CATALOG OF ELECTIVE DISCIPLINES

6B05 - Natural Sciences, Mathematics and Statistics
(Code and classification of the field of education)

6B052 - Environment
(Code and classification of the direction of training)

0520
(Code in the International Standard Classification of Education)

B051 - The environment
(Code and classification of the educational program group)

6B05201 - Ecology
(Code and name of the educational program)

(Level of preparation)

set of 2023

Developed
By the Academic Committee of the EP
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Reviewed
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Faculty of Engineering and Technology
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Chairman of the Commission on Quality Assurance Abdilova G.B.

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

Radiological RK problems

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

Short description of discipline
The discipline is aimed at studying radioecological problems of the Republic of Kazakhstan. The course deals with the problems associated with the extraction of uranium, describes the technology of its underground leaching. The current radioecological condition of the former Semipalatinsk test site and measures to return its lands to economic use are evaluated. Measures for the safe termination of the activities of nuclear power facilities are described on the example of the BN-350 reactor.

Purpose of studying of the discipline
Mastering knowledge about the nature of ionizing radiation, the effects of radiation on living organisms, the current radioecological situation in the Republic of Kazakhstan and ways to overcome modern radioecological problems of the country.

Learning Outcomes
ON3 Systematize the basic laws of the fundamental disciplines of the natural science cycle, possess professionally oriented knowledge and practical skills in the field of chemistry, biogeochemistry, ecotoxicology, soil science, biogeography with their use in ecology.
ON4 To describe the basic general professional ideas about the theoretical foundations of the doctrine of the biosphere, biological ecology, systemic ecology, social ecology, radiation ecology, geoecology, bioindication.

Learning outcomes by discipline
1) Describe radioecological problems of the Republic of Kazakhstan.
2) Solve environmental problems related to uranium mining and the activities of the former Semipalatinsk test site.
3) Recommend measures for the safe termination of the activities of nuclear power facilities.

Prerequisites
Chemistry

Postrequisites
Topical issues of radioecology of Kazakhstan

Prediploma practice

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

Short description of discipline
Pre-graduate practice is the completion of writing a thesis. In this practice, students are engaged in the collection and processing, generalization; analysis of statistical data and practical material on the topic of graduation research. The formulation of conclusions, patterns, recommendations and suggestions on the topic of the thesis are also considered. Knowledge is applied, making professional conclusions in the field of practical training, the formation of a scientific worldview, the development of logical thinking, the development of modern theoretical and experimental research methods.

Purpose of studying of the discipline
of necessary materials on the topic of graduation design (work)

Learning Outcomes
ON4 To describe the basic general professional ideas about the theoretical foundations of the doctrine of the biosphere, biological ecology, systemic ecology, social ecology, radiation ecology, geoecology, bioindication.
ON5 Possess knowledge of the basics of environmental monitoring, standardization and expertise, industrial ecology, environmental design, legal foundations of environmental management, and the ability to use theoretical knowledge in practical activities.
ON10 Develop environmental projects, coordinating environmental documentation at enterprises, environmental protection action plans with the implementation and implementation of industrial environmental control and compliance with requirements, labor protection and safety standards.

Learning outcomes by discipline
1)Apply knowledge by making professional conclusions in the field of practical training
2) evaluate the effectiveness of professional activity
3) to form a scientific worldview and the development of logical thinking

Prerequisites
Production practice II

Postrequisites
Final examination

Manufacturing practice III

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

Short description of discipline
In this practice, they study the system of environmental measures carried out at the enterprise, methods and techniques for conducting environmental research, conducting theoretical, experimental and field research, studying methods of economic stimulation of environmental activities of the enterprise. Industrial-safe methods, measures and means are applied in practice, excluding the impact of hazardous and harmful production factors and industrial pollution on workers and the environment.

Purpose of studying of the discipline

of necessary materials on the topic of graduation design (work)

Learning Outcomes

ON6 To set goals and objectives of the experiment, to work with laboratory equipment, to use modern methods of scientific research, tools and devices used in conducting environmental studies and ensuring the safety of the production environment
ON8 Demonstrate the skills of operating treatment facilities and implement technological processes for the processing, disposal and disposal of solid, liquid, radioactive waste with the introduction of low- waste technologies and the organization of work on the reclamation of disturbed lands and the creation of cultural landscapes.
ON9 To assess the possibilities and ways of economic use of natural resources, their distribution and condition, the quality of the natural environment and the level of man-made load to ensure the environmental safety of the region and the republic.

Learning outcomes by discipline

1) Have the skills to create and implement an environmental monitoring program and system in anthropogenic impact zones
2)Possess the skills of operating sewage treatment plants
3) make prompt and competent decisions to reduce pollution of environmental objects

Prerequisites

Production practice II

Postrequisites

Final examination

Introduction to Specialty

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

Short description of discipline

The discipline is aimed at revealing the basic concepts of ecology, its complexity, the huge role of environmental knowledge in the science and practice of various aspects of modern society, the patterns of relationships between organisms and their habitat, consideration of the essence, causes of global environmental problems and ways to solve these problems. The problems, methods and sections of the science "Ecology" with various aspects of the professional activity of an ecologist are considered.

