CATALOG OF ELECTIVE DISCIPLINES

6B01 - Pedagogical sciences
(Code and classification of the field of education)

6B015 - Teacher training in natural science subjects
(Code and classification of the direction of training)

0114
(Code in the International Standard Classification of Education)

B013 - Biology teacher training
(Code and classification of the educational program group)

6B01510 - Biology
(Code and name of the educational program)

Bachelor
(Level of preparation)

set of 2023

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Developed
By the Academic Committee of the EP 6B01510 - Biology
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Reviewed
At the meeting of the Quality Assurance Commission
Natural and Mathematical of the faculty
Recommended to be for approved
by the Academic Council of the University
Record No 4.1 "04" April 2023 y.
Chairman of the Commission Zheldybayeva B.S.

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

Flora and fauna of the world

Discipline cycle	Basic disciplines
Course	3
Credits count	5
Knowledge control form	Examination

Short description of discipline
The course examines the laws of the distribution of living organisms on the planet, the geographical aspects of flora and fauna, the structural and functional foundations of ecosystems. He also teaches the evolutionary development of living organisms in order to understand and explain their geographic distribution. Forms systematic knowledge of students about the flora and fauna of the environment, floristic, faunal, biotic migrations of the continent, modern zoning of the oceans, the main types of biomes.

Purpose of studying of the discipline
Formation of ideas about the diversity of plants and animals, their complexes on the surface of the globe, identification of causes and evolutionary trends in the dynamics of floras and faunas.

Learning Outcomes
ON 7 Possess knowledge about the resource value of plants in Kazakhstan; describe the diversity of the structure of cells, tissues and vegetative organs of various plant groups; evaluate the evolutionary significance of morphological structures of plants. To develop skills in the image of design and planning solutions for the construction of landscape compositions.
ON 8 Possess knowledge about the resource value of ichthyofauna, herpetofauna, ornithofauna and mammalian fauna. Describe the biodiversity, ecological status and significance of the most important animal representatives of Kazakhstan.

Learning outcomes by discipline
- Explain the diversity of biological objects, the importance of diversity in the stability of the biosphere;
- Apply methods of cultivation, classification, description, control of biological objects;
- Determine the taxonomy of representatives of regional flora and fauna, the causes of changes in the species composition of flora and fauna

Prerequisites
Plant Sistematic

Postrequisites
Bioresources Kazakhstan

Undergraduate practice

Discipline cycle	Profiling discipline
Course	4
Credits count	15
Knowledge control form	Total mark on practice

Short description of discipline
Students` pre-graduate practice is designed to collect, process theoretical and practical material to complete the writing of a thesis (project). During the practice, students gain theoretical and practical skills on the topic of the thesis;
The tasks of the pre-graduate practice, its content are determined and specified depending on the specifics of the organization in which the student is practicing.

Purpose of studying of the discipline
collection and processing of theoretical and practical material necessary for the thesis.

Learning Outcomes
ON10 Demonstrate knowledge of theoretical disciplines and apply them in professional activities; consolidate the skills of independent planning and conducting research experiments.

Learning outcomes by discipline
Demonstrate theoretical and practical knowledge on the topic of the thesis;
- approbation of research results on the topic of the thesis.
- to realize the social significance of his future profession, has a high motivation to perform professional activities.

Prerequisites
Basic and profile disciplines of the EP

Postrequisites
Final examination

Production (pedagogical) practice

Discipline cycle	Profiling discipline
Course	4
Credits count	15
Knowledge control form	Total mark on practice

Short description of discipline
The practice has an integrative character, as it is learned on the skills, abilities and competencies acquired by students during the passage of all types of practices. The purpose of the practice is to create conditions that allow students to acquire practical skills in teaching and master the basics of teaching skills.

Purpose of studying of the discipline
to create conditions that allow students to acquire practical skills in teaching and master the basics of teaching skills.

Learning Outcomes
ON2 Apply modern teaching technologies and criteria- based assessment, taking into account the individual, physiological and psychological characteristics of students.
ON10 Demonstrate knowledge of theoretical disciplines and apply them in professional activities; consolidate the skills of independent

planning and conducting research experiments.

Learning outcomes by discipline

- mastering the basics of pedagogical skills, skills and abilities of independent conduct of educational and teaching work
- to form an adequate self-esteem, responsibility for the results of one`s work;
- forms, develops educational and methodological materials.

Prerequisites

Basic and profile disciplines of the EP

Postrequisites

Final examination

Biochemistry

Discipline cycle	Basic disciplines
Course	1
Credits count	3
Knowledge control form	Examination

Short description of discipline

During the development of this course, students gain knowledge about the structure and properties of chemical compounds that make up living organisms, the basic laws of biochemical processes and the mechanisms of metabolism regulation. Students will develop their knowledge of organic chemistry and biology in the context of interdisciplinary communication, as well as develop skills in working with information sources, systematization, and independent search. Promotes the application of acquired knowledge in professional, scientific and cognitive activities.

Purpose of studying of the discipline

To reveal the place of biochemistry in a number of other natural disciplines, its importance in the life of modern society and to study the patterns of biochemical reactions in the body of plants, animals and

Learning Outcomes

ON4 To explain the chemical nature of a living organism using theoretical knowledge about the basic properties and structures of substances, patterns of chemical reactions.

Learning outcomes by discipline

- explain the patterns and possibilities of chemical processes and energy conversion in a living organism;
- describe the mechanisms of regulation of chemical transformations occurring in the body and their role in ensuring life
- integrate the acquired knowledge to solve situational problems;

Prerequisites

School course

Postrequisites

Basic and profile disciplines of the EP

Inorganical chemistry

Discipline cycle	Basic disciplines
Course	1
Credits count	3
Knowledge control form	Examination

Short description of discipline

This discipline provides for the study of the concept of chemical elements and their compounds; their properties, methods of obtaining and application; trends in the development of inorganic chemistry. When studying the course, students develop systemic knowledge about the structure of substances, about the characteristics of elements, about a comparative analysis of the physical and chemical properties of chemical elements.

Purpose of studying of the discipline

To get acquainted with the chemical classification of elements, the properties of chemical elements and their compounds.

Learning Outcomes

ON4 To explain the chemical nature of a living organism using theoretical knowledge about the basic properties and structures of substances, patterns of chemical reactions.

Learning outcomes by discipline

Link the presentation of individual sections of chemistry, highlighting the properties of metals and non-metals, and their compounds.
Describe a complex of very valuable physical and chemical properties of new classes of chemical compounds of metals and nonmetals.
Solve computational and experimental problems in the chemistry of elements.

Prerequisites

School course

Postrequisites

Basic and profile disciplines of the EP

General Chemistry

Discipline cycle	Basic disciplines
Course	1
Credits count	3
Knowledge control form	Examination

Short description of discipline

This course provides for the study of the foundations of general chemistry, the importance of atomic and molecular science; modern understanding of the chemical bond, the theory of solutions. When studying the course, students develop systemic knowledge about the basic chemical concepts, the dependence of the properties of substances on the nature of the chemical bond.

Purpose of studying of the discipline
To master the theoretical foundations of general chemistry.
Learning Outcomes
ON4 To explain the chemical nature of a living organism using theoretical knowledge about the basic properties and structures of substances, patterns of chemical reactions.
Learning outcomes by discipline
- Discuss the theoretical foundations of general chemistry and its applied aspects.
- Explain the basic patterns and laws of chemistry, the features of the chemical composition of inorganic compounds, the stability of substances and the direction of processes, the mechanisms of chemical reactions.
- Solve computational and experimental problems in general chemistry.
Prerequisites
School course
Postrequisites
Basic and profile disciplines of the EP

Invertebrate Zoology

Discipline cycle	Basic disciplines
Course	2
Credits count	5
Knowledge control form	Examination

Short description of discipline
This discipline provides for the study of issues related to the main issues of the biological diversity of the animal world, as well as their evolutionary relationships and systematics. When studying the course, students develop systemic knowledge about the general patterns of development and origin of various groups of invertebrates, about the role of animals in the environment and human life, about the principles of the structure of organs and systems, differentiation and integration of body functions, about the main patterns of reproduction and development animals
Purpose of studying of the discipline
To introduce the morphofunctional, taxonomic and ecological diversity of invertebrates, their evolution and significance in human life.
Learning Outcomes
ON3 Demonstrate scientific ideas about the diversity and systematics of the animal and plant world, knowledge about the human body and animals as an integral system. Possess the methodology of determining plants and animals, the skills of naturalistic work and environmental activities.
Learning outcomes by discipline
- Knows about the life levels of the organization of invertebrates and vertebrates.
- The diversity of animal world; all levels and organization of life and the main stages in the evolution of invertebrate animals, the knowledge of all taxonomic ranks animals.
- Can determine the animals; use the simplest methods of morphological research facilities; the right to work with a microscope and slides; to work with determinants of animals.
Prerequisites
School course
Postrequisites
Evolutionary Theory

Parasitology

Discipline cycle	Basic disciplines
Course	2
Credits count	5
Knowledge control form	Examination

Short description of discipline
This discipline involves the study of various systematic groups of parasites. When studying the course, students form systematic knowledge about the history of parasitology, about the features of the structure of parasites at all stages of development, about the systematics of parasitology objects, about the parasite-host relationship, about the features of the development cycle of parasites and vectors, about habitats, the spread of parasitic diseases in certain territories, as well as about control measures and methods of prevention with parasites and vectors.
Purpose of studying of the discipline
The course of choice «Parasitology» reflects the current state of science about the relationship of parasitic organisms with animals and humans.
Learning Outcomes
ON3 Demonstrate scientific ideas about the diversity and systematics of the animal and plant world, knowledge about the human body and animals as an integral system. Possess the methodology of determining plants and animals, the skills of naturalistic work and environmental activities.
Learning outcomes by discipline
- Understands the content of the main parasitological concepts; Distinguishes the main directions of modern parasitology; morphofunctional features of parasitic organisms;
- Assesses the nature of the impact of parasites on the host organism; responses of the host organism to the impact of parasites;
- Explains the importance of parasitic diseases in humans and domestic animals; develop programs of preventive conversations with students about the need to observe hygiene rules in order to prevent infection with parasitic diseases.
Prerequisites
School course
Postrequisites

Evolutionary Theory

Entomology

Discipline cycle	Basic disciplines
Course	2
Credits count	5
Knowledge control form	Examination

Short description of discipline
This discipline provides for the study of various systematic groups of the insect class. Students acquire knowledge about the history of entomology, about the systematics and classification of insects, about the features of the external and internal structure and functions of various organs of hexapods, about modern methods of studying insect groups, also about the general principles of insect breeding, about improving breeding technology, about sanitary and epidemiological control and methods of preserving the gene pool of insect cultures.

Purpose of studying of the discipline
In the process of studying the discipline entomology, students should know the biodiversity of animals, their importance in nature and human life, the areas of their distribution.

Learning Outcomes
ON3 Demonstrate scientific ideas about the diversity and systematics of the animal and plant world, knowledge about the human body and animals as an integral system. Possess the methodology of determining plants and animals, the skills of naturalistic work and environmental activities.

