THEMATIC PLAN OF LECTURES

Units	Course contents
Section 1. Cellular and molecular-genetically levels of organization of life	
Unit 1. An introduction to biology. Evolutionary-based levels of organization of life. The most important biopolymers of the cell.	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 the life. Structure and working principles of the light microscope. The stages of development and the basic tenets (basic postulates) of cell theory (M. Schleiden and T. Schwann, R. Virchow). Modern cell theory. The most important biopolymers of the cell. Structure and function of proteins, fats, carbohydrates, deoxyribonucleic acid in the cell. Structure, types and functions of RNA.
Unit 2. 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. Classification of cell organelles. Structure and function of membrane cell organelles: endoplasmic reticulum, Golgi Complex, lysosomes, mitochondria, plastids of plant cells. Structure and function of membrane cell organelles: ribosomes, centrioles, microtubules, microfilaments. The structure and functions of organelles for specific purposes: cilia and flagella, myofibrils, neurofibril.
Unit 3. 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 4. 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. Non-cellular forms of life. Structure and features of vital activity of viruses.
Unit 5. 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. Energy metabolism and its stages.
Unit 6. Life cycle of the cell.	Life cycle of the cell. The interphase and its periods. DNA replication. Mitosis, its phases, and biological significance. Cell death and its phases.
Section 2. Organismic (ontogenetic) the level of organization of biological systems.	

Unit 7. 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.
Unit 8. 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. 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). The chemical composition and structure of chromosomes. Chromosome as a group of adhesion genes. Chromosomal theory of inheritance by Thomas Morgan. Characterization of the genome of prokaryotes and eukaryotes.
Unit 9. The interaction of genes. Types and variants of inheritance	The concept of allelic genes. Types of interaction between allelic genes: complete dominance, incomplete dominance, codominance, overdominance. Multiple allelism. Inheritance of blood groups of humans. The interaction of nonallelic genes: epistasis, complementarity, polymeria. Pleiotropy genes.Types and variants of Mendelian inheritance. Monogenic inheritance. Genetics of sex. Autosomal and sex-linked inheritance. Independent and linked recessive inheritance. Polygenic inheritance of the traits. Cytoplasmic inheritance.
Unit 10. Variability of organisms.	Modification variability, especially, adaptive significance in ontogenesis and evolution. The concept of norm of the reaction. Mechanisms of combined variability (genetic recombination). The value of combined variability in ensuring genotypic diversity. Mutational variability. Classifications of mutations. The concept of the genetic, chromosomal mutations. Genomic mutations (euploidiya and aneuplodiya). Genetic, chromosomal and genomic of human disease.
Unit 11. Individual development of organisms.	The concept of ontogenesis. Periods of ontogenesis. Gametogenesis (spermatogenesis. oogenesis). Fertilization, and it stages (penetration, activation, nuclei fusion). Cleavage. Yolk distribution in three kinds of egg cells. The Blastula. Types of blastula. Gastrulation, modes early and late gastrulation. The Gastrula, germ layers: ectoderm, mesoderm,

	and endoderm. Neurulation. Organogenesis. Extraembryonic organs (amniotic membrane, chorion, yolk sac, allantois, placenta): structure and physiological importance.
Unit 12. 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 13. 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 the Charles Darwin. Modern (synthesis) theory of evolution. Factors of evolution.
Unit 14. 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 15. Ecology	Environmental factors: classification and general patterns of action of the environmental factors on a organism. The concept of trophic levels. The rule of the ecological pyramid. The biosphere. Biogeochemical cycles
Unit 16. Ecological basis of parasitism.	Parasitism as an ecological phenomenon. Classification of animal parasitic forms. Ways of origin of the various groups of parasites. Interaction between parasite and host-level individuals. Factors of the action of parasite on the host organism. Factors action hostess on the parasite. Morphophysiological adaptation to a parasitic lifestyle. Population level of interaction of the parasites and their hosts. The life cycles of parasites. Intermediate and major host. Vector-borne and natural focal, parasitic and infectious diseases. Ecological principles to combat parasitic diseases.
Unit 17. Protists	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, trypanosomiasis and giardiasis. General characteristics of the class Sarcodina. Morphophysiology and the life cycle of Entamoeba histolytica. Diagnosis and prevention of amebiasis.

	General characteristics of the class Sporozoa. The life cycle of Plasmodium sp., 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 18. Parasitical Invertebrates.	Types of Platyhelminthes (flatworms). Class Trematoda: The Flukes. The life cycle of pathogens, pathogenesis, diagnosis and prevention of fasciolasis. 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). 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 diphyllobothriasis. 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. General characteristics of the class Arachnids. Troop mites: morphology, life cycle, medical value. Morphophysiological characteristics and life cycle of the class Insects. Morphology, life cycle and medical importance of insects - ectoparasites (lice, fleas, houses and volfartova flies). Insects - the carriers of infectious and parasitic diseases (gnats, mosquitoes, sandflies, tsetse flies, midges), morphophysiological characteristics, life cycle and medical importance.