Purpose of studying of the discipline

To provide information about the modern role and importance of ecology, to reveal the patterns of interaction of living organisms and their habitat

Learning Outcomes

ON2 Possess the basics of professional knowledge, methods of scientific research used in ecology, generalize the results obtained taking into account the experience previously accumulated in science.
ON9 To assess the possibilities and ways of economic use of natural resources, their distribution and condition, the quality of the natural environment and the level of man-made load to ensure the environmental safety of the region and the republic.

Learning outcomes by discipline

1) Describe the main patterns of interaction of living organisms with the environment, the structure and dynamics of communities and ecosystems, as well as the patterns of functioning of ecological systems and the biosphere.
2) Formulate the basic laws of the fundamental disciplines of the natural science cycle.
3) Analyze and predict modern environmental problems of various levels based on the achievements of science and practice, advanced domestic and foreign experience.

Prerequisites

Biological ecology

Postrequisites

Quality management and control environment

Origin and Evolution of the Biosphere

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

Short description of discipline

The discipline is aimed at studying the origin and evolution of the biosphere as a global ecosystem. The course examines the distinctive properties of life, the problem and the main theories of the origin of life, the peculiarities of the development of the plant and animal world at different stages of the evolution of the biosphere. The concept of the biosphere by V.I. Vernadsky is studied. Atmospheric and hydrospheric global processes are characterized. The regularities of the functioning of the biosphere and the mechanisms that ensure its stability at the present stage are described

Purpose of studying of the discipline

To give a complete picture of the biosphere as the largest terrestrial ecosystem and its evolution, to outline the boundaries of the biosphere, to identify the scale, unity and patterns of global biosphere processes, human contribution to changing their pace, indicating current and potential consequences for the biosphere.

Learning Outcomes

ON2 Possess the basics of professional knowledge, methods of scientific research used in ecology, generalize the results obtained taking into account the experience previously accumulated in science.
ON9 To assess the possibilities and ways of economic use of natural resources, their distribution and condition, the quality of the natural environment and the level of man-made load to ensure the environmental safety of the region and the republic.

Learning outcomes by discipline

1) List the distinctive properties of the living.
2) Discuss the main theories of the origin of life and explain the features of the different stages of the evolution of the biosphere.

3) Explain the mechanisms that ensure the stability of the biosphere at the present stage.

Prerequisites

Biological ecology

Postrequisites

Quality management and control environment

Environmental aspects of natural philosophy

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

Short description of discipline

This course examines the ecological foundations of natural science, the biological efficiency of communities and ecosystems. The knowledge of the state of natural ecosystems, the processes of the mechanisms of environmental harmfulness and the production of anthropogenic factors for human health, as well as the factors of the influence of dangerous, environmentally harmful substances into the environment that lead to a change in the current or relaxed state of the habitat are studied

Purpose of studying of the discipline

Formation of systematized knowledge in the field of the ecological aspect of natural science on aspects of the theory and methodology of the organization of environmental education and upbringing, as well as in accordance with the latest scientific data on the problems of environmental management.

Learning Outcomes

ON2 Possess the basics of professional knowledge, methods of scientific research used in ecology, generalize the results obtained taking into account the experience previously accumulated in science.
ON9 To assess the possibilities and ways of economic use of natural resources, their distribution and condition, the quality of the natural environment and the level of man-made load to ensure the environmental safety of the region and the republic.

Learning outcomes by discipline

1) To know and understand identify and analyze natural and anthropogenic environmental processes and possible ways of their regulation;
2) To use in practice the knowledge of the analysis of environmental processes, setting specific tasks and priorities for the sustainable development of nature and society and using the knowledge gained to solve environmental problems;
3) To know the laws of the development of the biosphere and the conditions for maintaining its stability.

Prerequisites

Biological ecology

Postrequisites

Quality management and control environment

Forest protection

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

Short description of discipline

The discipline is aimed at studying the features of forest ecosystems, their distribution and diversity. A set of measures for the protection and restoration of forests is described. The causes of forest fires, their types, methods of prevention are considered. The ideas about regional forest communities and the patterns of their development are given on the example of the ribbon pine forest of the Irtysh region, the issues of reforestation and the organization of forest nurseries are considered.

Purpose of studying of the discipline

study of the features of forest ecosystems and regional forest communities

Learning Outcomes

ON3 Systematize the basic laws of the fundamental disciplines of the natural science cycle, possess professionally oriented knowledge and practical skills in the field of chemistry, biogeochemistry, ecotoxicology, soil science, biogeography with their use in ecology.
ON4 To describe the basic general professional ideas about the theoretical foundations of the doctrine of the biosphere, biological ecology, systemic ecology, social ecology, radiation ecology, geoecology, bioindication.
ON11 To monitor compliance with environmental legislation, standards and regulations on environmental protection and rational use of natural resources, preservation of the state nature reserve fund and natural ecological systems.

