applications
Nucleolus -Definition -The regions within the nucleolus -Nuclear matrix -Chromatin -Sex chromatin	1	▪ Definition of Nucleolus ▪ Explain the structure of the nucleolus ▪ Identify sex chromatin
The cytoplasm - Functions of cytoplasm - Components of cytosol - Cytoskeleton - Microtubules - Microfilaments (Actin filaments) - Intermediate filaments - Cytoplasmic inclusions	1	▪ Explain the structure and function of cytoplasm ▪ Recognize components of cytosol ▪ Define cytoskeleton and list functions ▪ Differentiate microtubules, microfilaments and intermediate filaments ▪ List functions of microtubules, microfilaments and intermediate Filaments ▪ Define cytoplasmic inclusions ▪ Classify cytoplasmic inclusions

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Mitochondria and Golgi Apparatus -The characteristics feature -The structure of mitochondria -The Functions of Mitochondria -Oxidative phosphorylation -The characteristics feature - The structure of Golgi complex - The functions - Secretory Vesicles	1	▪ Define of mitochondria ▪ Explain the structure of mitochondria ▪ Describe the function of mitochondria ▪ Explain the oxidative phosphorylation ▪ Definition of Golgi complex ▪ Explain the structure of Golgi apparatus ▪ Identification of secretory vesicles
Ribosome -Definition -The structure of Ribosome -Locations -The function -Endomembrane system -Rough endoplasmic reticulum (RER) Smooth endoplasmic reticulum -(SER) -The functions of smooth ER	1	▪ Define ribosome ▪ Explain the structure of ribosome ▪ Classification of endomembrane system
Lysosomes -Definition -The Structure & functions of lysosome*s* -Peroxisomes -Definition -The functions	1	▪ Definition of lysosomes ▪ Explain the structure of lysosome ▪ Describe the functions ▪ Peroxisomes ▪ Explain the structure and functions
Cell cycle division (Mitosis) -Purpose of mitosis -Interphase -Stages of mitosis -Cytokinesis -Regulation of cell cycle in eukaryotes	**1**	▪ Identify different types of cell division ▪ Explain how the cell prepares itself in interphase ▪ Describe the different phases of mitosis ▪ Understand the regulation of the cell cycle (checkpoints)
Cell cycle division (Meiosis) -Purpose of meiosis -Interphase -Stages of reductional division (meiosis I) - Stages of equational division (meiosis II)	**1**	▪ Describe the significance of meiosis ▪ List, describe, diagram, and Explain the events of each stage of meiosis ▪ See how meiosis and sexual reproduction can increase genetic variation ▪ Describe how the process of meiosis produces haploid cells. Compare mitosis and meiosis

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Human chromosomes -Structure of the human chromosome -Classification and preparation of chromosomes -Karyotype -Fish techniques (fluorescent in situe hybridization)	1	▪ Determine how chromosomes are organized ▪ Learn how DNA is packaged as chromatin inside the nucleus in association with histone proteins. ▪ Classify and identify the types of human chromosomes in a karyotype
Aberration of chromosome number -Polyploidy -Aneuploidy in the autosome -How aneuploidy arises? -Sex chromosome aneuploidy -Sex- determination	1	▪ Define the terms karyotype, autosomal and sex chromosomes. ▪ Learn the terms used to describe the abnormalities in chromosomal numbers: polyploidy, aneuploidy: trisomy and monosomy, and mosaicism and their causing mechanisms ▪ Summarize the causes of polyploidy and aneuploidy ▪ Recognize the common autosomal and sex chromosome aneuploidies
Structural aberration -Types of structural aberration	1	▪ Learn the terms that describe the abnormalities in chromosomal structure: deletions, duplications, translocations, isochromosomes and inversions. Describe and distinguish different chromosomal aberrations in man with examples.
Structure and function of plasma membrane -Components of the plasma membrane -The membrane Potential	1	▪ Study the structure and functions (components of the cell) of plasma membrane
Modification of plasma membrane Cilia and flagella- -Basal body -Microvilli -Stereocilia Caveolae	1	▪ Identify the structure of basal body ▪ Explain why the cilia is motile while The stereocilia are not motile ▪ Understand the function of caveolae
Movement of molecules across plasma membrane (facilitated) -Movement that does not require cellular energy -Diffusion -Facilitated Transport -Osmosis -Filtration - Active Transport	2	▪ Distinguish between diffusion, osmosis, and facilitated diffusion ▪ State the Explain how tonicity relates to the direction of water movement across a membrane role of each in the cell. ▪ Compare passive- and active-transport mechanisms

-Bulk transport -Endocytosis -Exocytosis		Compare endocytosis and exocytosis.
Cell differentiation and cell death - Cell differentiation - Cell death	2	▪ To define the processes of determination, differentiation.To know the importance and mechanism of apoptosis.
Epithelial tissue -Epithelial tissue -Functions of basal lamina -General functions of epithelial Tissue	1	▪ Identify the layers of basement membrane ▪ Describe the different components of basal lamina ▪ Define epithelial tissue
Classification of epithelial tissue -Simple epithelium -Classification of simple epithelium -Stratified epithelium -Classification of stratified epithelium -Transitional epithelium	2	▪ Classify simple epithelium ▪ Name the layers of transitional epithelium ▪ Describe pseudostratified epithelium
Glandular epithelium -Types of Glandular epithelium -Exocrine and endocrine glands -Classification of exocrine glands	2	▪ Define: Simple gland and Compound gland ▪ Describe: Mucous and serous glands Mixed gland Sebaceous gland ▪ Give an example of each following types of gland: holocrine gland, apocrine gland, compound gland and mixed gland
Biosafety	1	