Learning outcomes by discipline
- Knows the basic information on the external and internal structure of insects;
- The systematic position of insects and the characteristics of the main orders; biology of reproduction and development of insects; Able to use tools collecting organisms;
- Form and preserve zoological collections; analyze collected material and research results.

Prerequisites
School course

Postrequisites
Evolutionary Theory

Human anatomy

Discipline cycle	Basic disciplines
Course	2
Credits count	5
Knowledge control form	Examination

Short description of discipline
This discipline considers the formation of a scientific understanding of the features of the internal structure of the human body. During the course, students develop systematic knowledge about human morphology, the anatomy of individual organs and systems, as well as the relationship in the human body with the motor, digestive, respiratory, circulatory, endocrine, genitourinary, nervous systems and sensory organs. The course contributes to the development of anatomical and morphological knowledge of students.

Purpose of studying of the discipline
Students gain knowledge about the structure and functioning of the human body, the basic laws of growth and development of children and adolescents, morphology features.

Learning Outcomes
ON3 Demonstrate scientific ideas about the diversity and systematics of the animal and plant world, knowledge about the human body and animals as an integral system. Possess the methodology of determining plants and animals, the skills of naturalistic work and environmental activities.

Learning outcomes by discipline
- *Describe the patterns of the structure and topographical features of the human body*
- *explain the relationship of the structure of organs with the functions performed;*
- *explain the role of movement, digestion, respiration, blood composition, vascular system, endocrine glands, genitourinary, nervous system, sensory organs; use macro- and micro-preparations.*

Prerequisites
School course

Postrequisites
Human and animal physiology

Anatomy, the basics of sports morphology

Discipline cycle	Basic disciplines
Course	2
Credits count	5
Knowledge control form	Examination

Short description of discipline
The course is aimed at forming students` systematic knowledge about the structure and functions of the human body, changes in the body as a whole under the influence of various physical activities or sports activities. This course focuses on the anatomy of muscles and the physiology of human activity based on sports activity. The acquired knowledge of the course teaches students practical use for maintaining a healthy lifestyle.

Purpose of studying of the discipline
Students gain knowledge about the structure and functioning of the human body, the basic laws of growth and development of children

and adolescents, the features of sports morphology of athletes.

Learning Outcomes

ON3 Demonstrate scientific ideas about the diversity and systematics of the animal and plant world, knowledge about the human body and animals as an integral system. Possess the methodology of determining plants and animals, the skills of naturalistic work and environmental activities.

Learning outcomes by discipline

- *Describe the anatomical structure of the human body at different levels of organization.*
- *analyze and synthesize the studied material, highlight and reveal the cause-and-effect relationships of the formation of the human body.*
- *to determine on a living person the main anatomical formations – bone protrusions, gaps, the direction of the ligaments, the contours of the muscles, their place of origin and attachment, - projection of internal organs, vessels and peripheral nerves.*

Prerequisites

School course

Postrequisites

Human and animal physiology

Comparative anatomy of humans and animals

Discipline cycle	Basic disciplines
Course	2
Credits count	5
Knowledge control form	Examination

Short description of discipline

This discipline considers the formation of a natural and scientific understanding of the structure of each organ of man and animals. While studying the course, students gain knowledge on the embryonic development of humans and animals, comparative morphology and anatomy of the skeleton, blood transport, respiration, digestion, genitourinary, nervous systems and sensory organs. Includes the study of general patterns of the structure and development of the organ system

Purpose of studying of the discipline

Students gain knowledge about the structure of organs, organ systems and organisms of animals and humans in general and in a comparative aspect.

Learning Outcomes

ON3 Demonstrate scientific ideas about the diversity and systematics of the animal and plant world, knowledge about the human body and animals as an integral system. Possess the methodology of determining plants and animals, the skills of naturalistic work and environmental activities.

Learning outcomes by discipline

- *Demonstrate knowledge about the human and animal body as an integral system.*
- *Explain the features of the respiratory, digestive, genitourinary, nervous and sensory systems of humans and animals.*
- *Conduct a comparative analysis of human and animal systems.*

Prerequisites

School course

Postrequisites

Human and animal physiology

Virology

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

Short description of discipline

The study of this discipline forms students` in-depth professional knowledge in the field of virology, makes it possible to independently plan and conduct scientific research by acquiring new theoretical knowledge about their origin in nature and the morphology of viruses. They gain skills in laboratory studies of viruses using various experimental forms, acquire new knowledge based on the specifics of the specialty, including communication with other disciplines.

Purpose of studying of the discipline

the lighting of modern ideas about the structural organization of tissues and their interactions with each other and with environment.

Learning Outcomes

ON3 Demonstrate scientific ideas about the diversity and systematics of the animal and plant world, knowledge about the human body and animals as an integral system. Possess the methodology of determining plants and animals, the skills of naturalistic work and environmental activities.

Learning outcomes by discipline

- gives an idea of the classification and biological properties of viruses;
- explains the role of viruses in nature and human life
- use the literature in the field of viruses

Prerequisites

School course

Postrequisites

Evolutionary Theory

Microbiology

Discipline cycle	Profiling discipline
Course	2

Credits count	5
Knowledge control form	Examination

Short description of discipline
Microbiology introduces students to the properties of microorganisms, their physiology and metabolism, and determines the practical role of microorganisms in the environment, medicine, and biotechnology. Students should be able to study microorganisms in laboratory studies, prepare a nutrient medium for microorganisms, know how to decompose them in laboratory conditions and the rules for working with them.

Purpose of studying of the discipline
to acquaint students with the world of microorganisms and their basic properties, to determine the overall biological significance of the achievements of microbiology, to demonstrate the connection of microbiology with other biological areas, and also to determine the ideological and socio-ethical significance of microbiology. In order to master the course "Microbiology and Virology", students need knowledge of low molecular weight biological molecules, inorganic chemistry, botany, zoology, and biochemistry.

Learning Outcomes
ON3 Demonstrate scientific ideas about the diversity and systematics of the animal and plant world, knowledge about the human body and animals as an integral system. Possess the methodology of determining plants and animals, the skills of naturalistic work and environmental activities.

Learning outcomes by discipline
- gives an idea of the classification and biological properties of microorganisms;
- explains the role of microorganisms in nature and human life
- use the literature in the field of microbiology

Prerequisites
School course

Postrequisites
Evolutionary Theory

Microbiology with fundamentals of Virology

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

Short description of discipline
The course includes the study of the basic concepts and methods of microbiology and virology. Students, using microorganisms in modern biotechnologies, develop knowledge about the metabolism of bacteria, their growth, reproduction, taxonomy, health care, environmental protection. The student orients and systematizes the acquired knowledge and skills in the field of microbiology and virology, depending on the characteristics of the vital activity of microorganisms, and also uses them in the future profession of a teacher

Purpose of studying of the discipline
The course "Microbiology" aims to acquaint students with the most important properties of prokaryotes. To show the General biological significance of achievements in the field of Microbiology; to determine the relationship of Microbiology with other biological disciplines, to highlight the ideological and socio-ethical significance of discoveries in the field of Microbiology.

Learning Outcomes
ON3 Demonstrate scientific ideas about the diversity and systematics of the animal and plant world, knowledge about the human body and animals as an integral system. Possess the methodology of determining plants and animals, the skills of naturalistic work and environmental activities.

Learning outcomes by discipline
- explains the requirements of educational standards for microbiology and virology and is ready to implement educational programs in academic subjects.
- implements educational programs in microbiology and virology in accordance with the requirements of educational standards.
- uses methods of working with microorganisms as part of an educational program in academic subjects in accordance with the requirements of educational standards.

Prerequisites
School course

Postrequisites
Evolutionary Theory

Geobotany

Discipline cycle	Basic disciplines
Course	2
Credits count	5
Knowledge control form	Examination

Short description of discipline
This is a fundamental subject of the botanical cycle, which considers plant communities by types of vegetation, their phytocenoses and ecological and floristic features, their place in the ecosystem, their influence and dependence on the environment, their interaction with other components of the ecosystem`s vegetation. In the course of studying the discipline, students expand their knowledge in the field of biogeography, that is, the laws of the geographical position of organisms and their associations, their place in science, and practical significance.

Purpose of studying of the discipline
Mastering knowledge about the vegetation cover of the Earth as a set of plant communities and the patterns of their distribution.

Learning Outcomes
ON3 Demonstrate scientific ideas about the diversity and systematics of the animal and plant world, knowledge about the human body and animals as an integral system. Possess the methodology of determining plants and animals, the skills of naturalistic work and

environmental activities.

Learning outcomes by discipline

- Explain the typology, ecological features of plant communities, methods of population-demographic analysis of biodiversity;
- Analyze methods and principles of studying flora, patterns of evolution, succession, geography of plant communities;
- Identify the seasonal dynamics of plant communities, use the methods of geobotanical mapping and zoning.

Prerequisites

Anatomy and Morphology of Plants

Postrequisites

Big practicum in botany

Medicinal plants

Discipline cycle	Basic disciplines
Course	2
Credits count	5
Knowledge control form	Examination

Short description of discipline

This course deals with the classification of higher plants, the phylogeny of the main taxonomic groups, the theoretical and practical significance of important plant groups. Biologically active substances in medicinal plants, the identification of their new effective properties make it possible to study plant species used as medicinal raw materials. Forms students` theoretical knowledge about herbal remedies and materials used in various diseases.

Purpose of studying of the discipline

Formation of students` scientific knowledge and skills in the rational use of medicinal plant resources.

Learning Outcomes

ON3 Demonstrate scientific ideas about the diversity and systematics of the animal and plant world, knowledge about the human body and animals as an integral system. Possess the methodology of determining plants and animals, the skills of naturalistic work and environmental activities.

Learning outcomes by discipline

- Explain the morphological, biological, ecological features of medicinal plants in natural and artificial environments, safety rules when working with medicinal plants and their tinctures;
- Identify natural relationships between plant groups, determine the taxonomic categories used in the current system;
- Find and identify medicinal plants in various phytocenoses;

Prerequisites

Anatomy and Morphology of Plants

Postrequisites

Big practicum in botany

Plant Sistematic

Discipline cycle	Basic disciplines
Course	2
Credits count	5
Knowledge control form	Examination

Short description of discipline

This course is aimed at studying classical and modern methods of studying the vegetation cover, getting acquainted with the taxonomy of species characteristics of plants, distribution areas, the relationship of species, instilling in students theoretical knowledge of plant systematics, developing skills for independent work with plant objects. Considers the relationship of plants between themselves and the environment, determines the importance of plants and ways to protect them. In the process of studying the course, students will master the methods of studying plants in a natural phytocenosis.

Purpose of studying of the discipline

to contribute to the preparation of young specialists - botanists for research work: memorization and reproduction of the studied material; mastering botanical methods in practical and research work; the ability to analyze the studied material; correct assessment of the studied material

Learning Outcomes

ON3 Demonstrate scientific ideas about the diversity and systematics of the animal and plant world, knowledge about the human body and animals as an integral system. Possess the methodology of determining plants and animals, the skills of naturalistic work and environmental activities.

