

THEMATIC LESSON PLAN

Units	Discussion questions
Section 1. Cellular and molecular-genetically levels of organization of life	
Unit 1. An introduction to biology. The organization of life on Earth. Format-practical's.	Biology as a science of patterns, the mechanisms of functioning and development of organisms. Biology in the medical school. The definition of the essence of life. Fundamental properties of life. Evolutionary-based levels of organization of life. Structure and working principles of the light microscope.
Unit 2. Cell – the basic unit of life. The most important biopolymers of the cell. Format-practical's.	The stages of development and the basic tenets (basic postulates) of cell theory (M. Schleiden-T. Schwann, R. Virchow). Modern cell theory. The most important biopolymers of the cell. Structure and function of proteins in the cell and the organism. Structure and function of fats in the cell and the organism.
Unit 3. Chemical composition of cells.	Structure and function of carbohydrates in the cell and the organism. The structure and function of deoxyribonucleic acid in the cell. Structure, types and functions of RNA.
Unit 4. Morphofunctional organization of the cell.	The concept of elementary biological membrane, the model of its structure and function. Transport of substances through the membrane. Characterization of active and passive transport of the membrane. The cytoplasm is the internal environment of the cell, its properties and functions.
Unit 5. Classification and structure of cell organelles.	Classification of cell organelles. Structure and function of membrane cell organelles: endoplasmic reticulum and its types. Structure and function of Golgi Complex. Structure, types and function of lysosomes. Structure and function of mitochondria. The role of mitochondria in energy metabolism. Structure and function of plastids of the plant cells.
Unit 6. Classification and structure of cell organelles.	Structure and function remembrane cell organelles: ribosomes, centrioles, microtubules, microfilaments. The structure and functions of organelles for specific purposes: cilia and flagella, myofibrils, neurofibril.
Unit 7. Cell nucleus.	The role of the cell nucleus during the life of the cell. Structure and functions of each part of the cell nucleus: nuclear shell, nucleoplasm, chromatin and nucleolus. Structural organization of chromatin.
Unit 8. Features of the organization of the cells of plants, animals and bacteria. Non-cellular forms of life.	Comparative characteristics of cells prokaryotes and eukaryotes. Comparison of the structure and functions of plant and animal cells. Structure and features of vital activity of viruses.
Unit 9. The cell as an open system.	The concept of metabolism and its types. The relationship of plastic and energy metabolism. Protein biosynthesis in the cell. The transcription processes as stages of protein biosynthesis. Introns and exons of DNA, processing of the RNA. The translation processes as stages of protein biosynthesis. The role of ribosomes in protein synthesis.
Unit 10. Energy metabolism.	Energy metabolism and its stages. The concept of glycolysis. The oxygen stage of energy metabolism.
Unit 11. The life cycle of the cell.	The life cycle of the cell. The interphase and its periods. DNA replication. Mitosis, its phases, and biological significance. Cell death: necrosis and apoptosis.
Section 2. Organismic (ontogenetic) the level of organization of biological systems	

Unit 12. Reproduction of organisms.	Reproduction is a universal feature of living. Comparative characteristics of asexual and sexual reproduction of organisms. Types of asexual and sexual reproduction of organisms. Parthenogenesis. Meiosis, its phases and biological significance of meiosis.
Unit 13. Genetics - the science of heredity and variation.	Subject, objectives and methods of genetics. The laws of heredity of Gregor Mendel. Cytological basis of the laws of Gregor Mendel.
Unit 14. Genetic level of organization of genetic information.	Evidence for the role of DNA as the hereditary material. Properties of genetic code. Gene – a functional unit of heredity. Classification, properties and localization of genes. The relationship between gene and trait. Hypothesis Beadle-Tatum. The hypothesis of Jacob-Mono (operon hypothesis).
Unit 15. Chromosomal and genomic levels of organization of the genetic information.	The chemical composition and structure of chromosomes. Classification of chromosomes. Chromosome as a group of adhesion genes. Chromosomal theory of inheritance by Thomas Morgan. Polytene chromosomes. Characterization of the genome of prokaryotes and eukaryotes. The human karyotype. International classification of human chromosomes, its morphological basis.
Unit 16. The interaction of genes.	Allelic genes. Types of interaction between allelic genes: complete dominance, incomplete dominance, codominance, overdominance. Multiple allelism. Inheritance of blood groups in humans. The interaction of nonallelic genes: epistasis, complementarity, polymeria. Pleiotropy genes.
Unit 17. Types and variants of Mendelian inheritance.	Types and variants of Mendelian inheritance. Monogenic inheritance. Genetics of sex. Autosomal and sex-linked inheritance.
Unit 18. Types and variants of inheritance.	Independent and linked recessive inheritance. Polygenic inheritance of the traits. Cytoplasmic inheritance.
Unit 19. Modification and combined variability.	Modification variability, especially, adaptive significance in ontogenesis and evolution. The norm of reaction. Mechanisms of combined variability (genetic recombination). The value of combined variability in ensuring genotypic diversity.
Unit 20. Mutational variability.	Mutational variability. Classifications of mutations. The concept of the genetic, chromosomal mutations. Genomic mutations. Genetic, chromosomal and genomic of human disease.
Unit 21. Individual development of organisms.	Ontogenesis. Periods of ontogenesis. Gametogenesis (spermatogenesis. oogenesis). Fertilization, and it stages (penetration, activation, nuclei fusion).
Unit 22. Individual development of organisms.	Cleavage. Yolk distribution in three kinds of egg cells. The Blastula. Types blastula.
Unit 23. Embryonic development of organisms.	Gastrulation, modes early and late gastrulation. The Gastrula, germ layers: ectoderm, mesoderm, and endoderm. Neurulation. Organogenesis. Extraembryonic organs (amnion, chorion, yolk sac, allantois, placenta): structure and physiological importance. The critical periods of development. Teratogenic agents factors.
Unit 24. Regularities and mechanisms of ontogenesis.	Differentiation in development. Stages and factors of differentiation. The mechanisms of ontogenesis. Embryonic induction as a mechanism of ontogenesis. The regeneration of organs and tissues as a process of development. The

