

Biology and Ecology

(Year 11)

(70 hrs, 2 hr per week)

Table of contents	
1.	<p>Adaptations</p> <p>Adaptation as a general feature of biological systems. Unity principle of organisms and living environment. General rules of adaptation formation. Concept of preadaptation and postadaptation. Features of adaptations. Forming of adaptations on the molecular and cell levels of organization. Organism adaptation strategies. Concept of ecologically plastic and ecologically non-plastic species. Concept of adaptation radiation. Live forms or animals and plants as adaptations to the living environment.</p> <p>Ecological niche as a consequence of adaptation of organisms of a certain type to living in the ecosystem. Concept of connected evolution (coevolution) and coadaptation.</p> <p>Main habitats and adaptation of organisms to them. Means of organism thermal regulation. Symbiosis and its forms.</p> <p>Organism as a habitat. Spread of parasitism among different groups of organisms. Adaptation of parasites to living in the master's organism. Response of a master's organism on parasites. Adaptive biological rhythms of biological systems of different level of organization. Types of adaptive biological rhythms of organisms. Photoperiodicity and its adaptive meaning.</p>
2	<p>Biological bases of a healthy lifestyle</p> <p>Sciences dealing with human health. Principles of a healthy lifestyle. Components of a healthy way of life: rational diet, physical activity, personal and household hygiene, and rest.</p> <p>Safety and sexual culture.</p> <p>Negative impact of alcohol, smoking and drugs on human health. Impact of stress factors on human health. Impact of environment on human health.</p> <p>Human immune and peculiarities of its functioning. Immunocorrection. Immunotherapy. Prevention of non-infections, infectious, invasive human diseases and sexually transmitted diseases.</p>
3.	<p>Ecology</p> <p>Ecology subject, tasks and methods of a discipline. Connection of ecology with other sciences. Ecological laws.</p> <p>Ecological factors and their classification. The laws of impact of ecological factors on the organisms and their groups. Stenobiontic and eurybiontic species.</p> <p>Populations. Classifications of populations. Structure and features of populations. Mechanism of density and population number regulation. Functional role of populations in ecosystems.</p> <p>Features and attributes of ecosystems. Types of connections between the populations of different types in ecosystems. Ecological successions as processes of ecosystem self-development. Reasons for successions and types thereof. Laws of successions.</p>

	<p>Farming ecosystems, their structure and functioning peculiarities. Ways of increasing the efficiency of farming ecosystems.</p> <p>Biosphere as a global ecosystem, its structure and limits. Biogeochemical cycles as a necessary condition of biosphere functioning. The works of V. I. Vernadskyi on the biosphere and noosphere, their role in preventing the global environmental crisis.</p>
4	<p>Sustainable development and rational natural use.</p> <p>Modern ecological problems in Ukraine and abroad. Types of pollution and their consequences for natural and man-made ecosystems and human life. Concept of environmental quality. Environment pollution criteria.</p> <p>Impact of human on the atmosphere Consequences of atmospheric air pollution and its protection.</p> <p>Anthropic impact on the hydrosphere. Reasons for deterioration of natural waters, deficit of water resources, and principles of assessment of ecological condition of water bodies. Protection of water bodies.</p> <p>Main sources of anthropic pollution of soils and its consequences. Need for protection of soils.</p> <p>Anthropic impact on biodiversity. Issues of species acclimatization and reacclimatization. Saving biodiversity as a necessary condition of biosphere stability.</p> <p>Ecological policy in Ukraine: nature protection legislation of Ukraine, and international agreements. Red Book and black lists of animal species. Green book of Ukraine.</p> <p>Concept of sustainable development and its meaning. Nature use within sustainable development. Concept of ecological thinking. Need of international cooperation in environmental protection.</p>
5	<p>Use of results of biological studies in medicine, selection and biotechnology</p> <p>Tasks and achievements of modern selection. The role of Ukrainian plant and animal breeders. Modern methods of selection of animals, plants, and microorganisms. Concept of hybrid vigor and its genetic foundations.</p> <p>Value of work by M. I. Vavilov on the centers of diversity and origin of cultivated plants, law of homological rows of genetic variation on the planning of selection.</p> <p>Use of methods of genetic and cell engineering in modern selection. Genetic engineering of a person: achievements and risks.</p> <p>Bioethical issues of modern medicine. Modern biotechnology and its main directions.</p> <p>The use of developments of molecular genetics, molecular biology and biochemistry in biotechnology.</p> <p>Concept of biological safety, biological terrorism and biological protection. Biological safety and its main directions.</p>
<p>Expected results</p> <p>Pupil:</p> <ul style="list-style-type: none"> operates the key notions and terms of biology and ecology; realizes the sense of the main laws and rules in understanding the continuity of life and its constant connection to the environment; understands the universal application of functional signs of life, principles and requirements for organism vital functions; 	

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- establishes cross-curriculum relations between biology and ecology;
- has experience in search and research, knows how to present the obtained results;
- uses the obtained knowledge and skills in everyday life to assess the factors of the environment, consequences of one's activity, saving one's own life, and safety of other people;
- is responsible towards the environment and nature preservation.