CATALOG OF ELECTIVE DISCIPLINES

7M05 - Natural Sciences, Mathematics and Statistics
(Code and classification of the field of education)

7M051 - Biological and related sciences
(Code and classification of the direction of training)

0510
(Code in the International Standard Classification of Education)

M080 - Biology
(Code and classification of the educational program group)

7M05101 - Biology
(Code and name of the educational program)

Master
(Level of preparation)

set of 2023

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Developed
By the Academic Committee of the EP
The head of the AC Nurymkhan G.
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Chairman of the Commission on Quality Assurance Abdilova G.

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Protocol №5 "21" April 2023
Chairman of the Academic Council Oralkanova I.

Stem cell

Discipline cycle	Basic disciplines
Course	1
Credits count	5
Knowledge control form	Examination

Short description of discipline
The discipline examines the achievements of cytology, histology and radiobiology in the context of stem cell problems. Studies the basic properties, isolation and reproduction of stem cells, models and mechanisms of radiation carcinogenesis and the role of stem cells in it. Examines the stem cells of the breast, thyroid gland, stem cells of the gastrointestinal tract, the risks of antenatal and postnatal radiation.

Purpose of studying of the discipline
undergraduates gain knowledge about stem cells, about the features of their structure, development and metabolism, about the role of stem cells in the mechanisms of radiation carcinogenesis and about the methods of isolation and reproduction of tissue stem cells

Learning Outcomes
ON3 Conduct fundamental and applied scientific research in the field of biology.
ON4 Analyze and solve theoretical and applied problems in biology.
ON6 Demonstrate fundamental knowledge in the field of general biology, cellular and molecular biology, genetics, microbiology, biotechnology when conducting scientific research, developing innovative technologies, including in the educational practice of higher education.
ON8 Carry out scientific experiments in laboratory and field conditions, use systematized theoretical and practical knowledge of natural sciences in solving scientific, applied and educational problems.

Learning outcomes by discipline

Diversity of stem cell types and their individual characteristics;
Basic models and mechanisms of interaction of ionizing radiation with stem cells;
Modern methods of stem cell isolation and cultivation;

Prerequisites
Bachelor

Postrequisites
Basic and profile disciplines of the EP Final examination

Cell Biology

Discipline cycle	Basic disciplines
Course	1
Credits count	5
Knowledge control form	Examination

Short description of discipline
The discipline studies animal and plant cells, unicellular organisms, and bacteria. Investigates the structure, the basics of vital activity and reproduction of cells, their role and place in multicellular organisms, the structure and functions of individual cellular components, studies both the general properties of most cells and the work of specific cellular structures in normal and pathological changes.

Purpose of studying of the discipline
to acquaint undergraduates with various fields of cell biology in order to solve practical problems that are most in demand in biology, biomedical science and practice, to master them to deepen their knowledge.

Learning Outcomes
ON3 Conduct fundamental and applied scientific research in the field of biology.
ON4 Analyze and solve theoretical and applied problems in biology.
ON6 Demonstrate fundamental knowledge in the field of general biology, cellular and molecular biology, genetics, microbiology, biotechnology when conducting scientific research, developing innovative technologies, including in the educational practice of higher education.
ON8 Carry out scientific experiments in laboratory and field conditions, use systematized theoretical and practical knowledge of natural sciences in solving scientific, applied and educational problems.

Learning outcomes by discipline
- analyze the composition of cellular populations of a multicellular organism;
- understand and see similarities and differences in the structure and functioning of bacterial, plant and animal cells;
-identify and analyze organoids and structures on photomicroscopic preparations and electron microscopic photographs.

Prerequisites
Bachelor

Postrequisites
Basic and profile disciplines of the EP Final examination The research work of a student, including an internship and the implementation of a master s thesis I The research work of a student, including an internship and the implementation of a master s thesis II The research work of a student, including an internship and the implementation of a master s thesis III

Cell therapy

Discipline cycle	Basic disciplines
Course	1
Credits count	5
Knowledge control form	Examination

Short description of discipline
The discipline examines the basic principles of cell therapy, sources of stem and progenitor cells, the main methods of their isolation, cell

cultures, tissues. Studies the possibilities of modeling therapeutic effects in an in vitro experiment, features of cell settlement on materials (vitalization), static and dynamic cultivation, the possibility of changing the tensor of mechanical stresses to stimulate cellular stress, modification of the structure of materials to change cell migration.

Purpose of studying of the discipline

mastering knowledge in the field of fundamental regenerative cell therapy as a basis for the use of high-tech methods of treatment.

Learning Outcomes

ON3 Conduct fundamental and applied scientific research in the field of biology.
ON4 Analyze and solve theoretical and applied problems in biology.
ON6 Demonstrate fundamental knowledge in the field of general biology, cellular and molecular biology, genetics, microbiology, biotechnology when conducting scientific research, developing innovative technologies, including in the educational practice of higher education.
ON8 Carry out scientific experiments in laboratory and field conditions, use systematized theoretical and practical knowledge of natural sciences in solving scientific, applied and educational problems.

Learning outcomes by discipline

to know: the basics of ensuring the safety of the use of gene and cellular technologies;
differences and variability properties of cell lines;
areas of application of cellular, gene and gene-cell therapy in medicine and scientific activity;
cellular technologies for the restoration of damaged tissues and organs; the concept of cell cloning;

Prerequisites

Bachelor

Postrequisites

Final examination The research work of a student, including an internship and the implementation of a master s thesis I The research work of a student, including an internship and the implementation of a master s thesis II The research work of a student, including an internship and the implementation of a master s thesis III

Statistical methods in biology

Discipline cycle	Basic disciplines
Course	1
Credits count	5
Knowledge control form	Examination

Short description of discipline

The discipline studies the basic concepts, the need for multidimensional processing of biological data, data collection and preprocessing, selection of research data for statistical analysis. Considers external factors as possible causes of variability, linear regression, projection, methods for analyzing biological data, cluster analysis, multidimensional scaling. Verification- verification of verification rules, statement of experience and determination of correctness. Identification-alignment, recycling. International exchange of biometric data.

Purpose of studying of the discipline

Formation of undergraduates` skills and abilities of statistical processing of information obtained as a result of performing field and laboratory biological, environmental studies using modern equipment and computer systems.

Learning Outcomes

ON3 Conduct fundamental and applied scientific research in the field of biology.
ON4 Analyze and solve theoretical and applied problems in biology.
ON6 Demonstrate fundamental knowledge in the field of general biology, cellular and molecular biology, genetics, microbiology, biotechnology when conducting scientific research, developing innovative technologies, including in the educational practice of higher education.
ON7 Improve the level of scientific biological research through the widespread use of modern methods of processing, biometrics and interpretation of scientific data in the field of botany, zoology, cell biology, embryology, molecular biology, bioengineering.