Learning outcomes by discipline

- explain the systematization of lower and higher plants, the diversity of flora, the patterns of its development and formation, the structure of phytocenoses and the spatial distribution of plant communities;
- to determine the main features of lower and higher plants and their types; compare all levels and main stages of the structure of life in the evolution of plants;
- Describe the distribution of plants on earth, methods of reproduction, ecology, significance;
- Discuss the biological patterns of flora development, natural relationships between groups of plants;

Prerequisites

Anatomy and Morphology of Plants

Postrequisites

Big practicum in botany

Big practicum in plant physiology

Discipline cycle	Basic disciplines
Course	2

Credits count	5
Knowledge control form	Examination

Short description of discipline
Course - to introduce students with structural biochemical plant features and methods analyzing their metabolic activity, giving the knowledge and skills required for work with plant objects in modern scientific laboratories. Knows the structure and functions of plant cell organoids, patterns of plant growth and development, physiological bases of plant resistance.

Purpose of studying of the discipline
coverage of the current state of knowledge about the general patterns of plant life; identification of the relationship between the main biological processes, as well as the dependence of these processes on environmental conditions.

Learning Outcomes
ON 7 Possess knowledge about the resource value of plants in Kazakhstan; describe the diversity of the structure of cells, tissues and vegetative organs of various plant groups; evaluate the evolutionary significance of morphological structures of plants. To develop skills in the image of design and planning solutions for the construction of landscape compositions.

Learning outcomes by discipline
- Knows the structure and functions of plant cell organelles; essence and mechanisms of light and dark phases of photosynthesis;
- Able to determine the influence of various mineral elements on the growth and development of plants, individual indicators of growth, plant resistance;
- Has the skills to conduct experiments to study the basic physiological processes;

Prerequisites
Anatomy and Morphology of Plants

Postrequisites
Applied Biology with the Basics of Soil Science

Plant Physiology

Discipline cycle	Basic disciplines
Course	2
Credits count	5
Knowledge control form	Examination

Short description of discipline
This subject forms professional knowledge and skills in mastering a profession. Plant physiology is one of the fundamental subjects for the study of wildlife. Physiology reveals the significance of processes in plants, their relationship, changes under the influence of the external environment, establishes regulatory mechanisms, and creates methods aimed at increasing the productivity of crops. Experimental work; the ability to conduct experimental work with living organisms. This is especially important for professional and pedagogical training of students.

Purpose of studying of the discipline
to give modern ideas about the nature of the main physiological processes of a plant, the mechanisms of their regulation at different levels of organization of the plant organism and the main patterns of interconnection with the environment; with the
principles of system organization, differentiation, integration of body functions.

Learning Outcomes
ON 7 Possess knowledge about the resource value of plants in Kazakhstan; describe the diversity of the structure of cells, tissues and vegetative organs of various plant groups; evaluate the evolutionary significance of morphological structures of plants. To develop skills in the image of design and planning solutions for the construction of landscape compositions.

Learning outcomes by discipline
- Acquire knowledge: the study of plant cell organelles; functions of organs (leaf, stem, root); the formation of organic substances, the processes of photosynthesis and respiration; plant growth and development; absorption of water and minerals; plant resistance to adverse environmental conditions; chemical and physiological bases of internal mechanisms.
- Must be able to navigate the processes occurring in plants, the study of general patterns and specific mechanisms underlying the life of plants.
- Understanding of plant regulation systems (intracellular and organismal): genetic, membrane, trophic, hormonal, electrophysiological

Prerequisites
Anatomy and Morphology of Plants

Postrequisites
Applied Biology with the Basics of Soil Science

Physiology of growth and development of plants

Discipline cycle	Basic disciplines
Course	2
Credits count	5
Knowledge control form	Examination

Short description of discipline
This subject forms professional knowledge and skills in mastering a profession. Plant physiology is one of the fundamental subjects for the study of wildlife. Physiology reveals the significance of processes in plants, their relationship, changes under the influence of the external environment, establishes regulatory mechanisms, and creates methods aimed at increasing the productivity of crops. Experimental work; the ability to conduct experimental work with living organisms. This is especially important for professional and pedagogical training of students.

Purpose of studying of the discipline
to study the basic physiological processes of plant organisms, to reveal the essence of the life processes of plants, to identify their dependence on environmental conditions in order to control the course of growth and development of plants

Learning Outcomes
ON 7 Possess knowledge about the resource value of plants in Kazakhstan; describe the diversity of the structure of cells, tissues and

vegetative organs of various plant groups; evaluate the evolutionary significance of morphological structures of plants. To develop skills in the image of design and planning solutions for the construction of landscape compositions.

Learning outcomes by discipline

- Knows the physiological processes of the plant cell; functions of organs (leaf, stem, root); the process of photosynthesis, the theory of photosynthetic productivity, methods for increasing productivity, respiration processes; plant growth and development;
- Ways of applying fertilizers, methods of productive use of water, increasing the resistance of plants.
- Able to apply the acquired knowledge to further improve the level of theoretical training, as well as in practical activities. To do this, it is necessary to acquire the skills to conduct experiments to study the basic physiological processes. to navigate the physiological processes occurring in plants, to understand the general laws and specific mechanisms that underlie the life of plants. purposefully change physiological processes in order to increase plant productivity.

Prerequisites

Anatomy and Morphology of Plants

Postrequisites

Applied Biology with the Basics of Soil Science

Vertebrate Zoology

Discipline cycle	Basic disciplines
Course	2
Credits count	5
Knowledge control form	Examination

Short description of discipline

This discipline gives a complete picture of the features of the structure and physiological behavior of vertebrates, as well as their relationship with the environment and biodiversity. In the course of mastering the course, students develop knowledge about the patterns of organization of vertebrates, that is, the principles of the structure of organs and systems and life, taxonomy, geographical distribution, beneficial and harmful species of animals, and the purposes of using the animal world in the national economy.

Purpose of studying of the discipline

to provide specific knowledge on the structure, processes of vital activity, ecology, behavior, distribution and diversity of vertebrates.

Learning Outcomes

ON3 Demonstrate scientific ideas about the diversity and systematics of the animal and plant world, knowledge about the human body and animals as an integral system. Possess the methodology of determining plants and animals, the skills of naturalistic work and environmental activities.

Learning outcomes by discipline

- Describe the morphological and anatomical structure and functions of the organs of various groups of vertebrates; understand the levels of organization of life.
- Classify vertebrates and explain the belonging of different species to different taxonomic ranks.
- Compare different types, classes of animals by habitat, by way of life, by type of food, by type of reproduction and by ecology

Prerequisites

Invertebrate Zoology

Postrequisites

Evolutionary Theory

Ichthyology

Discipline cycle	Basic disciplines
Course	2
Credits count	5
Knowledge control form	Examination

Short description of discipline

This discipline provides for the study of morphology, anatomy, ecology and the history of fish development. When studying the course, students form systematic knowledge about the external and internal structure of fish, adaptation to the environment, embryology and phylogeny, geographical distribution and abundance of fish, patterns of its change, ethology, methods for determining productive fish stocks, scientifically based measures of fish conservation and fisheries, knowledge of effective ways of organization is formed.

Purpose of studying of the discipline

to study the diversity and phylogeny of fish, the features of internal and external structure.

Learning Outcomes

ON3 Demonstrate scientific ideas about the diversity and systematics of the animal and plant world, knowledge about the human body and animals as an integral system. Possess the methodology of determining plants and animals, the skills of naturalistic work and environmental activities.

Learning outcomes by discipline

- To know the distinguishing features of the main supraspecific taxa of fish and pisciformes; Features of the biology of the main economically important fish species.
- Determine the features of its ecology by the appearance of the fish.
- Know the main applied tasks of ichthyology associated with natural and economic activities Use modern methods research in the field ichthyology.

Prerequisites

Invertebrate Zoology

Postrequisites

Evolutionary Theory

Ornithology

Discipline cycle	Basic disciplines

Course	2
Credits count	5
Knowledge control form	Examination

Short description of discipline
This discipline includes knowledge about systematics, individual and historical development, physiology, ecology of birds. In the course of mastering the discipline, students receive extensive knowledge about the avifauna of Kazakhstan. Knowledge is being formed about the laws of the origin of birds, the principles of the structure of organs and systems, as well as the patterns of distribution on earth, the role of birds as carriers of pathogens of various diseases, in connection with which parasites and the spread of various diseases among humans and animals.

Purpose of studying of the discipline
The purpose of the discipline is to study the diversity and phylogeny of birds, the peculiarities of internal and external structure.

Learning Outcomes
ON3 Demonstrate scientific ideas about the diversity and systematics of the animal and plant world, knowledge about the human body and animals as an integral system. Possess the methodology of determining plants and animals, the skills of naturalistic work and environmental activities.
ON 8 Possess knowledge about the resource value of ichthyofauna, herpetofauna, ornithofauna and mammalian fauna. Describe the biodiversity, ecological status and significance of the most important animal representatives of Kazakhstan.

Learning outcomes by discipline
- Explain the principles of the structure of organs and systems of birds.
- Understand the patterns of distribution of birds on earth, explain the role of birds in the transmission of various parasites and diseases between humans and animals.
- Distinguish the main groups of birds, analyze their systematic status.

Prerequisites
Invertebrate Zoology

Postrequisites
Evolutionary Theory

Physiology of analyzers

Discipline cycle	Basic disciplines
Course	2
Credits count	5
Knowledge control form	Examination

Short description of discipline
The discipline gives an idea of the objective and subjective aspects of the physiology of analyzers. When mastering the course, students get acquainted with the general properties of analyzers - vision, balance, taste, smell, soma- sensory systems, general principles of construction, as well as the meaning in cognition of the world, functions of detection, discrimination, skipping, signal conversion to another state, coding, i.e. thresholds for distinguishing sensitivity with questions and laws.

Purpose of studying of the discipline
to study the general principles of organization, structural and functional structure, classification of analyzers.

Learning Outcomes
ON3 Demonstrate scientific ideas about the diversity and systematics of the animal and plant world, knowledge about the human body and animals as an integral system. Possess the methodology of determining plants and animals, the skills of naturalistic work and environmental activities.

Learning outcomes by discipline
characterize the general properties of analyzers;
explain sensitivity differentiation thresholds;
use physiological methods in the diagnosis of analyzers.

Prerequisites
Human anatomy

Postrequisites
Evolutionary Theory

Human and animal physiology

Discipline cycle	Basic disciplines
Course	2
Credits count	5
Knowledge control form	Examination

Short description of discipline
This discipline provides for the theoretical physiological conditions in the body and the interpretation of the life of the body. When studying the course, systematic knowledge is formed about the life of a living organism, individual systems, organs, tissues and cells, the influence on each other, the relationship and relationships with the external environment.

Purpose of studying of the discipline
To study the features of the vital activity of the human and animal organism in a changing environment and the mechanisms of neuro-humoral regulation

Learning Outcomes
ON3 Demonstrate scientific ideas about the diversity and systematics of the animal and plant world, knowledge about the human body and animals as an integral system. Possess the methodology of determining plants and animals, the skills of naturalistic work and environmental activities.

