

Biology

Year 9

(70 hrs., 2 hrs per week, reserve – 2 hrs)

Table of contents	
1.	Introduction. Biology as a science Scope of biology. Levels of organization of biological systems. Main methods of biological research
2.	Chemical content of cells Water, its physical and chemical substances. Other non-organic compounds. Organic molecules. Carbohydrates and lipids. Concept of biological macromolecules – biopolymers. Proteins, their structural organization and main functions. Enzymes and their role in the cell. Nucleic acids. Role of nucleic acids as a genetic information carrier
3.	Structure of a cell Method of researching cells. Types of microscopy. Structure of eucaryotic cell. Core, its structural organization and functions. Types of cells and their comparative features.
4.	Principles of functioning of cells Metabolism and energy exchange. Cell breathing. Biochemical breathing mechanisms. Photosynthesis. Basic principles of synthetic processes in cells and organisms
5.	Storage and implementation of hereditary information Genes and genomes. Structure of genes and main components of genomes of procaryots and eucaryots. Transcription. Main types of RNA. Genetic code. Protein biosynthesis. DNA duplication; DNA damage repairing. Cell division: cell cycle, mitosis. Meiosis. DNA recombination. Sex cells and impregnation. Stages of individual development
6.	Rules of features inheritance Classical methods of gene research. Genotype and phenotype. Trait as a result of gene interaction. Concept of genetic linkage and crossing-over. Sex genetics and inheritance Forms of changes. Mutations: types of mutations, reasons and consequences of mutation. Human hereditary diseases. Genetic consulting.



	Modern methods of molecular genetics
7	<p>Evolution of the organic world</p> <p>Populations of living organisms and their main features. Evolutionary factors. Mechanisms of initial evolutionary changes. Mechanisms of development of species. Development of evolutionary views. Role of paleontology and molecular genetics in justifying the evolutionary theory. Human evolution and its stages</p>
8	<p>Biodiversity (optional)</p> <p>Bases of evolutionary phylogeny and systematics. Main groups of organisms: bacterias, archeas, and eucaryots. Noncellular life forms: viruses. Review of main eucaryotic taxons</p>
9.	<p>Supraorganism biological systems</p> <p>Ecosystem and ecosystem diversity. Food relations. Biotic, abiotic and anthropic (man-made and industrial) factors. Ecosystem stability and reasons for its damage. Biosphere as an integrated system. Protection and conservation of biosphere.</p>
10.	<p>Biology as a basis of biotechnology and medicine</p> <p>Selection. Introduction into plant culture. Methods of plant selection. Domesticated animals. Methods of animal selection. Traditional biotechnologies. Bases of genetic and cell engineering. Genetically modified organisms</p>

Expected results

Pupil

- **characterizes:** the process of transcription, the process of protein biosynthesis; DNA replication process; genetic code and its meaning in protein biosynthesis; interrelation between the structure and functions of chromosomes; mitosis and meiosis processes in eucaryots; cell cycle stages; ontogenesis stages in plants and animals; inheritance, relation to sex; change: combination, mutation, and modification; possibilities of diagnosis of human hereditary diseases; development of views on the origin and diversity of living creatures; main principles of biological systematics;
- **researches/observes:** the examples of enzyme action; the elements of cell structure on constant and temporary microslides; impact of environmental factors on different organism groups;
- **solves:** elementary problems on molecular biology with the structure of proteins and nucleic acids;
- **analyzes and compares:** structural levels of proteins organization, features of organic molecules; cell structure of procaryotes and eucaryotes; cell structure of plants, animals, and mushrooms; interrelation between the structure and functions of a core; photosynthesis and chemosynthesis; transcription and replication; mitosis and meiosis;

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different life environments; natural and artificial ecosystems; classical methods of selection with modern biotechnological approaches;

- **applies the knowledge of:** cell life processes for motivation for a healthy way of life; assessing the hereditary traits in the family and family planning; and means of treating diseases of various nature (virus, bacteria, protozoan etc.)
- Actively protects the environment.