

## **STRUCTURE AND CONTENT OF THE ELECTIVE COURSE "BIOLOGICAL SYSTEMS"**

**Korshevniuk Tatiana**

Ph.D, senior researcher, leading researcher  
Institute of Pedagogy of the NAES of Ukraine

Elective courses are of great importance in teaching Biology to Ukrainian high school students. The curriculum of the elective course "Biological Systems" was developed for students of 10-11 grades [1]. The course is focused on meeting students' educational needs and their self-realization, expanding and deepening their knowledge of biological systems, developing competences, fostering interest in Biology, modern technologies and careers related to the study and use of biosystems.

The structure of the elective course "Biological Systems" includes four topics: "Structure and Functioning of Biological Systems", "Research of Biosystems", "Biological Systems and Scientific and Technological Progress", "Protection and Conservation of Biological Systems". Educational material on the structural and functional organization of biological systems, methods of their study, and areas of application covers three aspects of the study of these objects: theoretical, practical, and prognostic. The theoretical aspect concerns the basic parameters of biosystems (structure, functions, development, relationships with the environment), properties (self-regulation, self-organization), and diversity of natural biological systems. The ways and directions of using the theoretical knowledge in practical human activity today and in the near future are a practical aspect of the course content. It is determined by educational information about the creation of functional neuronal tissues, innovative products of biotechnology, the use of various biological systems (organisms, populations) to assess the quality of the environment. Students can learn about the development of closed biosystems with a controlled microclimate to solve a burning problem in Ukraine and the whole world such as providing the population with quality food in sufficient quantities. The prognostic aspect provides the material on predicting the possible consequences of human intervention in biological systems, their transformation and use (for example, predicting the effects of destructive human impacts on the biosphere and its ecosystems in order to prevent them).

The content of the course is not overloaded with factual material, which gives teachers the opportunity to adjust the curriculum, taking into account the interests of the whole group or individual students who have chosen the elective course "Biological Systems".

In the course curriculum, the expected learning outcomes are formulated according to the components of subject competence. The knowledge component involves the assimilation of concepts, terms, rules. Activity component includes various types of activity (cognitive, communicative, research, project, and reflective).

The value component is focused on the development of a bioethical attitude to nature and biological systems, knowledge and transformation of biological objects, the development of value orientations for the preservation of nature, the harmonious interaction of man and nature, and sustainable development. The program also provides for the development of key competencies and cross-cutting skills such as reading comprehension, the ability to express one's opinion orally and in writing, critical and systematic thinking, the ability to logically justify one's opinion, creativity, initiative, risk assessment, decision making, problem solving, and cooperation with other people [2].

The condition for successful study of the course "Biological Systems" is increasing students' independence at all stages of the research or project. Students should be encouraged to communicate, because "performing research, students benefit much more when they discuss expectations, observations, conclusions, theories and explanations before, during and after classes" [3, p. 319].

In the elective course "Biological Systems", sustainable development issues are considered from different points (biological, environmental, technological, social, and economic), which is supposed to involve students in research and development of strategies that ensure the long-term ability of nature and humanity to survive and prosper together. For example, the curriculum suggests that students should analyze and evaluate real or simulated results of human intervention in biological systems; discuss options for solving problems of biosystems imbalance, taking into account moral, ethical, environmental, economic, medical and other aspects; predict possible consequences of destructive human effects on biosystems at different levels of living organization in order to prevent them.

The approach is focused on the development of students' knowledge, skills, values, and patterns of behavior necessary for the development of society based on sustainable development.

It is known that the recognition of educational material value by students themselves causes a positive attitude to its learning. Therefore, the selection of the content of the elective course "Biological Systems" was carried out taking into account its relevance, personal and social significance. The guidelines were chosen concerning the following aspects of the content: 1) significance for the country development (to solve socio-economic and environmental problems); 2) relevance to future activities after graduation (for mastering general skills and applied skills, development of ideas about modern technologies and industries, the formation of the basis of the future career); 3) significance for student life-cognitive experience (for independent learning of reality, and self-affirmation); 4) importance in the learning process (for obtaining new knowledge, practical use, mastering the methods of cognitive activity, and forming beliefs in the truth of knowledge).

### References:

1. Коршевніук Т. Навчальна програма курсу за вибором «Біологічні системи», 10–11 класи. *Біологія і хімія в рідній школі*. 2020. № 1. С. 25-29. URL: <http://lib.iitta.gov.ua/id/eprint/721983>

2. Закон України «Про освіту» від 05.09.2017. № 2145-VIII [Електронний ресурс]. URL: <http://zakon0.rada.gov.ua/laws/show/2145-19> .
3. Patrick, H., & Yoon, C. (2004). Early adolescents' motivation during science investigation. *The Journal of Educational Research*, 97(6), 319–330.