Learning outcomes by discipline

Terminology of statistics, methods and features of their correct application; probabilistic nature of natural phenomena, properties and features of statistical data distribution;
methods of solving analytical problems of biology with the use of methods of mathematical statistics; independently plan the progress of work and perform methods of mathematical analysis and modeling, theoretical and experimental research.

Prerequisites

Bachelor

Postrequisites

Basic and profile disciplines of the EP Final examination The research work of a student, including an internship and the implementation of a master s thesis I The research work of a student, including an internship and the implementation of a master s thesis II The research work of a student, including an internship and the implementation of a master s thesis III

Biometrics

Discipline cycle	Basic disciplines
Course	1
Credits count	5
Knowledge control form	Examination

Short description of discipline

The discipline considers the planning of observations and methods of statistical processing of their results. Biometrics is an applied science that studies specific biological objects using mathematical methods. Studies statistical patterns and basic concepts of probability theory, compilation of a variation series, basic statistical indicators, statistical aggregates, types and types of samples, correlation analysis, regression analysis, variance analysis.

Purpose of studying of the discipline

mathematical processing of certain indicators based on physical and behavioral characteristics.

Learning Outcomes

ON3 Conduct fundamental and applied scientific research in the field of biology.
ON4 Analyze and solve theoretical and applied problems in biology.
ON6 Demonstrate fundamental knowledge in the field of general biology, cellular and molecular biology, genetics, microbiology, biotechnology when conducting scientific research, developing innovative technologies, including in the educational practice of higher education.
ON7 Improve the level of scientific biological research through the widespread use of modern methods of processing, biometrics and interpretation of scientific data in the field of botany, zoology, cell biology, embryology, molecular biology, bioengineering.

Learning outcomes by discipline

Apply methods of variational statistics and biometric analysis to study biological objects;
To determine by the biometric method the average values of the studied feature and on the basis of these averages to make substantive judgments about the features of the features that were studied in this group of objects.
Determine the most important biometric indicators

Prerequisites

Bachelor

Postrequisites

Basic and profile disciplines of the EP Final examination The research work of a student, including an internship and the implementation of a master s thesis I The research work of a student, including an internship and the implementation of a master s thesis II The research work of a student, including an internship and the implementation of a master s thesis III

Bionics

Discipline cycle	Basic disciplines
Course	1
Credits count	5
Knowledge control form	Examination

Short description of discipline

The discipline examines the theoretical foundations of practical bionics, bionic modeling, bionic research, constructive natural systems, prospects for the development of practical
bionics. Considers the application in technical devices and systems of the principles of organization, properties, functions and structures of wildlife, that is, forms of life in nature and their industrial analogues. Studies biological bionics, which studies the processes occurring in biological systems, theoretical bionics, which builds mathematical models of processes.

Purpose of studying of the discipline

the study of the basic laws and patterns, processes in natural objects and systems in order to use bionic knowledge in the design and creation of constructive three-dimensional systems from various materials.

Learning Outcomes

ON3 Conduct fundamental and applied scientific research in the field of biology.
ON4 Analyze and solve theoretical and applied problems in biology.
ON6 Demonstrate fundamental knowledge in the field of general biology, cellular and molecular biology, genetics, microbiology, biotechnology when conducting scientific research, developing innovative technologies, including in the educational practice of higher education.
ON7 Improve the level of scientific biological research through the widespread use of modern methods of processing, biometrics and interpretation of scientific data in the field of botany, zoology, cell biology, embryology, molecular biology, bioengineering.

Learning outcomes by discipline

- to know the basic principles of the construction and functioning of biological systems and their elements;
- to know the features of constructive systems of wildlife and patterns of development;
- to use elements of biological systems in the design of an environmentally safe subject-spatial environment of human habitation.
- analyze and synthesize accumulated scientific knowledge about the principles of organization and functioning of living systems.

Prerequisites

Bachelor

Postrequisites

Basic and profile disciplines of the EP Final examination The research work of a student, including an internship and the implementation of a master s thesis I The research work of a student, including an internship and the implementation of a master s thesis II The research work of a student, including an internship and the implementation of a master s thesis III

The Evolutionary Theory

Discipline cycle	Basic disciplines
Course	1
Credits count	5
Knowledge control form	Examination

Short description of discipline

The discipline considers the basic theories of evolution, forms of variability, modifications, types of modifications, types of mutations. Studies modern ideas about the structure of the gene, mutations in natural populations, combinative variability, mutation process and genetic combinatorics. Studies speciation, allopatric and sympatric speciation, quantum speciation. The concept of ontogenesis, ontogenesis in protozoa, stages of ontogenesis and types of evolutionary trends: complication, simplification, embryonization.

Purpose of studying of the discipline

Formation of ideas about the evolutionary doctrine as a science about the general laws and driving forces of the development of wildlife.

Learning Outcomes

ON3 Conduct fundamental and applied scientific research in the field of biology.
ON4 Analyze and solve theoretical and applied problems in biology.

ON6 Demonstrate fundamental knowledge in the field of general biology, cellular and molecular biology, genetics, microbiology, biotechnology when conducting scientific research, developing innovative technologies, including in the educational practice of higher education.
ON8 Carry out scientific experiments in laboratory and field conditions, use systematized theoretical and practical knowledge of natural sciences in solving scientific, applied and educational problems.

Learning outcomes by discipline

- use scientific arguments to explain the unity and diversity of the organic world;
- to cover the main problems of the theory of evolution;
- apply the general laws of the historical development of wildlife to explain the results of their own research.

Prerequisites

Bachelor

Postrequisites

Basic and profile disciplines of the EP Final examination The research work of a student, including an internship and the implementation of a master s thesis I The research work of a student, including an internship and the implementation of a master s thesis II The research work of a student, including an internship and the implementation of a master s thesis III

Modern problems of evolution

Discipline cycle	Basic disciplines
Course	1
Credits count	5
Knowledge control form	Examination

Short description of discipline

The discipline studies the methods of studying evolution, the main sections of the evolutionary doctrine, the basic theories of evolution, the genetic foundations of the evolutionary process. Considers the organization of life and its main characteristics, the main properties of living systems, the concept of speciation, mutation as an elementary evolutionary material. Studies the population gene pool, the problems of macroevolution, the evolution of ontogenesis. The importance of evolution for environmental protection and biodiversity conservation.

Purpose of studying of the discipline

to orient the undergraduate student in the course of the problems facing modern evolutionary teaching, to help him in forming his own position on the causes and course of evolution.

Learning Outcomes

ON3 Conduct fundamental and applied scientific research in the field of biology.
ON4 Analyze and solve theoretical and applied problems in biology.
ON6 Demonstrate fundamental knowledge in the field of general biology, cellular and molecular biology, genetics, microbiology, biotechnology when conducting scientific research, developing innovative technologies, including in the educational practice of higher education.
ON8 Carry out scientific experiments in laboratory and field conditions, use systematized theoretical and practical knowledge of natural sciences in solving scientific, applied and educational problems.

