ADDITIONAL EDUCATIONAL PROGRAM (MINOR)
«Fundamentals of applied research in biology»

For whom it is intended: The program (Minor) "Environment and Biotechnology" among with other biological disciplines is aimed at training highly qualified specialists.

Relevance: In the program of additional education "Fundamentals of applied research in biology", students receive knowledge about human health and its internal organs, information about inheritance, parasitic organisms, achievements of the modern biotechnological industry, methods of obtaining food using microorganisms. Using methods of biological modeling, they study the mechanisms of occurrence and development of many human diseases. Students in laboratory classes in these fields of science carry out work on the cultivation of microorganisms, plants in an artificial nutrient medium, the reproduction of microclones, obtaining various medicines from plants and monitoring their impact on human health.

Justification: The course of applied scientific research in biology is research aimed at students applying new knowledge to achieve practical goals and solve real problems. In other words, they are aimed at solving the problems of applying scientific knowledge obtained as a result of fundamental research in the practical activities of students. For example, scientific research in the field of biotechnology is often a combination of the two named types, and therefore they should be called theoretical and applied.

Purpose: Application of particularly significant biological objects in research practices

Program Description:

1.The program (Minor) «Fundamentals of applied research in biology» consists of 3 disciplines, each discipline comprises 5 credits, in total the student must acquire 15 credits.

2.The program (Minor) «Fundamentals of applied research in biology» does not require pre-requisites

3.The number of credits for obtaining a bachelor's degree remains unchanged no less than 240 credits.

Program content:

Name of the discipline	Description of the discipline	Teaching outcomes
Basics of biotechnology	The purpose of teaching the discipline «Basics of biotechnology» is to familiarize students with modern areas of knowledge on the biology of plant cells cultured in vitro, and all the main areas of plant biotechnology. Cells retain their ability to synthesize additional substances specific to each plant species in vitro. With the help of biotechnological methods for medicine and the food industry, biologically active compounds and valuable substances contained in the plant are also extracted and used in production conditions. Thanks to the totipotency of plant cells, new technologies are being prepared for crop production, such as clonal micro-propagation of plants and the	LO 1-has the skills to work in sterile conditions LO 2- knows how to use biotechnological methods correctly and effectively. LO 3-can prepare a nutrient medium for growing living objects. LO 4- can cultivate cells in agar-agar and liquid nutrient medium.

	production of seedlings without viruses. The combination of cell culture methods with traditional breeding methods is very effective. At the same time, new technologies – cellular and genetic engineering – are a way to create new cells and organisms with the right traits.	
Basics of Microbiology and Virusology	The purpose of the discipline is the formation of systematized knowledge and skills in the field of microbiology related to the peculiarities of the vital activity of microorganisms. The course "Microbiology" includes the study of the basic concepts and methods of microbiology, issues of bacterial metabolism, their growth, reproduction, taxonomy, environmental protection using microorganisms in modern biotechnologies. To show the general biological significance of achievements in the field of microbiology and virology, to highlight the role of microorganisms in the development of biotechnology, the food industry. To give students knowledge and practical skills in microbiology – the study of various groups of saprophytic and pathogenic microorganisms. The influence of environmental factors on the vital activity of microorganisms and the role of microorganisms in the transformation of substances in nature, in production processes	LOC 1-knows the basic concepts and definitions from the field of microbiological research; LOC 2-knows the methods of cultivation of microorganisms; . LOC 3-Development of new methods of identification of microorganisms; LOC 4-studies food sampling for microbiological research; LOC 5-conducts microbiological control in biotechnological production
Medical biology	Medical biology aims to study molecular-genetic, cellular, organ and organismic mechanisms of the functioning of the human body, both in normal and pathological conditions, with an emphasis on clinical	LOC 1-Students have knowledge in the fields of medicine, genetics, human genetics LOC 2-Students have knowledge in the field of parasitology

	diagnostic methods of diseases. Students acquire knowledge and understanding about the interaction between different fields of medicine and biology in solving problems in medical biology. The discipline includes the main chapters of the fundamental sciences, such as genetics and molecular biology, cell biology, genetic engineering and gene therapy, embryology, ontogeny, microbiology, virology, zoology, botany, mycology and parasitology. Students work with online materials, tables, diagrams, laboratory equipment, and microscopic techniques. Upon the completion of the course, students should be able to classify diseases according to the nature of their origin, to offer the most appropriate method of clinical diagnostics, taking into account knowledge of modern achievements in biotechnological science. The acquired knowledge and skills will allow students to form professional competence not only as young teachers, but also as potential scientists and specialists in clinical diagnostic laboratories.	LOC 3- knows the laws of medical biomechanics LOC 4- understands that the body is a complex system LOC 5- can give medical and biological genetic advice.