Learning outcomes by discipline

- *To consider the organism of man and animals as a single integral system;*
- *Explain the role of the mechanisms of neurohumoral regulation in the adaptation of the body to changing environmental conditions; features of the reflex activity of humans and animals;*
- *Analyze the integrative processes of the human cerebral cortex.*

- knows the morphological, physiological and functional features of the body, the principles of the organization of systems, differentiation, integration, regulatory mechanisms that ensure homeostasis in a living system, the structure and functions of organ systems of human and animal organisms, physiological properties and functions of cells and tissues, working with living objects in natural and laboratory conditions, methods of conducting research work on physiology with students;
- Is able to solve professional problems using theoretical and practical knowledge;
- mastering the system of subject knowledge, skills and abilities, taking into account the characteristics of the human body in the formation of a healthy lifestyle, age-related features of the development of the body of students, educational and work load during classes at school, to carry them out in further professional development.

Prerequisites

Human anatomy

Postrequisites

Evolutionary Theory

Ecological physiology of humans and animals

Discipline cycle	Basic disciplines
Course	2
Credits count	5
Knowledge control form	Examination

Short description of discipline

The discipline studies the features of the life 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 impact on the human body of working and living conditions, increasing physical and emotional-psychological stress, as well as stressful situations is considered.

Purpose of studying of the discipline

The purpose of the discipline is to study the vital activity of the organism as a whole, physiological systems, organs, cells and individual cellular structures under the action of various environmental factors.

Learning Outcomes

ON3 Demonstrate scientific ideas about the diversity and systematics of the animal and plant world, knowledge about the human body and animals as an integral system. Possess the methodology of determining plants and animals, the skills of naturalistic work and environmental activities.

Learning outcomes by discipline

- characterize the features of the vital activity of the human body;
- explain the dependence of the activity of physiological systems on the influence of environmental factors in various physical and geographical zones;
-master the laws of preserving human health.

Prerequisites

Human anatomy

Postrequisites

Evolutionary Theory

Methodology of biology training

Discipline cycle	Basic disciplines
Course	3
Credits count	5
Knowledge control form	Examination

Short description of discipline

This course provides for the formation of students` knowledge about science in the process of teaching the subject of biology, studied in the school curriculum. The course is compiled in accordance with the updated requirements of education, new innovative technologies, group work of students. In the course of studying the course, students gain knowledge and experience to form professional competencies for the activities of a teacher.

Purpose of studying of the discipline

The purpose of teaching methods of biology as an academic discipline is the development of the major problems of education and training subjects of the biological cycle to school, to familiarize students with the organizational forms of educational process, methods and methodological techniques of biology lessons.

Learning Outcomes

ON2 Apply modern teaching technologies and criteria-based assessment, taking into account the individual, physiological and psychological characteristics of students.
ON5 Possess a system of methodological knowledge and skills that ensure readiness to effectively carry out the educational process in biology at school, independence and creativity in their teaching activities. Be able to reconstruct various parts of previously acquired knowledge into a new context in accordance with current trends in the development of biology and use it in their professional activities.

Learning outcomes by discipline

- selects the main methodological principles, forms and techniques of effective teaching of biology
- to develop lessons of the main types according to the sections of the course "Biology"
- actively uses methods, means of teaching and educating students in the pedagogical process

Prerequisites

Technologies of the updated content of education and criteria assessment

Postrequisites

Methods of organization of extracurricular work on the subject

Rules and principles of the content of the living corner

Discipline cycle	Basic disciplines
Course	3
Credits count	5
Knowledge control form	Examination

Short description of discipline

The subject allows students to expand their understanding of the world of animals and plants, acquired during the study of the chapters "Plants" and "Animals". It is designed to work with schoolchildren who are looking for direct contact with nature, who want to learn more about the behavior and physiological characteristics of animals, who want to help them. Under the guidance of a teacher, the student can enjoy the beautiful natural objects in the system, learn more about animals and interesting things to explore in detail.

Purpose of studying of the discipline

formation of systematic knowledge and skills in the field of creating a living corner, to ensure the professional readiness of students for this activity, taking into account current trends and promising areas

Learning Outcomes

ON5 Possess a system of methodological knowledge and skills that ensure readiness to effectively carry out the educational process in biology at school, independence and creativity in their teaching activities. Be able to reconstruct various parts of previously acquired knowledge into a new context in accordance with current trends in the development of biology and use it in their professional activities.
ON10 Demonstrate knowledge of theoretical disciplines and apply them in professional activities; consolidate the skills of independent planning and conducting research experiments.

Learning outcomes by discipline

- abilities and interest in field work, collection of materials on excursions and in a corner of wildlife are determined;
- is able to prepare the collected materials for laboratory processing and organize the information necessary for the design of the study;
- has the skills to draw conclusions to the actual intellectual activity aimed at analyzing the results obtained.

Prerequisites

Technologies of the updated content of education and criteria assessment

Postrequisites

Methods of organization of extracurricular work on the subject

Technology biology training in English

Discipline cycle	Basic disciplines
Course	3
Credits count	5
Knowledge control form	Examination

Short description of discipline

This course develops students` organizational skills and the ability to use various teaching methods for the main sections of the school biology course. Uses modern pedagogical technologies in teaching biology in English. It allows future teachers to form methodological skills and knowledge, a creative approach to independent pedagogical activity for the effective implementation of educational processes in the course of biology at school.

Purpose of studying of the discipline

The aim of this course is to prepare students to features of teaching biology in the English language in schools and other educational institutions. Teaching biology in a foreign language was able to successfully apply modern teaching technology. Preparing the future teacher of competitive professional multilingual teacher.

Learning Outcomes

ON5 Possess a system of methodological knowledge and skills that ensure readiness to effectively carry out the educational process in biology at school, independence and creativity in their teaching activities. Be able to reconstruct various parts of previously acquired knowledge into a new context in accordance with current trends in the development of biology and use it in their professional activities.
ON10 Demonstrate knowledge of theoretical disciplines and apply them in professional activities; consolidate the skills of independent planning and conducting research experiments.

Learning outcomes by discipline

- Mastering by students the vocabulary and linguistic features of a foreign language and the formation of communicative-functional connections and argumentation skills in a foreign language, as well as understanding the linguistic and cultural characteristics of the country of the language being studied.
- Knows the methodology and has the skills of oral and written translation into native and foreign languages; skills of writing a scientific article and its translation into a foreign language.
- Possesses the skills of compiling full-fledged developments of lessons, practical and laboratory classes in a foreign language; conducting classes in a real school, using various methods and techniques.
- Analyzes the work done, the strengths and weaknesses of students related to language competencies.

Prerequisites

Technologies of the updated content of education and criteria assessment

Postrequisites

Methods of organization of extracurricular work on the subject

Applied Biology with the Basics of Soil Science

Discipline cycle	Basic disciplines
Course	3
Credits count	5

Knowledge control form	Examination

Short description of discipline
The course explains the connection with other subjects by introducing students to natural sciences and agriculture through theoretical and practical training. Students form the necessary knowledge for the organization of work at the school experimental site. Students will learn to evaluate the physico- chemical properties of soil, environmental factors and their significance for plants, as well as the evolutionary significance of morphological structures of plants and will be able to interpret the results of biological research.

Purpose of studying of the discipline
theoretical and practical education, acquaintance with the field of agriculture, explanation of the relationship with other sciences, equipping them with the knowledge necessary for the organization of work in the experimental plots at school, teaching methods of conducting scientific research of educational value.

Learning Outcomes
ON 7 Possess knowledge about the resource value of plants in Kazakhstan; describe the diversity of the structure of cells, tissues and vegetative organs of various plant groups; evaluate the evolutionary significance of morphological structures of plants. To develop skills in the image of design and planning solutions for the construction of landscape compositions.
ON 8 Possess knowledge about the resource value of ichthyofauna, herpetofauna, ornithofauna and mammalian fauna. Describe the biodiversity, ecological status and significance of the most important animal representatives of Kazakhstan.

Learning outcomes by discipline
-understands the cause-and-effect relationships of natural phenomena
- analyzes the essence of the processes occurring in wildlife
- is able to use technologies of cultivation of agricultural crops.

Prerequisites
Plant Physiology

Postrequisites
Bioresources Kazakhstan

Plant biotechnology

Discipline cycle	Basic disciplines
Course	3
Credits count	5
Knowledge control form	Examination

Short description of discipline
The course "Plant Biotechnology" aims to highlight the current state of knowledge about the biologyof cultivated plant cells as an object of biotechnology. At the end of the course, the student will be proficient in information and communication technologies for organizing work and solving standard professional tasks in the specialty.

Purpose of studying of the discipline
to study biology of the cultivated cages and the production technology of the revitalized landing material of the most important the agriculture of cultures, creation of new grades with use of genetic engineering and receiving important substances of a phytogenesis.

Learning Outcomes
ON 7 Possess knowledge about the resource value of plants in Kazakhstan; describe the diversity of the structure of cells, tissues and vegetative organs of various plant groups; evaluate the evolutionary significance of morphological structures of plants. To develop skills in the image of design and planning solutions for the construction of landscape compositions.

Learning outcomes by discipline
- have an idea about the principles of cultivation of plant cells in vitro;
- uses the acquired knowledge to improve the level of theoretical training, as well as apply them in practice.
- acquires practical skills in cell subculturing and evaluation of their growth.

Prerequisites
Plant Physiology

Postrequisites
Bioresources Kazakhstan

Organization works on the school grounds

Discipline cycle	Basic disciplines
Course	3
Credits count	5
Knowledge control form	Examination

Short description of discipline
The course of work organization at the school site is designed to expand and deepen knowledge of applied biology. In the course of studying this course, students will gain basic knowledge of agricultural technology, will be able to describe the diversity of the structure of cells, tissues and vegetative organs of various plant groups, and will learn to evaluate the evolutionary significance of morphological structures of plants. They will also master the methods of organizing work at the school site and the skills of socially useful work.

Purpose of studying of the discipline
students receive knowledge on proper organization of various activities in the school educational precinct; the formation of theoretical knowledge and practical skills necessary for professional activities.

Learning Outcomes
ON5 Possess a system of methodological knowledge and skills that ensure readiness to effectively carry out the educational process in biology at school, independence and creativity in their teaching activities. Be able to reconstruct various parts of previously acquired knowledge into a new context in accordance with current trends in the development of biology and use it in their professional activities.

Learning outcomes by discipline
-understands the cause-and-effect relationships of natural phenomena
- analyzes the essence of the processes occurring in wildlife

- is able to use technologies of cultivation of agricultural crops.

Prerequisites

Plant Physiology

Postrequisites

Bioresources Kazakhstan

Animals and plants bielander

Discipline cycle	Basic disciplines
Course	3
Credits count	5
Knowledge control form	Examination

Short description of discipline

The course examines the biodiversity of the environment, how to protect and use them. Studies monitoring of biodiversity conservation and sustainability of ecosystems, diversity of plants and animals, their structural and functional adaptation to environmental conditions, determination of their place in the biocenosis. Expands the theoretical knowledge of students about the modern systematics of living organisms, the adaptation of plants and animals to evolutionary processes.

Purpose of studying of the discipline

Study of the biological diversity of the environment, protection and its rational use.

Learning Outcomes

ON 7 Possess knowledge about the resource value of plants in Kazakhstan; describe the diversity of the structure of cells, tissues and vegetative organs of various plant groups; evaluate the evolutionary significance of morphological structures of plants. To develop skills in the image of design and planning solutions for the construction of landscape compositions.
ON 8 Possess knowledge about the resource value of ichthyofauna, herpetofauna, ornithofauna and mammalian fauna. Describe the biodiversity, ecological status and significance of the most important animal representatives of Kazakhstan.