Learning outcomes by discipline

- to argue for a modern evolutionary approach to the study of biological processes to use modern scientifically based techniques, methods and means of teaching biology, including technical means of teaching, information and computer technologies
- have an idea of the methods of analysis and modeling of evolutionary processes; - to understand the role of the evolutionary idea in the biological worldview, to know the basic theories of evolution, the concepts of speciation.

Prerequisites

Bachelor

Postrequisites

Basic and profile disciplines of the EP Final examination The research work of a student, including an internship and the implementation of a master s thesis I The research work of a student, including an internship and the implementation of a master s thesis II The research work of a student, including an internship and the implementation of a master s thesis III

Theory of evolution

Discipline cycle	Basic disciplines
Course	1
Credits count	5
Knowledge control form	Examination

Short description of discipline

The discipline studies modern ideas about the origin of life on Earth. Studies the mechanisms of evolutionary transformations, experimental study of all links of the evolutionary process, starting with the variability of populations and ending with speciation, methods of analysis and modeling of evolutionary processes. Examines theoretical studies of the main problems of evolutionary science, the topic of microevolution, problems anthropogenesis. Explores natural phenomena and explains their cause-and-effect relationships.

Purpose of studying of the discipline

Study of the mechanisms of evolutionary transformations, experimental study of all links of the evolutionary process, starting with the variability of populations and ending with speciation, theoretical studies of the main problems of evolutionary science

Learning Outcomes

ON3 Conduct fundamental and applied scientific research in the field of biology.
ON4 Analyze and solve theoretical and applied problems in biology.
ON6 Demonstrate fundamental knowledge in the field of general biology, cellular and molecular biology, genetics, microbiology, biotechnology when conducting scientific research, developing innovative technologies, including in the educational practice of higher education.
ON8 Carry out scientific experiments in laboratory and field conditions, use systematized theoretical and practical knowledge of natural sciences in solving scientific, applied and educational problems.

Learning outcomes by discipline
- navigate the modern scientific literature on evolutionary theory, problems of the origin of life on Earth;
- to argue the modern evolutionary approach to the study of biological processes to use modern scientifically based techniques, methods and means of teaching biology.
Prerequisites
Bachelor
Postrequisites
Basic and profile disciplines of the EP Final examination The research work of a student, including an internship and the implementation of a master s thesis I The research work of a student, including an internship and the implementation of a master s thesis II The research work of a student, including an internship and the implementation of a master s thesis III

Modern problems of human and animal biology

Discipline cycle	Profiling discipline
Course	1
Credits count	5
Knowledge control form	Examination

Short description of discipline
The discipline studies the molecular mechanisms of development regulation, modern methods of genome research, free radical reactions in cells and problems of their regulation, problems of plant immunity, the human genome. Modern concepts of molecular and biochemical mechanisms of tumor growth, problems of new and emerging viral infections, the problem of consciousness in modern biology, modern problems of neurobiology, modern approaches to the study of the evolution of living organisms, the current state of the study of biodiversity and its prospects are considered.
Purpose of studying of the discipline
familiarization of undergraduates with current problems and promising areas of modern scientific research in the field of human and animal biology.
Learning Outcomes
ON3 Conduct fundamental and applied scientific research in the field of biology.
ON4 Analyze and solve theoretical and applied problems in biology.
ON6 Demonstrate fundamental knowledge in the field of general biology, cellular and molecular biology, genetics, microbiology, biotechnology when conducting scientific research, developing innovative technologies, including in the educational practice of higher education.
ON7 Improve the level of scientific biological research through the widespread use of modern methods of processing, biometrics and interpretation of scientific data in the field of botany, zoology, cell biology, embryology, molecular biology, bioengineering.
Learning outcomes by discipline
- apply the knowledge of molecular biology to explain the processes of interaction of pathogens with plants;
- use knowledge of the integrative functions of the central nervous system to analyze the behavioral activity of animals and humans;
- to use the achievements of genetics in solving the problems of medicine and biotechnology, as well as to apply the knowledge gained in further practical activities.
Prerequisites
Modern problems of evolution Cell Biology
Postrequisites
Basic and profile disciplines of the EP Final examination The research work of a student, including an internship and the implementation of a master s thesis II The research work of a student, including an internship and the implementation of a master s thesis III

Ecological physiology of animals

Discipline cycle	Profiling discipline
Course	1
Credits count	5
Knowledge control form	Examination

Short description of discipline
The discipline studies methods of studying physiological processes in animals, physiological mechanisms of adaptation of the body, regulation of vital functions of the body, physiological mechanisms of adaptations at the population level. Examines the influence of extreme environmental factors on the animal organism, mechanisms of adaptive regulation of the number of animals, physiological mechanisms of adaptations to changing environmental conditions (temperature, light), biological rhythms, ecological and physiological characteristics of temperature adaptations.
Purpose of studying of the discipline
study of the influence of extreme environmental factors on the animal body, such as acceleration, weightlessness, noise, vibration, motion sickness, hypoxia and hyperoxia, hyper- and hypocapnia, magnetic fields, ionizing radiation.
Learning Outcomes
ON3 Conduct fundamental and applied scientific research in the field of biology.
ON6 Demonstrate fundamental knowledge in the field of general biology, cellular and molecular biology, genetics, microbiology, biotechnology when conducting scientific research, developing innovative technologies, including in the educational practice of higher education.
ON8 Carry out scientific experiments in laboratory and field conditions, use systematized theoretical and practical knowledge of natural sciences in solving scientific, applied and educational problems.
Learning outcomes by discipline
- apply methods of ecological physiology, approaches to the study of adaptation, mechanisms of adaptation of living organisms at various levels of the organization to a changing environment, features of adaptation to specific environmental factors;
- analyze ecological processes, physiological mechanisms, laws, master the concepts of ecology and physiology.
Prerequisites

Cell Biology

Postrequisites

Basic and profile disciplines of the EP Final examination The research work of a student, including an internship and the implementation of a master s thesis II The research work of a student, including an internship and the implementation of a master s thesis III

Ecological human physiology

Discipline cycle	Profiling discipline
Course	1
Credits count	5
Knowledge control form	Examination

Short description of discipline

The discipline studies the peculiarities of the vital activity of the human body and the mechanisms of its adaptation in a constantly changing environment, the dependence of the functions of organs and physiological systems on the effects of environmental factors in various physical and geographical zones, natural cycles. The influence of working and living conditions, increasing physical and emotional-psychological loads, as well as stressful situations on the human body is considered.

