

**Abstract of the operational program of discipline
"Biology"**

of the Main professional educational program of higher education - specialty program in the specialty 31.05.01 General Medicine, approved in 17/04/24

Form of education: Full-time

The period of development: 6 years

Department of Biology and histology

1. The purpose of discipline: mastering the discipline of biology

2. The place of discipline in the structure of Basic Professional Educational Program of Higher Education: the discipline of biology applies to the basic part of Block 1 of the Federal State Educational Standards of Higher Education.

3. Requirements to results of mastering the discipline:

The process of studying the discipline is directed to formation and development of competencies: General Competencies -5; General Professional Competences-1; Professional Competences-1;

As a result of studying discipline the student should **Know**:

- Structure and operation rules of the light microscope use;
- Main types of cell organization. The structure of Pro- and eukaryots. Structure and functions of the cell organelles. The main concepts of the Cell Theory;
- Principles of the structure of DNA and RNA as the major biopolymers of the cell;
- The main stages and process of replication, transcription, translation;
- The principle of the genetic information recording in molecules of nucleic acids and code biological properties; the most important types of genetic mutations and their possible consequences in human;
- Structure and classification of chromosomes, human karyotype features major types of chromosomal and genomic mutations, mechanisms of their occurrence and the possible consequences in human;
- Means of cell division, similarities and differences of the concepts of "cell cycle" and "mitotic cycle", the processes occurring in the cell interphase and mitosis;
- Distinctive features and biological significance of meiosis;
- Periods of organism ontogeny and types of its post-embryonic development;
- Structure of germ cells;
- The course of fertilization process, its stages, the essence of fertilization;
- Main types of the egg cells, cleavage, blastula, cleavage mechanisms;
- Main gastrulation types, characteristic for Chordata and the possible consequences of gastrulation and cleavage disorders; the main stages of organogenesis;
- The germ layer derivatives;
- Development, structure and functions of Amniota provisional organs and their features in human, the possible consequences of the human provisory organs development disorders;
- The basic concepts definitions of Genetics and examples, illustrating them;
- Mendel rules formulations and their cytological foundation;
- Chromosome theory of heredity;
- The genetic balance and its disorder consequences, features of various types of allelic and non-allelic genes interaction;
- Distinctive features of the various types of inheritance;
- Cytological mechanisms of combinative variability;
- Methods of Human Genetics;
- Forms of biotic linkages;
- Classification of parasitism and parasites;
- Methods of transmission and infection with parasitic diseases;
- The A. N. Severtsov Doctrine of Phyloembryogeny;
- Types of morpho-functional transformations of organs and systems;
- Basic biogenetic law of Müller-Haeckel and the law of embryonic similarity of K. Baer;
- Progressive direction of evolution of the organ systems of Chordates;
- General regularities of origin and development of life;
- Systematic of the species Homo sapiens;

- Proof of the natural origin of man;
- Racial features and the morpho-functional adaptation to different environmental conditions;

To be able to:

- To regulate the light on the microscope;
- To find the object at low and high microscope magnification;
- To work with the microscope immersion;
- To find the structural differences of unicellular, multicellular, plant, animal cells with the help of study tables;
- To prepare a temporary onion epiderm microscopic slide, to identify parts of the cell;
- To sketch the observed object correctly;
- To discern a “simple feature” and a “complex feature”;
- To solve the problems of processes of replication, transcription translation modeling.
- To use the table of the genetic code;
- To analyze the karyotype, to determine the sex of an organism with the help of chromosome sets;
- To identify the different types of human aneuploidy
- To characterize the hereditary syndrome, associated with abnormal karyotype with the help of study tables;
- To determine the number of chromosomes and DNA (n, C) in any period of mitotic cycle, and at different stages of meiosis;
- To detect various phases of mitosis and meiosis on microscopic slide;
- To sketch different stages of embryogenesis, to indicate the drawing symbols correctly.
- To apply the knowledge obtained for understanding of the modern methods of prenatal diagnostics of hereditary diseases of the fetus;
- To use the genealogical symbols correctly;
- To analyze the genotype and phenotype of the parental generation and offspring; to determine the probability of birth of sick children;
- To create and analyze pedigree diagrams;
- To diagnose the situational problems of parasitic diseases on slides and photos;
- To sketch the observed object correctly.
- To solve situational problems on parasitology
- To make comparative analysis of the structure of organs and systems of Chordates;
- To identify the main directions of the evolution of these systems;
- to explain the Otoposthetic causality of developmental anomaly;
- To solve situational problems;
- To establish the sequence of evolutionary processes;
- To determine race of the individual, basing on phenotype.

To possess:

- Light microscope technique and preparing a temporary microscopic slide;
- The methods of solving the problems on Cytology.
- The methods of solving problems on Genetics.
- The methods of studying human heredity(cytogenetic method, genealogical method, twins method)
- The microscopy skills, ovohelminthoscopy.

4. Total complexity of the discipline is 6 credits. 216 hours

6. The main sections of the discipline:

1. Cytology.
2. Ontogenesis.
3. Evolutionary teaching. Anthropogenesis. Evolution of the organic world. Phylogeny of systems of organs of vertebrates.
4. Fundamentals of General and medical genetics.
5. Ecology. Medical Parasitology:
 - 1) medical protozoology
 - 2) medical helminthology
 - 3) medical arachnoentomology