Learning outcomes by discipline

- *demonstrate knowledge about the diversity of flora and fauna in the environment;*
- *apply the acquired knowledge to solve theoretical and other methodological problems;*
- *analyze all the diversity of flora and fauna in the environment;*

Prerequisites

Plant Sistematic

Postrequisites

Bioresources Kazakhstan

Cytology and Histology

Discipline cycle	Basic disciplines
Course	3
Credits count	5
Knowledge control form	Examination

Short description of discipline

The course examines the structure and functions of cells, intercellular substance, the laws of the body at the tissue level, the characteristics of tissues in different organs. Explains the mechanisms of adaptation of cells, tissues and organs to biological, physical, environmental, chemical and other factors. Develops students` ability to apply the basic physical, chemical, mathematical and other natural science concepts and methods in solving professional problems.

Purpose of studying of the discipline

Mastering by students of fundamental theoretical knowledge about the structural organization of life processes at the cellular, tissue and organ levels, revealing the patterns of their development and, in this regard, the possibility of purposeful influence on them.

Learning Outcomes

ON9 Explain the main mechanisms of heredity and variability; apply methods of statistical data analysis, forecasting and modeling of biological and environmental processes, including using modern information technologies. To argue the basic laws of individual and historical development of living organisms.

Learning outcomes by discipline

- Demonstrate knowledge about the basic laws of the development and vital activity of the body based on the structural organization of cells, tissues and organs;
- Apply knowledge of the principles of cellular organization of biological objects, biophysical and biochemical bases, membrane processes and molecular mechanisms of vital activity;
- Analyze and conduct a comparative analysis of the observed structural changes in cells and intercellular matter of tissues and organs.

Prerequisites

Plant Sistematic

Postrequisites

Bioresources Kazakhstan

Genetics

Discipline cycle	Basic disciplines
Course	3
Credits count	5
Knowledge control form	Examination

Short description of discipline

Genetics is a basic discipline in the preparation of future biology teachers. During the development of this course, students study the basic laws of inheritance of traits and their variability, the cytological foundations of mono- and dihybrid crossing, the features of non-

allelic interaction of genes. Students will get acquainted with the basic provisions of the chromosomal theory of heredity, studies the causes and consequences of mutational processes for the evolution of living organisms on the planet and the features of the concentration of traits in populations.

Purpose of studying of the discipline

Formation of students` knowledge system on the fundamental genetic foundations of the emergence and functioning of living organisms and biocenoses on Earth, their stability, variability and development in ontogeny and phylogeny.

Learning Outcomes

ON9 Explain the main mechanisms of heredity and variability; apply methods of statistical data analysis, forecasting and modeling of biological and environmental processes, including using modern information technologies. To argue the basic laws of individual and historical development of living organisms.

Learning outcomes by discipline

- explain the basic concepts of the material substrate of heredity and the mechanisms of variability, the main genetic phenomena, the laws of heredity and variability of living organisms, the role of heredity and the environment in the formation of the phenotype.
- analyze the types of inheritance of breeding traits, types of genetic variability arising under the influence of mutagenic factors and formulate conclusions based on calculated statistical indicators.
- solve problems in the main sections of genetics, making scientific conclusions and explaining the results obtained

Prerequisites

Introduction to the Biology Teaching Profession

Postrequisites

Methods of solving problems in genetic

Population genetics

Discipline cycle	Basic disciplines
Course	3
Credits count	5
Knowledge control form	Examination

Short description of discipline

The discipline is aimed at studying the genetic diversity of populations, the laws of heredity and variability in natural populations, the distribution of allele frequencies in populations under the influence of evolutionary factors. The purpose of population genetics is to determine genetic variations among different populations of the same species. Comparison of the genetic composition of different populations can give an idea of the importance of gene flow for maintaining the stability of populations of living organisms.

Purpose of studying of the discipline

Formation of basic knowledge of students about the mechanisms of heredity and variability in populations.

Learning Outcomes

ON9 Explain the main mechanisms of heredity and variability; apply methods of statistical data analysis, forecasting and modeling of biological and environmental processes, including using modern information technologies. To argue the basic laws of individual and historical development of living organisms.

Learning outcomes by discipline

- Explain the basic concepts and theoretical positions of modern population and evolutionary genetics, the main methods used to study the genetic structure of a population and compare populations with each other, study the effects of factors of evolution at the genetic level, phylogenetic analysis.
- analyze population-genetic data, determine the locus of genes.
- apply the acquired knowledge to solve problems concerning the features of inheritance of traits in natural populations;
- analyze population-genetic data, determine the locus of genes.
- apply the acquired knowledge to solve problems concerning the features of inheritance of traits in natural populations

Prerequisites

Introduction to the Biology Teaching Profession

Postrequisites

Methods of solving problems in genetic

Genetic engineering

Discipline cycle	Basic disciplines
Course	3
Credits count	5
Knowledge control form	Examination

Short description of discipline

Genetic engineering is a field of biotechnology that considers technologies for changing the composition of DNA at the junction of related disciplines: biology, biochemistry, genetics and virology. The purpose of the course is to study the mechanisms of "turning on" and "turning off" individual genes that control the activity of organisms, as well as the mechanisms of transferring genetic instructions from one organism to another. Students will consider the possibilities of applying genetics and molecular biology in medicine.

Purpose of studying of the discipline

formation at undergraduates of profound theoretical knowledge in the field of methods of genetic engineering as recent trend of biological science for use in practical activities.

Learning Outcomes

ON9 Explain the main mechanisms of heredity and variability; apply methods of statistical data analysis, forecasting and modeling of biological and environmental processes, including using modern information technologies. To argue the basic laws of individual and historical development of living organisms.

Learning outcomes by discipline

- explain the general provisions and approaches of genetic engineering, achievements and prospects, the basic principles of obtaining recombinant DNA, stages of genetic engineering; tasks, directions and problems of genetic engineering.

- use the acquired knowledge for the selection of biological objects and their application in various technological processes;
- understand the need to use genetic engineering methods to design new forms.

Prerequisites

Introduction to the Biology Teaching Profession

Postrequisites

Methods of solving problems in genetic

Big practicum in botany

Discipline cycle	Profiling discipline
Course	3
Credits count	5
Knowledge control form	Examination and term work/Project

Short description of discipline

Contains information about various systematic groups of plants, structural features of each systematic group, taking into account their ecological confinement. The main objectives of the course are to reveal at a high modern level the diversity and structure of plant forms and the development of their structures in an evolutionary aspect, to show the relationship between plants and the environment, to determine the significance of plants and ways to protect them

Purpose of studying of the discipline

formation of students` theoretical and practical knowledge of modern morphology, anatomy and systematics of plants, development of students` interest in conducting scientific research in the field of botany.

Learning Outcomes

ON 7 Possess knowledge about the resource value of plants in Kazakhstan; describe the diversity of the structure of cells, tissues and vegetative organs of various plant groups; evaluate the evolutionary significance of morphological structures of plants. To develop skills in the image of design and planning solutions for the construction of landscape compositions.

Learning outcomes by discipline

- Demonstrate knowledge about the structure of plant cells and plant tissues, morphology and anatomy of the shoot, root and generative systems;
- distribute plants into systematic groups and determine the place of plant growth in various environmental conditions;
- Apply knowledge when conducting biological research, collecting and processing materials.

Prerequisites

Anatomy and Morphology of Plants

Postrequisites

Landscape design

Nature protection in Kazakhstan

Discipline cycle	Profiling discipline
Course	3
Credits count	5
Knowledge control form	Examination and term work/Project

Short description of discipline

The discipline considers the distribution of organisms in nature according to the ecosystem and landscape- geographical principle, taxonomic groups, the influence of factors on wildlife. Teaches the specifics of various protected areas – nature reserves, nature reserves, national nature parks, ethnic territories, places of recreation and recreation. Future specialists will be taught how to effectively use the natural resources of protected areas as a means of optimizing environmental management, correctly apply fundamental environmental laws.

Purpose of studying of the discipline

formation of ideas about the main types of specially protected natural territories and the peculiarities of their functioning, consideration of the practice of biodiversity conservation and prospects for the development of various areas of wildlife protection and management of the natural world.

Learning Outcomes

ON 7 Possess knowledge about the resource value of plants in Kazakhstan; describe the diversity of the structure of cells, tissues and vegetative organs of various plant groups; evaluate the evolutionary significance of morphological structures of plants. To develop skills in the image of design and planning solutions for the construction of landscape compositions.
ON 8 Possess knowledge about the resource value of ichthyofauna, herpetofauna, ornithofauna and mammalian fauna. Describe the biodiversity, ecological status and significance of the most important animal representatives of Kazakhstan.

Learning outcomes by discipline

- Explain the consequences of anthropogenic impacts on the biosphere, plan measures for its protection;
- to understand the role of biological diversity as a leading factor in the sustainability of living systems and the biosphere as a whole;
- to carry out measures to protect biodiversity and rationally use natural resources for economic purposes

Prerequisites

Anatomy and Morphology of Plants

Postrequisites

Landscape design

Evolutionary adaptation of plants

Discipline cycle	Profiling discipline
Course	3
Credits count	5
Knowledge control form	Examination

Short description of discipline
The subject of plant evolutionary adaptation studies anatomical, morphological, physiological and biochemical adaptations (the presence of a long root system, which in conditions of soil and atmospheric drought with a lack of moisture can reach several tens of meters, which contributes to the use of groundwater by the plant, the presence of a thick cuticle in xerophytes, the ability of leaves to roll back, the transformation of leaves into thorns, reducing the loss of water), as well as evolutionary, ontogenetic and urgent adaptive processes.
Purpose of studying of the discipline
To give students knowledge about the laws and directions of evolutionary development, the main stages of phylogeny of the main systems of organs and tissues of plants.
Learning Outcomes
ON 7 Possess knowledge about the resource value of plants in Kazakhstan; describe the diversity of the structure of cells, tissues and vegetative organs of various plant groups; evaluate the evolutionary significance of morphological structures of plants. To develop skills in the image of design and planning solutions for the construction of landscape compositions.
ON9 Explain the main mechanisms of heredity and variability; apply methods of statistical data analysis, forecasting and modeling of biological and environmental processes, including using modern information technologies. To argue the basic laws of individual and historical development of living organisms.
Learning outcomes by discipline
1.To know the main directions of the evolutionary development of the plant world, the stages of phylogeny of the main systems of organs and tissues of the plant, the stages of the emergence of the main systematic groups of plants.
2.Be able to identify primitive and advanced traits in the structure of the plant body, to determine the traits of specialization and adaptation to environmental conditions in plants.
3. Master the technique of comparing the features of primitiveness and advancement in the structure of organs and tissues of plants.
Prerequisites
Anatomy and Morphology of Plants
Postrequisites
Landscape design

Big practiccum in zoology

Discipline cycle	Profiling discipline
Course	3
Credits count	5
Knowledge control form	Examination