Purpose of studying of the discipline

the study of the dependence of the functions and vital activity of the organism on the living conditions in different physical and geographical zones, in different seasons, time periods, as well as the physiological basis of adaptation of organisms to various environmental factors

Learning Outcomes

ON4 Analyze and solve theoretical and applied problems in biology.
ON6 Demonstrate fundamental knowledge in the field of general biology, cellular and molecular biology, genetics, microbiology, biotechnology when conducting scientific research, developing innovative technologies, including in the educational practice of higher education.
ON8 Carry out scientific experiments in laboratory and field conditions, use systematized theoretical and practical knowledge of natural sciences in solving scientific, applied and educational problems.

Learning outcomes by discipline

– use the basic methods of ecological physiology;
–plan and conduct physiological experiments, as well as processing the results obtained
– analyze the results of studies of the body`s response to environmental influences.

Prerequisites

Bachelor

Postrequisites

Basic and profile disciplines of the EP Final examination The research work of a student, including an internship and the implementation of a master s thesis II The research work of a student, including an internship and the implementation of a master s thesis III

Environment and biological diversity

Discipline cycle	Profiling discipline
Course	1
Credits count	5
Knowledge control form	Examination

Short description of discipline

The discipline studies the diversity of life in all its manifestations, as well as indicators of the complexity of biological systems, the diversity of its components, the classification of biodiversity of animals and birds, the mechanisms of adaptive reactions of animals. Considers general approaches to modeling biological diversity at different levels of the biological hierarchy, as well as ways to preserve biological diversity, the role of plants, animals and microorganisms in the biosphere.

Purpose of studying of the discipline

the study of the biological diversity of plants, animals and microorganisms, the features of their structure, adaptations to the environment, patterns of distribution, conservation of biodiversity.

Learning Outcomes

ON3 Conduct fundamental and applied scientific research in the field of biology.
ON4 Analyze and solve theoretical and applied problems in biology.
ON6 Demonstrate fundamental knowledge in the field of general biology, cellular and molecular biology, genetics, microbiology, biotechnology when conducting scientific research, developing innovative technologies, including in the educational practice of higher education.
ON8 Carry out scientific experiments in laboratory and field conditions, use systematized theoretical and practical knowledge of natural sciences in solving scientific, applied and educational problems.

Learning outcomes by discipline

-analyze the results of anthropogenic violation of the basic functional principles of natural ecosystems and the changes in regional and global ecosystems and the biosphere occurring at this time;
- analyze environmental processes, set specific tasks in environmental protection activities, set priorities and acquire practical skills in using the knowledge gained to solve environmental problems.
- solve scientific and practical tasks for the study of biological features of species

Prerequisites

Biometrics Modern problems of evolution Cell Biology

Postrequisites

Basic and profile disciplines of the EP Final examination The research work of a student, including an internship and the implementation of a master s thesis II The research work of a student, including an internship and the implementation of a master s thesis III

Variety of associations and ekosistem

Discipline cycle	Profiling discipline
Course	1
Credits count	5
Knowledge control form	Examination

Short description of discipline
The discipline examines the history of the study of biological forms and natural communities, the classification of natural ecosystems, the change of ecosystems under human influence, the principles of monitoring research and biological diversity, levels of biodiversity, the principles of classification of biological taxa, forms of life. Studies natural communities, the main biomes of the land, intrazonal natural communities, agricultural biocenoses, conservation problems
biodiversity. International cooperation for the conservation of biological diversity.

Purpose of studying of the discipline
formation of in- depth systematic knowledge of basic concepts in the study of biodiversity and practical skills in the field of its conservation, skills and competencies for assessing biodiversity at various levels of the biosphere organization, taking into account the main strategies for its restoration, ensuring security and sustainable human interaction with the natural environment and society.

Learning Outcomes
ON4 Analyze and solve theoretical and applied problems in biology.
ON6 Demonstrate fundamental knowledge in the field of general biology, cellular and molecular biology, genetics, microbiology, biotechnology when conducting scientific research, developing innovative technologies, including in the educational practice of higher education.
ON7 Improve the level of scientific biological research through the widespread use of modern methods of processing, biometrics and interpretation of scientific data in the field of botany, zoology, cell biology, embryology, molecular biology, bioengineering.

Learning outcomes by discipline
- to choose and apply experimental and computational-theoretical research methods in professional activity; to analyze data on the state of the environment and its components
using modern equipment and modern computer technologies;
- analyze applied problems in the field of ecology and plan successive stages of their solution; apply the results of their own research to solve applied environmental problems arising from the interaction of man and nature;

Prerequisites
Biometrics Modern problems of evolution Cell Biology

Postrequisites
Final examination Biotechnology of plants and animals Ethology The research work of a student, including an internship and the implementation of a master s thesis II The research work of a student, including an internship and the implementation of a master s thesis III

Ecology biodiversity

Discipline cycle	Profiling discipline
Course	1
Credits count	5
Knowledge control form	Examination

Short description of discipline
The discipline studies the diversity of life in all its manifestations, as well as indicators of the complexity of biological systems, the diversity of its components, the classification of biodiversity of animals and birds, the mechanisms of adaptive reactions of animals. Considers general approaches to modeling biological diversity at different levels of the biological hierarchy, as well as ways to preserve biological diversity, the role of plants, animals and microorganisms in the biosphere.

Purpose of studying of the discipline
study of the biological diversity of the environment, protection and its rational use.

Learning Outcomes
ON4 Analyze and solve theoretical and applied problems in biology.
ON6 Demonstrate fundamental knowledge in the field of general biology, cellular and molecular biology, genetics, microbiology, biotechnology when conducting scientific research, developing innovative technologies, including in the educational practice of higher education.
ON7 Improve the level of scientific biological research through the widespread use of modern methods of processing, biometrics and interpretation of scientific data in the field of botany, zoology, cell biology, embryology, molecular biology, bioengineering.

Learning outcomes by discipline
- apply the knowledge gained in solving theoretical and other methodological problems;
- analyze all the diversity of flora and fauna in the environment;
- determine the degree and depth of assimilation of educational material;
- use various techniques and means of knowledge control.

Prerequisites
Modern problems of evolution Cell Biology

Postrequisites
Basic and profile disciplines of the EP Final examination The research work of a student, including an internship and the implementation of a master s thesis II The research work of a student, including an internship and the implementation of a master s thesis III

Actual problems of genetics

Discipline cycle	Profiling discipline
Course	1
Credits count	5

Knowledge control form	Examination

Short description of discipline

Actual problems of genetics studies the achievements of genetics, which are a key factor in the study of complex biological processes and systems at the molecular, cellular, organismic, population levels. Currently, the problems of genetic science are relevant, since it is important to apply in science the general provisions and approaches in plant and animal genetics, achievements and prospects, the basic principles of obtaining recombinant DNA, the stages of genetic experimental work.

Purpose of studying of the discipline

formation of deep theoretical knowledge in the field of actual problems of genetics, possession of modern methods for crossing plant and animal material.