	physiological and reparative regeneration. Methods of reparative regeneration.
Section 3. Population-specific level of organization of the living systems. Biogeocoenotic and biosphere levels of organization of the biological systems	
Unit 25. Evolution.	Pre-Darwinian evolutionary ideas the period of formation. J.-B. Lamarck's theory of evolution. The main provisions of the theory of evolution of Charles Darwin. Modern (synthesis) theory of evolution. Population - the unit of evolution. Factors evolution.
Unit 26. The concept of biological species.	Microevolution. Macroevolution. Modes of speciation. The species. Criteria for the species. The main directions of evolution (biological progress and regression). Ways to achieve of biological progress (aromorphosis, idioadaptation, total degeneration) and its forms.
Unit 27. Anthropogenesis.	The position of Homo sapiens in the animal world. The qualitative uniqueness of the person. Biological and social factors of anthropogenesis. The role of biological factors of the anthropogenesis at the present stage. Human races and the unity of the human species.
Unit 28. Ecology.	Environmental factors. Classification. General patterns of action of environmental factors on organism. Biogeocoenosis. The concept of trophic levels. The rule of the ecological pyramid. The biosphere. Biogeochemical cycles.
Unit 29. Parasitology. Protists. Class Sarcodina.	Parasitism as a biological phenomenon. General characteristics of the class Sarcodina. Morphophysiology and the life cycle of a Entamoeba histolytica. Amebiasis: diagnosis and prevention.
Unit 30. Protists. Class Zoomastigophora.	General characteristics of the class Zoomastigophora. The life cycle of pathogens, pathogenesis, diagnosis and prevention of trypanosomiasis. The life cycle of pathogens, pathogenesis, diagnosis and prevention of leishmaniasis. The life cycle, pathogenesis, diagnosis and prevention of trypanosomiasis and giardiasis.
Unit 31. Protists. Classes Sporozoa and Cilliophora.	General characteristics of the class Sporozoa. The life cycle of Plasmodium, pathogenesis, diagnosis and prevention of malaria. The life cycle of pathogens, pathogenesis, diagnosis and prevention of toxoplasmosis. General characteristics of the class Cilliophora. The life cycle of pathogens, pathogenesis, diagnosis and prevention of balantidiasis.
Unit 32. Class Trematoda.	Characteristics of Platyhelminthes. Class Trematoda: The Flukes. The life cycle of pathogens, pathogenesis, diagnosis and prevention of fascioliasis. The life cycle of pathogens, pathogenesis, diagnosis and prevention of opistorhosis. The life cycle of pathogens, pathogenesis, diagnosis and prevention of lung fluke disease. The life cycle of pathogens, pathogenesis, diagnosis and prevention of dicroceliasis. Morphophysiology and the life cycle of blood fluke (Schistosoma).
Unit 33. Class Cestoda.	Class Cestoda: The Tapeworms. The life cycle of pathogens, pathogenesis, diagnosis and prevention of teniasis and cysticercosis. The life cycle of pathogens, pathogenesis, diagnosis and prevention of teniarinhosis. The life cycle of pathogens, pathogenesis, diagnosis and prevention of

	hymenolepiasis. The life cycle of pathogens, pathogenesis, diagnosis and prevention of diphyllbothriasis.
Unit 34. Nematelminthes.	Characteristics of class Nematoda (roundworms). The life cycle of pathogens, pathogenesis, diagnosis and prevention of ascariasis, enterobiasis and trichinosis. The life cycle of pathogens, pathogenesis, diagnosis and prevention of ankylostomiasis, strongyloidosis. The life cycle of pathogens, pathogenesis, diagnosis and prevention of guinea worm, filariosis.
Unit 35. Medical importance of class Arachnids.	General characteristics of the class Arachnids. Troop mites: morphology, life cycle, medical value.
Unit 36. Medical importance of class Insects.	Morphophysiological characteristics and life cycle of the class Insects. Morphology, life cycle and medical importance of ectoparasit insects (lice, fleas, houses and volfartova flies). Insects - the carriers of infectious and parasitic diseases (gnats, mosquitoes, sandflies, tsetse fly. midges). Morphophysiological characteristics, life cycle and medical importance.