Short description of discipline
This course provides knowledge about the structural features of different groups of animals. Gives systematic knowledge about the shape of the body, skeleton, skin, digestive system, circulatory system, respiration and digestion, nervous and sensory organs, reproductive system, development, as well as methods for determining species of invertebrates and vertebrates, the importance and rationality of vertebrates in agriculture and basic usage methods .
Purpose of studying of the discipline
mastering zoological methods in practical and research work; analysis of the studied material; correct analysis, generalization of the research material.
Learning Outcomes
ON 8 Possess knowledge about the resource value of ichthyofauna, herpetofauna, ornithofauna and mammalian fauna. Describe the biodiversity, ecological status and significance of the most important animal representatives of Kazakhstan.
Learning outcomes by discipline
- Describe the morphological and anatomical structure and functions of the organs of various groups of invertebrates and vertebrates; understand the levels of organization of life.
- Separate aquatic, amphibious and terrestrial vertebrates of Kazakhstan. To make temporary micropreparations, wet preparations, carcasses and stuffed animals of vertebrates.
- Assess the state of the ichthyofauna, herpetofauna, avifauna and theriofauna of Kazakhstan. Solve problems of conservation of biodiversity of invertebrates and vertebrates.
Prerequisites
Invertebrate Zoology Vertebrate Zoology
Postrequisites
Landscape design

Taxonomy of animals

Discipline cycle	Profiling discipline
Course	3
Credits count	5
Knowledge control form	Examination

Short description of discipline
This course provides knowledge about the levels of structural organization and taxonomic groups of animals, as well as phylogeny. During the course, students develop systematic knowledge about the features of the structure, development and lifestyle of different groups of animals, the relationship of animals with the environment, adaptation, patterns of diversity and geographical distribution of invertebrates and vertebrates, their significance for humans.
Purpose of studying of the discipline
the study of diversity, structural features, animal life, adaptability to the environment, zoning distribution, increasing their productivity, rational use and conservation of its reserves in nature.the study of diversity, structural features, animal life, adaptability to the environment, zoning distribution, increasing their productivity, rational use and conservation of its reserves in nature.
Learning Outcomes

ON 8 Possess knowledge about the resource value of ichthyofauna, herpetofauna, ornithofauna and mammalian fauna. Describe the biodiversity, ecological status and significance of the most important animal representatives of Kazakhstan.

Learning outcomes by discipline

characterizes the levels of structural organization of animals, identifies taxonomic groups, compares the structural features of various groups of animals.

Prerequisites

Invertebrate Zoology Vertebrate Zoology

Postrequisites

Landscape design

Animal ecology

Discipline cycle	Profiling discipline
Course	3
Credits count	5
Knowledge control form	Examination

Short description of discipline

This subject allows you to understand the scientific basis of various environmental phenomena of animals, environmental laws common to all living organisms. In the course of mastering the course, students develop knowledge about the types of interaction of living organisms with their environment and living organisms, about the natural patterns of communication, about the impact on nature and economy and human health, about the patterns of adaptation to environmental factors, animal populations.

Purpose of studying of the discipline

The purpose of the discipline is to study the mechanisms and basic principles of interaction of biological systems with the environment of animals at various levels of organization.

Learning Outcomes

ON3 Demonstrate scientific ideas about the diversity and systematics of the animal and plant world, knowledge about the human body and animals as an integral system. Possess the methodology of determining plants and animals, the skills of naturalistic work and environmental activities.

ON 8 Possess knowledge about the resource value of ichthyofauna, herpetofauna, ornithofauna and mammalian fauna. Describe the biodiversity, ecological status and significance of the most important animal representatives of Kazakhstan.

Learning outcomes by discipline

- describe the main features of the relationship between different groups of animals and their habitat (air, water and soil), the trophic structure of ecosystems and the role of animals in them

- explain the combined effect of abiotic and biotic factors, behavior, form, geographical distribution of animals.

- predict the consequences of anthropogenic impact on animals and their communities and find ways to solve environmental problems

Prerequisites

Invertebrate Zoology Vertebrate Zoology

Postrequisites

Landscape design

Cell biology

Discipline cycle	Basic disciplines
Course	3
Credits count	5
Knowledge control form	Examination

Short description of discipline

Cell biology studies the structural organization and composition of plant and animal cells, intercellular matter; ultrastructure and functional features of cell organoids, their participation in the main metabolic processes: respiration, photosynthesis, transport of substances, protein biosynthesis based on light- optical, electron microscopy data. The discipline forms basic knowledge about the biology of the cell as an elementary structural unit of the living, about the main directions and prospects of using the achievements of cell biology in medicine.

Purpose of studying of the discipline

The purpose of the discipline is to study the structure of the cell and the mechanisms of metabolism at the molecular level.

Learning Outcomes

ON9 Explain the main mechanisms of heredity and variability; apply methods of statistical data analysis, forecasting and modeling of biological and environmental processes, including using modern information technologies. To argue the basic laws of individual and historical development of living organisms.

Learning outcomes by discipline

- Understand the ways of cell evolution and the formation of multicellular organisms;

- Explain the mechanisms of division of somatic and germ cells, regulation of the cell cycle;

- Describe and analyze fixed and living cells using special methods of light microscopy.

Prerequisites

Genetics

Postrequisites

Evolutionary Theory

Genetics and selection

Discipline cycle	Basic disciplines
Course	3
Credits count	5

Knowledge control form	Examination

Short description of discipline
The course is aimed at studying the basic laws of heredity and variability, the cytological foundations of mono- and dihybrid crossing, the principles of transmission of heredity and variability in a number of generations, the main provisions of the chromosomal theory of heredity, general scientific and general biological methods in genetics, modern methods of genetics and breeding and their research to increase productivity and improve the quality of plant varieties and animal breeds.

Purpose of studying of the discipline
the formation of a system of views in the field of genetics and breeding.

Learning Outcomes
ON9 Explain the main mechanisms of heredity and variability; apply methods of statistical data analysis, forecasting and modeling of biological and environmental processes, including using modern information technologies. To argue the basic laws of individual and historical development of living organisms.

Learning outcomes by discipline
1. Demonstrate knowledge of the basic laws of heredity and variability at the classical and modern level, the principles of transmission of heredity and variability in a number of generations, modern methods of genetics and breeding
2. Apply modern genetic methods to study the heredity and variability of tree species in natural populations and forest cultures.
3. master the methodology of laboratory genetic research at the modern level.

Prerequisites
Genetics

Postrequisites
Evolutionary Theory

Molecular Biology

Discipline cycle	Basic disciplines
Course	3
Credits count	5
Knowledge control form	Examination

Short description of discipline
The course of molecular biology is aimed at studying the functioning of living organisms from the point of view of the chemical structure of the molecules that make up them, the composition, structure of nucleic acids, mechanisms of DNA replication, transcription and RNA and translation of genetic information on ribosomes during protein biosynthesis. The discipline explains the molecular mechanisms of heredity and variability, the main metabolic processes in the cell and the transport of substances through biological membranes.

Purpose of studying of the discipline
To study the structure and main stages of cell activity, mechanisms of preservation and transmission of genetic information at the molecular level.

Learning Outcomes
ON9 Explain the main mechanisms of heredity and variability; apply methods of statistical data analysis, forecasting and modeling of biological and environmental processes, including using modern information technologies. To argue the basic laws of individual and historical development of living organisms.

Learning outcomes by discipline
1. Demonstrate knowledge about the structure and functioning of nucleic acids, cell organoids,
2. analyze the processes of construction and destruction of elements and components of a living cell,
3. explain the molecular mechanisms of heredity and variability;
4. master the methodology of laboratory genetic research at the modern molecular level.

Prerequisites
Genetics

Postrequisites
Evolutionary Theory

Soil biology

Discipline cycle	Basic disciplines
Course	3
Credits count	5
Knowledge control form	Examination

Short description of discipline
Soil biology studies the micro- and macroflora, micro- and macrofauna of the soil habitat, the peculiarities of the relationship of edaphobionts and the influence of various groups of organisms on the change of the physico-chemical properties of the soil and the improvement of its fertility. The discipline considers the distribution of the population density of the soil environment depending on the thermal, water and air regimes, as well as the function of living matter in the process of soil formation and the influence of a complex of environmental factors on soil biology.

Purpose of studying of the discipline
To study the main factors of soil formation, patterns of geographical distribution of soils, classification and characteristics of the main types of soils in Kazakhstan, morphological, physical, theoretical foundations and management methods in the field of use and protection of soil cover.

Learning Outcomes
ON 7 Possess knowledge about the resource value of plants in Kazakhstan; describe the diversity of the structure of cells, tissues and vegetative organs of various plant groups; evaluate the evolutionary significance of morphological structures of plants. To develop skills in the image of design and planning solutions for the construction of landscape compositions.

Learning outcomes by discipline
1. Describe the main factors of soil formation, patterns of geographical distribution of soils, classification and characteristics of the main

types of soils in Kazakhstan
2. Is able to apply theoretical knowledge to solve applied problems in the field of rational use and protection of soils, to reveal the meaning of elementary soil processes.
3. Determine the composition and types of soils under study.

Prerequisites
Big practicum in botany

Postrequisites
Landscape design

Indoor and decorative floriculture

Discipline cycle	Basic disciplines
Course	3
Credits count	5
Knowledge control form	Examination

Short description of discipline
The discipline "Indoor and decorative floriculture" studies the biological features of indoor plants, their sequence and place in human life. Also, students studying this discipline gain knowledge about the influence of environmental factors on ornamental plants, methods of reproduction, as well as about the features of using leading types of decorative flowers as objects of landscape architecture elements.

Purpose of studying of the discipline
Formation of knowledge about the types of decoratively grown flowers and their ecology, planting, flower care and methods of their reproduction.

Learning Outcomes
ON3 Demonstrate scientific ideas about the diversity and systematics of the animal and plant world, knowledge about the human body and animals as an integral system. Possess the methodology of determining plants and animals, the skills of naturalistic work and environmental activities.
ON 7 Possess knowledge about the resource value of plants in Kazakhstan; describe the diversity of the structure of cells, tissues and vegetative organs of various plant groups; evaluate the evolutionary significance of morphological structures of plants. To develop skills in the image of design and planning solutions for the construction of landscape compositions.

Learning outcomes by discipline
Describes the biology of plants of practical importance; distinguishes the meaning; defines the main types of plants growing in indoor conditions.

Prerequisites
Big practicum in botany

Postrequisites
Landscape design

Ecology of plants

Discipline cycle	Basic disciplines
Course	3
Credits count	5
Knowledge control form	Examination

Short description of discipline
Plant ecology studies the influence of a complex of environmental factors on the morpho-physiological characteristics of various plant species, the relationship of various groups and life forms of plants in phytocenoses and biogeocenoses, the basics of conservation and restoration of phytocenoses, ecological-biological and ecological-geographical foundations of the functioning of plant communities, the basics of correction and restoration of plant communities. The discipline forms students` systematic knowledge about the basic laws of the distribution of vegetation cover

Purpose of studying of the discipline
tto form students` comprehensive understanding of the ecological properties of plants and their communications, as well as systematized knowledge about the main characteristics and patterns of distribution of vegetation cover on the Earth`s surface.