Learning Outcomes

ON3 Conduct fundamental and applied scientific research in the field of biology.
ON4 Analyze and solve theoretical and applied problems in biology.
ON6 Demonstrate fundamental knowledge in the field of general biology, cellular and molecular biology, genetics, microbiology, biotechnology when conducting scientific research, developing innovative technologies, including in the educational practice of higher education.
ON7 Improve the level of scientific biological research through the widespread use of modern methods of processing, biometrics and interpretation of scientific data in the field of botany, zoology, cell biology, embryology, molecular biology, bioengineering.

Learning outcomes by discipline

- to be able to comment genetically scientifically on the processes taking place in nature;
- understand the basic laws of heredity, the basics of chromosomal theory, gender, population genetics, the concepts of gene, genome, gene pool, trait, inheritance, variability, mutation and be able to put into practice the types of mutations and the laws of genetics.

Prerequisites

Biometrics Modern problems of evolution Cell Biology

Postrequisites

Basic and profile disciplines of the EP Final examination The research work of a student, including an internship and the implementation of a master s thesis II The research work of a student, including an internship and the implementation of a master s thesis III

Population genetics

Discipline cycle	Profiling discipline
Course	1
Credits count	5
Knowledge control form	Examination

Short description of discipline

The discipline studies the concept of population, the Hardy-Weinberg-Castle Law and the consequences of the law, polymorphism and heterozygosity in populations. Considers models of selection against recessive homozygotes, against dominant homozygotes, selection in the absence of dominance, selection against heterozygotes, selection in favor of heterozygotes, the concept of inbreeding, regular and irregular inbreeding in populations. Path coefficient analysis and inbreeding coefficien.t

Purpose of studying of the discipline

formation of basic knowledge among undergraduates about the mechanisms of heredity and variability in populations

Learning Outcomes

ON3 Conduct fundamental and applied scientific research in the field of biology.
ON4 Analyze and solve theoretical and applied problems in biology.
ON6 Demonstrate fundamental knowledge in the field of general biology, cellular and molecular biology, genetics, microbiology, biotechnology when conducting scientific research, developing innovative technologies, including in the educational practice of higher education.
ON7 Improve the level of scientific biological research through the widespread use of modern methods of processing, biometrics and interpretation of scientific data in the field of botany, zoology, cell biology, embryology, molecular biology, bioengineering.

Learning outcomes by discipline

To apply in professional activity the basic principles of population genetics, the effect of the Hardy- Weinberg- Castle law and its consequences, processes that violate the Hardy-Weinberg-Castle law;
- analyze genetic processes in different populations.

Prerequisites

Biometrics Modern problems of evolution Cell Biology

Postrequisites

Basic and profile disciplines of the EP Final examination The research work of a student, including an internship and the implementation of a master s thesis II The research work of a student, including an internship and the implementation of a master s thesis III

Genetic engineering

Discipline cycle	Profiling discipline
Course	1
Credits count	5
Knowledge control form	Examination

Short description of discipline

The discipline studies the main stages of recombinant DNA technology, enzymes used in genetic engineering, vector systems for gene transfer, methods for constructing recombinant DNA, characteristics of cloned DNA sequences. Examines the genetic transformation of bacteria and mammals, the genetic transformation of plants: methods and applications. Genetic engineering allows you to turn on and off individual genes, controlling the activity of organisms, as well as transferring genetic instructions from one organism to another.

Purpose of studying of the discipline

in-depth study of the theoretical foundations of the design, cloning and expression of genetic material in bacterial and eukaryotic cells, as well as the creation of organisms with a new genetic program

Learning Outcomes
ON3 Conduct fundamental and applied scientific research in the field of biology.
ON4 Analyze and solve theoretical and applied problems in biology.
ON6 Demonstrate fundamental knowledge in the field of general biology, cellular and molecular biology, genetics, microbiology, biotechnology when conducting scientific research, developing innovative technologies, including in the educational practice of higher education.
ON7 Improve the level of scientific biological research through the widespread use of modern methods of processing, biometrics and interpretation of scientific data in the field of botany, zoology, cell biology, embryology, molecular biology, bioengineering.
Learning outcomes by discipline
apply the acquired knowledge about the molecular foundations of recombinant DNA design in genetic manipulation of cells and the creation of transgenic organisms.
Prerequisites
Biometrics Modern problems of evolution Cell Biology
Postrequisites
Basic and profile disciplines of the EP Final examination The research work of a student, including an internship and the implementation of a master s thesis II The research work of a student, including an internship and the implementation of a master s thesis III

Organization and planning of scientific research abroad

Discipline cycle	Profiling discipline
Course	1
Credits count	5
Knowledge control form	Examination

Short description of discipline
The discipline considers modern methods of conducting research work abroad, the main stages of conducting research and components of research work abroad, methods of analysis, processing, systematization of information, methods of statistical processing of experimental data, the basics of experiment planning in the study of technological processes, statistical processing of experimental data, formulation of conclusions for each stage research work.
Purpose of studying of the discipline
to provide knowledge on the main directions of scientific research abroad and to instill skills in the use of biological methods, as well as to know and be able to apply them in practice.
Learning Outcomes
ON2 Possess the methodology and algorithm of planning, organization of research and scientific-pedagogical activities.
ON3 Conduct fundamental and applied scientific research in the field of biology.
ON8 Carry out scientific experiments in laboratory and field conditions, use systematized theoretical and practical knowledge of natural sciences in solving scientific, applied and educational problems.
Learning outcomes by discipline
- To know the basics of research activity in the Republic of Kazakhstan and abroad, ways of its implementation in educational institutions, forms of organization of research training, rules for registration of the results of scientific research;
- independently and effectively organize and plan research work.
Prerequisites
History and philosophy of science Foreign language (professional)
Postrequisites
Basic and profile disciplines of the EP Final examination The research work of a student, including an internship and the implementation of a master s thesis II The research work of a student, including an internship and the implementation of a master s thesis III

Modern methods and organization, planning of scientific research

Discipline cycle	Profiling discipline
Course	1
Credits count	5
Knowledge control form	Examination

Short description of discipline
The discipline considers modern methods of conducting research work, the main stages of conducting research and the components of research work, methods of analysis, processing, systematization of information,
methods of statistical and mathematical processing of experimental data. Studies the basics of experiment planning in the study of technological processes, conducting statistical processing of experimental data, formulating
conclusions for each stage of research work.
Purpose of studying of the discipline
Principles and methods of organizing and planning scientific research.
Learning Outcomes
ON2 Possess the methodology and algorithm of planning, organization of research and scientific-pedagogical activities.
ON6 Demonstrate fundamental knowledge in the field of general biology, cellular and molecular biology, genetics, microbiology, biotechnology when conducting scientific research, developing innovative technologies, including in the educational practice of higher education.
ON8 Carry out scientific experiments in laboratory and field conditions, use systematized theoretical and practical knowledge of natural sciences in solving scientific, applied and educational problems.