Learning Outcomes
ON 7 Possess knowledge about the resource value of plants in Kazakhstan; describe the diversity of the structure of cells, tissues and vegetative organs of various plant groups; evaluate the evolutionary significance of morphological structures of plants. To develop skills in the image of design and planning solutions for the construction of landscape compositions.
ON9 Explain the main mechanisms of heredity and variability; apply methods of statistical data analysis, forecasting and modeling of biological and environmental processes, including using modern information technologies. To argue the basic laws of individual and historical development of living organisms.

Learning outcomes by discipline
1. Demonstrate knowledge on the relationship of plant organisms with each other and with the environment, the basics of conservation and restoration of phytocenoses, ecological-biological and ecological-geographical foundations of the functioning of plant communities, the basics of correction and restoration of plant
communities.
2. Use knowledge about plants and apply modern methods of working with plant objects in field and laboratory conditions.
3. Apply
modern methods of processing and interpretation of environmental information during scientific and industrial research

Prerequisites
Big practicum in botany

Postrequisites
Landscape design

Lichenology and briology

Discipline cycle	Profiling discipline
Course	4
Credits count	6
Knowledge control form	Examination

Short description of discipline
This course examines the species of lower plants and higher spore plants, including habitat, anatomical and morphological features, taxonomy of lichens and mosses. The range of lichens and mosses, the influence of anthropogenic factors and their protection, their place in the plant world have been studied. Allows students to regularly identify species and use them as ecological groups and local components.

Purpose of studying of the discipline
Formation of students` basic knowledge about the features of the structure and functioning of lichenized fungi (lichens) and mosses, their distribution, taxonomic groups and practical use possibilities.

Learning Outcomes
ON 7 Possess knowledge about the resource value of plants in Kazakhstan; describe the diversity of the structure of cells, tissues and vegetative organs of various plant groups; evaluate the evolutionary significance of morphological structures of plants. To develop skills in the image of design and planning solutions for the construction of landscape compositions.

Learning outcomes by discipline
characterize plant species of the lowest stage and spore plants of the highest stage; identify features; define species.

Prerequisites
Big practicum in botany

Postrequisites
Final examination

Synthetic theory of evolution

Discipline cycle	Profiling discipline
Course	4
Credits count	5
Knowledge control form	Examination

Short description of discipline
This discipline provides for the study of the synthetic theory of evolution (STE), as well as modern evolutionary synthesis. When studying the course, students form systematic knowledge about Neolamarkism and its varieties (mechanolamarkism, ortholamarkism, psycholamarkism), about the creation and main provisions of the synthetic theory of evolution (STE), about variability and its role in evolution, about mutation as a material for the evolutionary process, about the works of evolutionists of the modern world, about modern problems of the criteria of the species, about the problems of human origin.

Purpose of studying of the discipline
Mastering the theory of evolution by students, developing their ability to independently analyze and synthesize complex material in modern biology.

Learning Outcomes
ON9 Explain the main mechanisms of heredity and variability; apply methods of statistical data analysis, forecasting and modeling of biological and environmental processes, including using modern information technologies. To argue the basic laws of individual and historical development of living organisms.
ON10 Demonstrate knowledge of theoretical disciplines and apply them in professional activities; consolidate the skills of independent planning and conducting research experiments.

Learning outcomes by discipline
1.Knows the basic concepts and laws of evolutionary theory, the basics of micro and macroevolution, common causes and driving forces of biological evolution historical and modern provisions of the evolutionary theory of historical and modern provisions of evolutionary theory and is able to put them into practice.
2. Able to prove the occurrence of adaptations on individual examples and to prove the emergence of various adaptations of organisms on numerous examples.
3.Owns the theoretical foundations of evolutionary theory. To purchase common biological thinking; to introduce the basics of scientific research methods.

Prerequisites
Big practicum in botany Microbiology with fundamentals of Virology

Postrequisites
Final examination

Modern problems of evolution

Discipline cycle	Profiling discipline
Course	4
Credits count	5
Knowledge control form	Examination

Short description of discipline
This discipline provides for the study of the modern problem of evolution. When studying the course, students form systematic knowledge about artificial selection, the prerequisites and forms of the struggle for existence according to Darwin, about the main provisions of Darwin`s teachings. on the formation of adaptations according to Lamarck and Darwin and on the comparative analysis of Lamarck`s evolutionary concept and Darwin`s Evolutionary doctrine, on the relative nature of adaptations, on the history of the development of the concept of species, on the main levels of the organization of life and the evolutionary process, on the comparative analysis of natural and artificial selection

Purpose of studying of the discipline

Formation of dialectical-materialistic views of students, increasing the ability to biological thinking, explanation of cause-and-effect relationships of natural phenomena.

Learning Outcomes

ON9 Explain the main mechanisms of heredity and variability; apply methods of statistical data analysis, forecasting and modeling of biological and environmental processes, including using modern information technologies. To argue the basic laws of individual and historical development of living organisms.
ON10 Demonstrate knowledge of theoretical disciplines and apply them in professional activities; consolidate the skills of independent planning and conducting research experiments.

Learning outcomes by discipline

1.Knows theories of evolution as uniform frame of reference on development of wildlife at all levels of the organization, the analysis of basic provisions of the modern synthetic theory of evolution – ideas of unity of mechanisms of microevolutionary process, speciation and macroevolutionary process. 2.Learning and recall of the material studied; the development of evolutionary methods in practical and research work; the ability to analyze the material studied.
3.To purchase common biological thinking; to introduce the basics of scientific research methods.

Prerequisites

Big practicum in botany Microbiology with fundamentals of Virology

Postrequisites

Final examination

Evolutionary Theory

Discipline cycle	Profiling discipline
Course	4
Credits count	5
Knowledge control form	Examination

Short description of discipline

The discipline studies the processes of formation of adaptations, factors determining the individual development of organisms and specific ways of historical development of individual groups of organisms and the organic world as a whole. When studying the course, students form a systematic knowledge of the methods of comparative anatomy, embryology and paleontology, triple parallelism, as well as the use of selection methods, biogeography to prove the evolutionary process, ecology, molecular biology and anthropology.

Purpose of studying of the discipline

To form a system of knowledge about general biological laws, laws, theories in the field of studying evolutionary teaching; to expand biological knowledge about evolutionary teaching; possession of scientific terminology, key concepts.

Learning Outcomes

ON9 Explain the main mechanisms of heredity and variability; apply methods of statistical data analysis, forecasting and modeling of biological and environmental processes, including using modern information technologies. To argue the basic laws of individual and historical development of living organisms.
ON10 Demonstrate knowledge of theoretical disciplines and apply them in professional activities; consolidate the skills of independent planning and conducting research experiments.

Learning outcomes by discipline

Knows theories of evolution as uniform frame of reference on development of wildlife at all levels of the organization, the analysis of basic provisions of the modern synthetic theory of evolution ideas of unity of mechanisms of microevolutionary process, speciation and macroevolutionary process. To describe morphological regularities of evolution; stages of human formation. Mastering the basics of evolutionary theory develops the ability to independently comprehend the complex material of modern biology. When studying this course, students form a dialectic-materialistic worldview, biological thinking, a static approach to the phenomena of nature is developed, the cause-and-effect relations of natural phenomena are understood.

Prerequisites

Big practicum in botany Microbiology with fundamentals of Virology

Postrequisites

Final examination

Methods of solving problems in genetic

Discipline cycle	Profiling discipline
Course	4
Credits count	5
Knowledge control form	Examination

Short description of discipline

This discipline considers the methodology of solving and design of typical and combined genetic problems, is an addition to the previous theoretical course of genetics, develops students` skills in analyzing the distribution of hereditary traits in a number of generations, reveals the causes and consequences of the ratio of traits in natural populations, forms skills in constructing genetic maps of various types of organisms. Also, the purpose of this discipline is to teach methods of explaining the progress of solving problems in biology lessons

Purpose of studying of the discipline

To acquaint students with the ways of solving problems according to the basic laws of heredity and variability, to master the methodology of solving complex Olympiad problems.

Learning Outcomes

ON9 Explain the main mechanisms of heredity and variability; apply methods of statistical data analysis, forecasting and modeling of biological and environmental processes, including using modern information technologies. To argue the basic laws of individual and historical development of living organisms.
ON10 Demonstrate knowledge of theoretical disciplines and apply them in professional activities; consolidate the skills of independent planning and conducting research experiments.

Learning outcomes by discipline
- solve quantitative and qualitative problems in all sections of genetics;
- explain the main mechanisms of heredity and variability;
- Apply knowledge of the basic provisions of the chromosomal theory of heredity in explaining the features of the splitting of traits in linked inheritance;
Prerequisites
Genetics
Postrequisites
Final examination

The organization of research work at the school

Discipline cycle	Profiling discipline
Course	4
Credits count	5
Knowledge control form	Examination

Short description of discipline
The course forms students` practical skills and abilities to use the results of scientific research in the educational process. In the process of studying this discipline, the student develops general cultural, general professional and professional competencies. The ability to take into account modern trends in the development of technology and technology in their professional activities
Purpose of studying of the discipline
The purpose of the discipline is the formation of systemic knowledge on history, theory and practice of the development of science, its role in social production; the formation of practical skills and abilities to use the results of scientific research in the educational process.
Learning Outcomes
ON5 Possess a system of methodological knowledge and skills that ensure readiness to effectively carry out the educational process in biology at school, independence and creativity in their teaching activities. Be able to reconstruct various parts of previously acquired knowledge into a new context in accordance with current trends in the development of biology and use it in their professional activities.
ON6 Structure natural science material in biology and design the process of teaching biology. Critically evaluate scientific content in the field of biology and related sciences, put forward ideas for their transformation.
Learning outcomes by discipline
- the ability to take into account modern trends in the development of equipment and technologies in the field of their professional activities
- study of the essence, functions, structure, content and logic of scientific knowledge in the development of science;
- practices the features of implementing research results into practice
Prerequisites
Genetics
Postrequisites
Final examination

Professional English in biology classes at school

Discipline cycle	Profiling discipline
Course	4
Credits count	5
Knowledge control form	Examination

Short description of discipline
The course deepens and expands students` theoretical knowledge by mastering the laws and concepts of biology in English. Develops students` critical thinking, communicative, cognitive, professional and general cultural competencies. Allows you to get acquainted with modern world scientific literature, expand your lexical base and linguistic worldview in English, systematize your knowledge of biology in a foreign language.
Purpose of studying of the discipline
Deepening and expanding the theoretical knowledge of students about the basic concepts and patterns in biology and strengthening this knowledge in English, and also provides an additional opportunity for students to train critical thinking.
Learning Outcomes
ON5 Possess a system of methodological knowledge and skills that ensure readiness to effectively carry out the educational process in biology at school, independence and creativity in their teaching activities. Be able to reconstruct various parts of previously acquired knowledge into a new context in accordance with current trends in the development of biology and use it in their professional activities.
ON6 Structure natural science material in biology and design the process of teaching biology. Critically evaluate scientific content in the field of biology and related sciences, put forward ideas for their transformation.
Learning outcomes by discipline
Knows the basic methods of organizing student learning activities and monitoring its results. Apply methods of enhancing students` activities, apply research techniques.
- Use English as a means to obtain information from English-language sources for educational and self-educational purposes.
- Expand knowledge of the main sections of biology in English;;
- Use information and communication technologies in professional activities;
Prerequisites
Genetics
Postrequisites
Final examination

Biometrics

Discipline cycle	Profiling discipline

Course	4
Credits count	6
Knowledge control form	Examination

Short description of discipline
This course covers the theoretical foundations of statistical analysis of biological data, the theory of measurements and errors, modern methods of biological analysis. Teaches to determine the number of biological experiments carried out to solve the problems of analyzing data from a biological experimental study and to give accurate, correct conclusions on them using mathematical and statistical methods. Develops in students the ability to mathematically represent the results of a biometric study, to determine biometric indicators.