Learning outcomes by discipline
- Analyze the results of scientific research, implement the results of research and development in practice, apply practical skills in compiling and processing scientific and technical documentation, scientific reports, abstracts, publications and public discussions;
- evaluate the scientific significance and prospects of using research results in their professional field;

- formulate research goals and objectives, choose research methods;
- use mathematical statistics techniques for planning and organizing an experiment, analyzing data and their reliability.

Prerequisites

History and philosophy of science

Postrequisites

Basic and profile disciplines of the EP Final examination The research work of a student, including an internship and the implementation of a master s thesis II The research work of a student, including an internship and the implementation of a master s thesis III

Organization of research work in schools and colleges

Discipline cycle	Profiling discipline
Course	1
Credits count	5
Knowledge control form	Examination

Short description of discipline

The course "Organization of research work in schools and colleges" examines the model representations of the technology of research activity and ways of its implementation in educational institutions, the concepts of the research position and ways of its formation, the forms of organization of research training, the basics of scientific and technical information and the practice of information retrieval, the rules of registration of the results of scientific research and work on the manuscript, the protection of the results of scientific research.

Purpose of studying of the discipline

to provide undergraduates with knowledge on the organization and planning of research and innovation activities.

Learning Outcomes

ON2 Possess the methodology and algorithm of planning, organization of research and scientific-pedagogical activities.
ON3 Conduct fundamental and applied scientific research in the field of biology.
ON8 Carry out scientific experiments in laboratory and field conditions, use systematized theoretical and practical knowledge of natural sciences in solving scientific, applied and educational problems.

Learning outcomes by discipline

- Analyze the results of scientific research, implement the results of research and development in practice, apply practical skills in compiling and processing scientific and technical documentation, scientific reports, abstracts, publications and public discussions;
- evaluate the scientific significance and prospects of using research results in their professional field;
- formulate research goals and objectives, choose research methods;
- use mathematical statistics techniques for planning and organizing an experiment, analyzing data and their reliability.

Prerequisites

History and philosophy of science Foreign language (professional)

Postrequisites

Basic and profile disciplines of the EP Final examination The research work of a student, including an internship and the implementation of a master s thesis II The research work of a student, including an internship and the implementation of a master s thesis III

Ethology

Discipline cycle	Profiling discipline
Course	2
Credits count	5
Knowledge control form	Examination

Short description of discipline

The discipline studies the forms of animal behavior, factors of the external and internal environment of the organism that determine behavior, their interaction. Studies the social behavior of animals and the ethological structure of populations, the physiological mechanisms of animal behavior, the development of behavior in ontogenesis, the evolution of behavior and its adaptive function. Examines the methods of studying the evolution of behavior, the specifics of behavior, the habits of animals during breeding, acclimatization, extraction, daily activity in natural conditions.

Purpose of studying of the discipline

Studying the basics of animal behavior.

Learning Outcomes

ON4 Analyze and solve theoretical and applied problems in biology.
ON6 Demonstrate fundamental knowledge in the field of general biology, cellular and molecular biology, genetics, microbiology, biotechnology when conducting scientific research, developing innovative technologies, including in the educational practice of higher education.
ON8 Carry out scientific experiments in laboratory and field conditions, use systematized theoretical and practical knowledge of natural sciences in solving scientific, applied and educational problems.

Learning outcomes by discipline

- use knowledge of ethology to explain adaptations in animals and humans;
- to use knowledge of the mechanisms of formation of behavioral reactions in animals when studying organisms both in nature and in laboratories.

Prerequisites

Modern problems of evolution Modern problems of human and animal biology Actual problems of genetics Cell Biology

Postrequisites

Final examination The research work of a student, including an internship and the implementation of a master s thesis III

Ethology with fundamentals of zoopsychology

Discipline cycle	Profiling discipline
Course	2
Credits count	5

Knowledge control form	Examination

Short description of discipline
The discipline considers the conditions for observing animal behavior, methods of describing behavior, methods and approaches in studying animal behavior: physiological, biochemical, immunological, molecular genetic. Animal behavior in extreme conditions, adaptation of animals to living conditions at low and high ambient temperatures, inactive behaviors and species characteristics of animals, group behavior of animals, sexual behavior of animals.

Purpose of studying of the discipline
To form an idea of ethology and zoopsychology as scientific fields, their formation, goals, tasks, and also to show the determining role of behavior in the life of individual animals and communities as a whole.

Learning Outcomes
ON4 Analyze and solve theoretical and applied problems in biology.
ON6 Demonstrate fundamental knowledge in the field of general biology, cellular and molecular biology, genetics, microbiology, biotechnology when conducting scientific research, developing innovative technologies, including in the educational practice of higher education.
ON8 Carry out scientific experiments in laboratory and field conditions, use systematized theoretical and practical knowledge of natural sciences in solving scientific, applied and educational problems.

Learning outcomes by discipline
- to characterize the main provisions of classical ethology, features of social behavior of animals;
- apply modern methods of studying animal behavior.

Prerequisites
Modern problems of evolution Modern problems of human and animal biology Actual problems of genetics Cell Biology

Postrequisites
Final examination The research work of a student, including an internship and the implementation of a master s thesis III

Population of wild animals

Discipline cycle	Profiling discipline
Course	2
Credits count	5
Knowledge control form	Examination

Short description of discipline
The discipline examines fundamental laws in the field of ecology of populations and communities, ideas about the peculiarities of the development and functioning of populations and communities, the influence of environmental factors on the dynamics and structure of wild animal populations, mechanisms for maintaining a stable state of biotic communities and biological diversity on the planet. Studies the formation of changes in the behavior of wild animals depending on a number of factors.

Purpose of studying of the discipline
to form a master`s student`s idea of the population and its place in modern environmental management technologies;

Learning Outcomes
ON4 Analyze and solve theoretical and applied problems in biology.
ON6 Demonstrate fundamental knowledge in the field of general biology, cellular and molecular biology, genetics, microbiology, biotechnology when conducting scientific research, developing innovative technologies, including in the educational practice of higher education.
ON8 Carry out scientific experiments in laboratory and field conditions, use systematized theoretical and practical knowledge of natural sciences in solving scientific, applied and educational problems.

Learning outcomes by discipline
assess the biodiversity of the territory, identify diagnostic signs, observe, identify and describe the object of study.

Prerequisites
Modern problems of evolution Modern problems of human and animal biology Actual problems of genetics Cell Biology

Postrequisites
Final examination The research work of a student, including an internship and the implementation of a master s thesis III

Biotechnology of plants and animals

Discipline cycle	Profiling discipline
Course	2
Credits count	5
Knowledge control form	Examination

Short description of discipline
The discipline considers the cultivation of eukaryotic cells in vitro, the technology of obtaining and cultivating animal cell lines, methods of creating chimeras, hybridization of animal cells. Studies methods of embryotransplantation, embryoculture and embryoengineering. And also studies the cultivation of individual plant cells, the main directions of plant cell engineering, suspension cultures, morphogenesis in callus tissues, clonal micro-reproduction of plants.

Purpose of studying of the discipline
formation of a complex of basic knowledge on plant and animal biotechnology

Learning Outcomes
ON5 Possess the theoretical and methodological foundations of scientific research in biology, methods of introducing research results into practical and pedagogical activities.
ON6 Demonstrate fundamental knowledge in the field of general biology, cellular and molecular biology, genetics, microbiology, biotechnology when conducting scientific research, developing innovative technologies, including in the educational practice of higher education.
ON7 Improve the level of scientific biological research through the widespread use of modern methods of processing, biometrics and interpretation of scientific data in the field of botany, zoology, cell biology, embryology, molecular biology, bioengineering.

ON8 Carry out scientific experiments in laboratory and field conditions, use systematized theoretical and practical knowledge of natural sciences in solving scientific, applied and educational problems.

Learning outcomes by discipline

- to put into practice theoretical knowledge and practical skills for the selection of optimal conditions for the cultivation of isolated cells and tissues of medicinal plants at various stages in vitro;
- know experimental approaches to cellular and embryological engineering;

Prerequisites

Biometrics Modern problems of evolution Environment and biological diversity Actual problems of genetics Cell Biology

Postrequisites

Final examination The research work of a student, including an internship and the implementation of a master s thesis III

Agricultural biotechnology

Discipline cycle	Profiling discipline
Course	2
Credits count	5
Knowledge control form	Examination

Short description of discipline

The discipline studies the molecular foundations of heredity and the realization of hereditary information, methods of regulating the reproduction of farm animals, biotechnological aspects of animal cloning, the main directions of biotechnology
of feed preparations. Considers the technology of obtaining and using fertilizers, biotechnological methods for obtaining transgenic plants resistant to stress, insects, fungal, bacterial and viral infections, herbicides.

Purpose of studying of the discipline

formation of knowledge about modern post- genomic and biotechnological methods of molecular breeding of new varieties of agricultural plants and animals

Learning Outcomes

ON5 Possess the theoretical and methodological foundations of scientific research in biology, methods of introducing research results into practical and pedagogical activities.
ON6 Demonstrate fundamental knowledge in the field of general biology, cellular and molecular biology, genetics, microbiology, biotechnology when conducting scientific research, developing innovative technologies, including in the educational practice of higher education.
ON7 Improve the level of scientific biological research through the widespread use of modern methods of processing, biometrics and interpretation of scientific data in the field of botany, zoology, cell biology, embryology, molecular biology, bioengineering.
ON8 Carry out scientific experiments in laboratory and field conditions, use systematized theoretical and practical knowledge of natural sciences in solving scientific, applied and educational problems.

Learning outcomes by discipline

- apply basic knowledge in the field of molecular breeding aimed at increasing the level of economically useful traits of livestock and crop products;
- possess methods of developing and implementing biotechnological approaches to solving the problem of increasing the fertility of agricultural soils;
- apply the obtained theoretical knowledge in the practice of the agro-industrial complex.

Prerequisites

Modern problems of evolution Modern problems of human and animal biology Actual problems of genetics Cell Biology

Postrequisites

Final examination The research work of a student, including an internship and the implementation of a master s thesis III

Technology of reproduction of animals

Discipline cycle	Profiling discipline
Course	2
Credits count	5
Knowledge control form	Examination

Short description of discipline

The discipline studies the origin of farm animals, the individual development of farm animals (ontogenesis), directed rearing of young animals. Considers the evaluation and selection of animals by origin, breeding selection, breeding of animals by lines and families, biological features: increased heterozygosity, the occurrence of heterosis, the formation of new hereditary forms and properties of animals.

Purpose of studying of the discipline

undergraduates receive theoretical knowledge on general issues of animal reproduction techniques and practical skills in embryo transplantation and embryoengineering research in animal husbandry.

Learning Outcomes

ON4 Analyze and solve theoretical and applied problems in biology.
ON6 Demonstrate fundamental knowledge in the field of general biology, cellular and molecular biology, genetics, microbiology, biotechnology when conducting scientific research, developing innovative technologies, including in the educational practice of higher education.
ON8 Carry out scientific experiments in laboratory and field conditions, use systematized theoretical and practical knowledge of natural sciences in solving scientific, applied and educational problems.

Learning outcomes by discipline

- identify and apply methods of breeding farm animals of different species and breeds in different climatic and other conditions

Prerequisites

Modern problems of evolution Modern problems of human and animal biology Actual problems of genetics Cell Biology

Postrequisites

Final examination The research work of a student, including an internship and the implementation of a master s thesis III

Nature protection in Kazakhstan

Discipline cycle	Profiling discipline
Course	2
Credits count	5
Knowledge control form	Examination

Short description of discipline

The discipline studies the system of specially protected natural territories: principles and approaches to creation, main categories, history of formation. The development and current state of conservation in Kazakhstan, the role of protected areas in the process of maintaining the stability of biological diversity. It also considers the protected territories of Kazakhstan, the specifics of their fauna and flora, national parks and reserves, their inhabitants, protection measures and recreational use.

Purpose of studying of the discipline

undergraduates receive stable knowledge about the system of specially protected natural territories of Kazakhstan, the organization of national parks and reserves in Kazakhstan, about the development and current state of conservation in Kazakhstan, about the role of protected areas in the process of maintaining the stability of biological diversity.

Learning Outcomes

ON4 Analyze and solve theoretical and applied problems in biology.
ON6 Demonstrate fundamental knowledge in the field of general biology, cellular and molecular biology, genetics, microbiology, biotechnology when conducting scientific research, developing innovative technologies, including in the educational practice of higher education.
ON7 Improve the level of scientific biological research through the widespread use of modern methods of processing, biometrics and interpretation of scientific data in the field of botany, zoology, cell biology, embryology, molecular biology, bioengineering.

Learning outcomes by discipline

- apply the basic theoretical approaches and principles of modern biogeography in order to understand the laws of the functioning of the system of protected areas;
- analyze the relationship of biological objects with the conditions and factors of the natural environment, with the influence of human activity;
- interpret biological and geographical information to solve the targeted tasks of specific protected areas.

Prerequisites

Modern problems of evolution Cell Biology

Postrequisites

Final examination The research work of a student, including an internship and the implementation of a master s thesis II The research work of a student, including an internship and the implementation of a master s thesis III

Nature protection of Kazakhstan

Discipline cycle	Profiling discipline
Course	2
Credits count	5
Knowledge control form	Examination

Short description of discipline

The discipline studies the legislative and regulatory framework of environmental protection activities. Considers the Law of the Republic of Kazakhstan "On Specially Protected Natural territories", specially protected natural territories are the basis for the long-term existence of a biocenosis. The geographical location of the zones and their natural and climatic features. Flora and fauna. Environmental fundamentals of ecosystem protection. Protection of endangered plant communities.