Purpose of studying of the discipline
Teaching students the basics of practical knowledge and skills in the field of biometrics and its relationship with other sciences, i.e. to master elementary methods of modern biometrics.

Learning Outcomes
ON9 Explain the main mechanisms of heredity and variability; apply methods of statistical data analysis, forecasting and modeling of biological and environmental processes, including using modern information technologies. To argue the basic laws of individual and historical development of living organisms.

Learning outcomes by discipline
- Explain about areas requiring the use of biometric methods for obtaining and processing information;
- Apply the methods of variation statistics to study biological objects, which is called biometrics;
– To determine the average values of the studied trait by the biometric method and, on the basis of these averages, make judgments on the merits of those features of the traits that were studied in a given group of objects.

Prerequisites
Big practicum in botany

Postrequisites
Landscape design

Bioresources Kazakhstan

Discipline cycle	Profiling discipline
Course	4
Credits count	6
Knowledge control form	Examination

Short description of discipline
This discipline provides knowledge about the biodiversity of the resources of plants and vertebrates of Kazakhstan, the stages of the history of the study of individual groups of useful species. During the development of the course, students form knowledge about medicinal, tannic, aromatic, technical valuable and popular raw plant resources, fish, amphibians, birds, mammals, the current state, as well as systematic knowledge about the methods of obtaining raw materials and methods of their application.

Purpose of studying of the discipline
in-depth study of the basic theories of animal and plant resources.

Learning Outcomes
ON 7 Possess knowledge about the resource value of plants in Kazakhstan; describe the diversity of the structure of cells, tissues and vegetative organs of various plant groups; evaluate the evolutionary significance of morphological structures of plants. To develop skills in the image of design and planning solutions for the construction of landscape compositions.
ON 8 Possess knowledge about the resource value of ichthyofauna, herpetofauna, ornithofauna and mammalian fauna. Describe the biodiversity, ecological status and significance of the most important animal representatives of Kazakhstan.

Learning outcomes by discipline
To characterize the biodiversity of plant resources of Kazakhstan; to characterize the biodiversity of animal resources of Kazakhstan; to explain the features of the biology of the main economically significant species; to know about the current state of resources, as well as methods of obtaining raw materials and methods of their application

Prerequisites
Big practicum in botany

Postrequisites
Final examination

Plant biogeography

Discipline cycle	Profiling discipline
Course	4
Credits count	5
Knowledge control form	Examination

Short description of discipline
The discipline considers the distribution of living organisms and communities in the environment, the significance of the patterns of structure and distribution of vegetation on the planet and in its individual regions. The ecological foundations of biogeography, ecological factors and their interaction, the laws of vegetation differentiation on land and in the ocean, and the geographical distribution of cultivated plants are studied. Topical issues of biodiversity and conservation of biological resources have been studied.

Purpose of studying of the discipline
providing fundamental and applied knowledge about the patterns of territorial distribution of plants in their interaction with the environment.

Learning Outcomes
ON 7 Possess knowledge about the resource value of plants in Kazakhstan; describe the diversity of the structure of cells, tissues and vegetative organs of various plant groups; evaluate the evolutionary significance of morphological structures of plants. To develop skills

in the image of design and planning solutions for the construction of landscape compositions.

Learning outcomes by discipline

– demonstrate knowledge about the main geographical factors and patterns that determine the distribution of organisms and their aggregates within the biosphere;
– analyze the landscape and zonal-regional structure of vegetation cover;
– apply the acquired knowledge in geoecological and biodiversity conservation work.

Prerequisites

Big practicum in botany

Postrequisites

Final examination

Hydrobiology

Discipline cycle	Profiling discipline
Course	4
Credits count	5
Knowledge control form	Examination

Short description of discipline

The course covers aquatic ecosystems, structure, functional features, ecological systematics of the hydrosphere, as well as the biological resources of the oceans, rivers, lakes and reservoirs, i.e. aquatic life. Teaches the functions and evolution of aquatic organisms in accordance with the basic general biological laws of various biosystems. Water ecosystems, their structural and holistic representations, their rational use in accordance with protection from pollution builds competencies.

Purpose of studying of the discipline

Formation of students` understanding of aquatic ecosystems, their structures and functional features, the ecological state of the hydrosphere and scientific forecasting of its condition.

Learning Outcomes

ON 8 Possess knowledge about the resource value of ichthyofauna, herpetofauna, ornithofauna and mammalian fauna. Describe the biodiversity, ecological status and significance of the most important animal representatives of Kazakhstan.

Learning outcomes by discipline

- Demonstrate knowledge about the morphological and physiological features of hydrobionts in connection with their habitat conditions and, in particular, the physico-chemical properties of water; about the features of the relationship of hydrobionts in hydrobiocenoses;
- systematize and present the learned material;
- use theoretical and practical knowledge to identify and solve research problems in the field of hydrobiology.

Prerequisites

Big practicum in botany

Postrequisites

Final examination

Landscape design

Discipline cycle	Profiling discipline
Course	4
Credits count	5
Knowledge control form	Examination

Short description of discipline

The course allows you to improve the theoretical and practical knowledge of students in the field of creating landscape compositions and using them in the interior of the school. Students will get acquainted with the basic principles of landscape design, layout, stylistics, zoning in the design of territories that allow a person to change the environment. Also, the proposed course develops skills in the image of design and planning solutions, forms knowledge of professional terms of landscape art.

Purpose of studying of the discipline

Formation of a system of theoretical knowledge and practical skills for the creation of landscape compositions and their use in interiors and open environmental situations, the formation of microclimate, image improvement.

Learning Outcomes

ON 7 Possess knowledge about the resource value of plants in Kazakhstan; describe the diversity of the structure of cells, tissues and vegetative organs of various plant groups; evaluate the evolutionary significance of morphological structures of plants. To develop skills in the image of design and planning solutions for the construction of landscape compositions.

Learning outcomes by discipline

- Demonstrate their knowledge of the fundamental principles of planning, stylistics, zoning and other aspects of territory design;
- Demonstrate their knowledge of the fundamental principles of planning, stylistics, zoning and other aspects of territory design;
- to make a landscape program, a landscape plan of various scales;
- analyze statistical materials for drawing up landscape plans; assess the state of specific natural conditions and resources.

Prerequisites

Big practicum in botany

Postrequisites

Final examination

Biosphere - a global ecosystem

Discipline cycle	Profiling discipline
Course	4
Credits count	5
Knowledge control form	Examination

Short description of discipline
A discipline that studies the life shell of the Earth as a global ecosystem unit. A necessary component of the global ecosystem is a complex cycle between living organisms and inanimate nature. Photosynthesis of autotrophs is considered an important process in the global ecosystem. The main trophic connections between organisms from the same food chain are also discussed. The problems of conservation of the biosphere and the role of man in nature are considered.
Purpose of studying of the discipline
To form future professionals an idea of the origin of life on Earth and the evolution of the biosphere, to explore the biosphere as a global environmental ecosystem.
Learning Outcomes
ON9 Explain the main mechanisms of heredity and variability; apply methods of statistical data analysis, forecasting and modeling of biological and environmental processes, including using modern information technologies. To argue the basic laws of individual and historical development of living organisms.
ON10 Demonstrate knowledge of theoretical disciplines and apply them in professional activities; consolidate the skills of independent planning and conducting research experiments.
Learning outcomes by discipline
to understand the ways of development and preservation of civilization, the connection of geopolitical and biospheric processes, to take an active life position using professional knowledge;
-to understand modern problems of biology and use fundamental biological concepts in the field of professional activity to formulate and solve new problems;
– demonstrate knowledge of the basics of the doctrine of the biosphere, understanding of modern biosphere processes, the ability to assess them systematically, the ability to predict the consequences of the implementation of socially significant projects;
Prerequisites
Big practicum in botany
Postrequisites
Final examination

The doctrine of the biosphere

Discipline cycle	Profiling discipline
Course	4
Credits count	5
Knowledge control form	Examination

Short description of discipline
A discipline that studies the outer shell of the Earth, where life is widespread, and includes all living organisms and all elements of the bone nature. Students will gain knowledge about the global life envelope of the Earth, get acquainted with the main problems of conservation and morphogenesis of life on Earth. The acquired knowledge about the Biosphere will be a new approach to the study of the planet`s ecosphere as a developing and self-regulating ecosystem of the Earth.
Purpose of studying of the discipline
To form an idea among future specialists about the formation of the Biosphere as the vital shell of the Earth
Learning Outcomes
ON9 Explain the main mechanisms of heredity and variability; apply methods of statistical data analysis, forecasting and modeling of biological and environmental processes, including using modern information technologies. To argue the basic laws of individual and historical development of living organisms.
ON10 Demonstrate knowledge of theoretical disciplines and apply them in professional activities; consolidate the skills of independent planning and conducting research experiments.
Learning outcomes by discipline
- Explain the basic laws of the functioning of the biosphere
- Describe the objects of the human environment, the components of the biotic, abiotic and social environment, their interaction, role and significance for the purposes of nature conservation;
- To assess the environmental consequences of anthropogenic activities, to find ways to prevent and solve emerging environmental violations.
Prerequisites
Big practicum in botany
Postrequisites
Final examination

The ecological function of soils in the biosphere and ecosystems

Discipline cycle	Profiling discipline
Course	4
Credits count	5
Knowledge control form	Examination

Short description of discipline
A discipline that studies the ecological functions of soils and their significance for the Earth`s biosphere. The most important importance of soil for the biosphere is based on its following properties. Soil is one of the habitats and an important link in regulating the circulation of biogeochemical substances in the biosphere, where various cycles of organic and inorganic components that ensure the existence of life are carried out.
Purpose of studying of the discipline
the formation of fundamental knowledge about the living shell of the Earth - the soil, as a natural body, its properties, education, evolution.
Learning Outcomes
ON 7 Possess knowledge about the resource value of plants in Kazakhstan; describe the diversity of the structure of cells, tissues and

vegetative organs of various plant groups; evaluate the evolutionary significance of morphological structures of plants. To develop skills in the image of design and planning solutions for the construction of landscape compositions.
ON10 Demonstrate knowledge of theoretical disciplines and apply them in professional activities; consolidate the skills of independent planning and conducting research experiments.

Learning outcomes by discipline

- Demonstrate knowledge about the importance of soil in human life, its role in the biosphere;
- Explain the structure and properties of the soil, its role in the conservation of biological diversity;
- apply the acquired knowledge in practice and use methods of soil-ecological research.

Prerequisites

Big practicum in botany

Postrequisites

Final examination