Purpose of studying of the discipline

To study the legislative and regulatory framework of environmental protection activities and specially protected natural areas

Learning Outcomes

ON4 Analyze and solve theoretical and applied problems in biology.
ON6 Demonstrate fundamental knowledge in the field of general biology, cellular and molecular biology, genetics, microbiology, biotechnology when conducting scientific research, developing innovative technologies, including in the educational practice of higher education.
ON7 Improve the level of scientific biological research through the widespread use of modern methods of processing, biometrics and interpretation of scientific data in the field of botany, zoology, cell biology, embryology, molecular biology, bioengineering.

Learning outcomes by discipline

- plan environmental protection measures at the enterprise, territory, region, industry level;
- organize the formation and implementation of environmental programs at the enterprise and territory level;

Prerequisites

Modern problems of evolution Cell Biology

Postrequisites

Final examination The research work of a student, including an internship and the implementation of a master s thesis II The research work of a student, including an internship and the implementation of a master s thesis III

Ecology Of Kazakhstan

Discipline cycle	Profiling discipline
Course	2
Credits count	5
Knowledge control form	Examination

Short description of discipline

Ecology sections: autecology, demecology, synecology, global ecology. Autecology: the organism and its living conditions. Environmental

factors and their classification. Abiotic and biotic factors. Ecology of populations – demecology. The concept of a population. Static characteristics of the population: population size and biomass, age and sex composition. Dynamic characteristics of the population: fertility, growth rate, mortality. Regulation of population size. The problem of providing human society with natural resources. Rational use of natural resources. Development of low-waste technologies.

Purpose of studying of the discipline

To study the manifestations of natural processes, to master the processing techniques used in industry that reduce the harmful effects on the environment, the development of biological thinking and basic engineering and biological knowledge, for their application in industrial enterprises and in other areas.

Learning Outcomes

ON4 Analyze and solve theoretical and applied problems in biology.
ON6 Demonstrate fundamental knowledge in the field of general biology, cellular and molecular biology, genetics, microbiology, biotechnology when conducting scientific research, developing innovative technologies, including in the educational practice of higher education.
ON7 Improve the level of scientific biological research through the widespread use of modern methods of processing, biometrics and interpretation of scientific data in the field of botany, zoology, cell biology, embryology, molecular biology, bioengineering.

Learning outcomes by discipline

Analyze the patterns of environmental processes associated with anthropogenic impact on the environment;
To identify their causes and ways of elimination; to use the acquired knowledge about the laws of interaction between living organisms and the environment in practice.

Prerequisites

Modern problems of evolution Cell Biology

Postrequisites

Final examination The research work of a student, including an internship and the implementation of a master s thesis II The research work of a student, including an internship and the implementation of a master s thesis III

Methods of teaching biology at the present level

Discipline cycle	Profiling discipline
Course	2
Credits count	5
Knowledge control form	Examination

Short description of discipline

The methodology of teaching biology at the modern level should equip undergraduates with knowledge of the theoretical and methodological foundations of methodological science and initial methodological skills that contribute to the performance of various functions of a biology teacher.. In connection with modern requirements, the focus of this course is on the development of independent cognitive activity of students, their upbringing in the process of teaching biology.

Purpose of studying of the discipline

The main purpose of the course is to develop a system of methodological knowledge and skills among undergraduates that ensure readiness to effectively carry out the educational process in biology at school, independence and creativity in their teaching activities.

Learning Outcomes

ON1 Apply fundamental scientific, pedagogical, managerial, communicative knowledge and skills in professional activity.
ON5 Possess the theoretical and methodological foundations of scientific research in biology, methods of introducing research results into practical and pedagogical activities.

Learning outcomes by discipline

analyze the program of textbooks and methodological literature, apply the knowledge gained in the field of biology to solve pedagogical and other methodological tasks, plan, organize and conduct educational work, determine the degree and depth of assimilation of educational material by students, use various techniques and means of knowledge control, methodically competently conduct laboratory and practical classes, use various means of visibility.

Prerequisites

Psychology of management Tertiary education

Postrequisites

Final examination

New approaches to learning

Discipline cycle	Profiling discipline
Course	2
Credits count	5
Knowledge control form	Examination

Short description of discipline

Teaching critical thinking. The use of ICT in teaching and learning. Teaching in accordance with the age characteristics of the trainees. Management and leadership in training. A master`s student must know, understand and possess the practical skills of a teacher in the context of seven modules; possess the skills of critical thinking (reflection) about his practice; possess the methodology for activating the process of involving students in self-education. Readiness to work in the professional community of teachers.

Purpose of studying of the discipline

to develop a system of methodological knowledge and skills among undergraduates that ensure readiness to effectively carry out the educational process in biology at school, independence and creativity in their teaching activities.

Learning Outcomes

ON1 Apply fundamental scientific, pedagogical, managerial, communicative knowledge and skills in professional activity.
ON5 Possess the theoretical and methodological foundations of scientific research in biology, methods of introducing research results into practical and pedagogical activities.

Learning outcomes by discipline

analyze the program of textbooks and methodological literature, apply the acquired knowledge to solve pedagogical and other methodological tasks, plan, organize and conduct educational work, determine the degree and depth of assimilation of educational material by students, use various techniques and means of knowledge control, methodically competently conduct laboratory and practical classes, use various means of visibility.

Prerequisites

Psychology of management Tertiary education

Postrequisites

Final examination Pedagogical practice

Professional guide of the teacher

Discipline cycle	Profiling discipline
Course	2
Credits count	5
Knowledge control form	Examination

Short description of discipline

The discipline considers the targets of higher education in modern educational paradigms, the axiological component of the professional image of a teacher, the values and meanings of pedagogical activity, the methodological component of the professional image of a teacher. New approaches in teaching and learning, teaching critical thinking, assessment for learning and evaluation of learning, the use of ICT in teaching and learning; training of talented and gifted students, teaching in accordance with the age characteristics of trainees, management and leadership in learning.

Purpose of studying of the discipline

Preparation of a master `s student for teaching at a university and the creation of conditions for the formation of his professional image .

Learning Outcomes

ON1 Apply fundamental scientific, pedagogical, managerial, communicative knowledge and skills in professional activity.
ON5 Possess the theoretical and methodological foundations of scientific research in biology, methods of introducing research results into practical and pedagogical activities.

Learning outcomes by discipline

- determine the features of your pedagogical image;
- to identify the orientation of the axiological, ontological, methodological components of the professional image of the teacher;
- to carry out the selection of ways to form a professional image and implement them in their teaching activities;
- plan personal and professional development in the context of the professional image of the teacher

Prerequisites

Psychology of management Tertiary education

Postrequisites

Final examination Pedagogical practice