Learning outcomes by discipline

1) Describe the features of forest ecosystems, their distribution and diversity.
2) Distinguish between types of forest fires, their causes and methods of prevention.
3)Recommend a set of measures for protection and reforestation, including the example of the ribbon pine forest of the Irtysh region.

Prerequisites

School course

Postrequisites

Ecological biogeography

Ecology of animals

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

Short description of discipline
The discipline is aimed at studying information about the most important ecological features of representatives of the animal kingdom, their main ecological characteristics and classifications. The features of gas exchange and heat exchange of animals, the role of ambient temperature in animal life, animal biorhythms, regulation of their numbers, hunting and fishing management are considered. The role of animal organisms in the natural balance, the influence of anthropogenic factors on the vital activity of animals is considered.
Purpose of studying of the discipline
Considering the factual ecology of animals and the habitat of animals, to study their characteristics and structure.
Learning Outcomes
ON3 Systematize the basic laws of the fundamental disciplines of the natural science cycle, possess professionally oriented knowledge and practical skills in the field of chemistry, biogeochemistry, ecotoxicology, soil science, biogeography with their use in ecology.
ON4 To describe the basic general professional ideas about the theoretical foundations of the doctrine of the biosphere, biological ecology, systemic ecology, social ecology, radiation ecology, geoecology, bioindication.
ON11 To monitor compliance with environmental legislation, standards and regulations on environmental protection and rational use of natural resources, preservation of the state nature reserve fund and natural ecological systems.
Learning outcomes by discipline
1) Classify ecological groups and animal life forms, terms and concepts of this course.
2) Distinguish animals by intra- and interspecific interactions, explain their role in the biosphere.
3) To assess the degree of dependence of the distribution of the species on environmental factors, the relationship of the morphological structure of the organism from the habitat.
Prerequisites
School course
Postrequisites
Ecological biogeography

Ecology of animals and plants

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

Short description of discipline
The discipline is aimed at studying information about the most important ecological features of representatives of the animal and plant kingdom, their main ecological characteristics and classifications. The features of gas exchange and heat exchange of animals, the role of ambient temperature in animal life, animal biorhythms, regulation of their numbers, hunting and fishing management are considered. It characterizes the importance of air, heat, water and light in plant life, heat as necessary conditions for the existence of plants.
Purpose of studying of the discipline
To provide students with information about the most important ecological features of representatives of the animal and plant kingdom, to study their main ecological characteristics and classifications.
Learning Outcomes
ON3 Systematize the basic laws of the fundamental disciplines of the natural science cycle, possess professionally oriented knowledge and practical skills in the field of chemistry, biogeochemistry, ecotoxicology, soil science, biogeography with their use in ecology.
ON4 To describe the basic general professional ideas about the theoretical foundations of the doctrine of the biosphere, biological ecology, systemic ecology, social ecology, radiation ecology, geoecology, bioindication.
ON11 To monitor compliance with environmental legislation, standards and regulations on environmental protection and rational use of natural resources, preservation of the state nature reserve fund and natural ecological systems.
Learning outcomes by discipline
1) Classify ecological groups and life forms of plants and animals, terms and concepts of this course.
2) Distinguish plants and animals by intra- and interspecific interactions, explain their role in the biosphere.
3) To assess the degree of dependence of the distribution of the species on environmental factors, the relationship of the morphological structure of the organism from the habitat.
Prerequisites
School course
Postrequisites
Ecological biogeography

Bioindicative methods of research

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

Short description of discipline
The discipline is aimed at studying the tasks, methods and principles of the application of bioindication in the assessment of the state of the environment. Bioindication reactions at different levels of the organization of living things are considered, including the use of microorganisms to assess the state of natural objects, the use of bioindication methods for plant research, as well as the advantages of invertebrates and the possibility of using vertebrates in bioindication. The comparison of bioindication research methods with physico-chemical methods is carried out.
Purpose of studying of the discipline
To study general approaches and methods of bioindication, as well as to teach to analyze the quality of natural habitats based on the assessment of the state of living organisms and their communities living in them.
Learning Outcomes
ON3 Systematize the basic laws of the fundamental disciplines of the natural science cycle, possess professionally oriented knowledge

and practical skills in the field of chemistry, biogeochemistry, ecotoxicology, soil science, biogeography with their use in ecology.
ON4 To describe the basic general professional ideas about the theoretical foundations of the doctrine of the biosphere, biological ecology, systemic ecology, social ecology, radiation ecology, geoecology, bioindication.
ON11 To monitor compliance with environmental legislation, standards and regulations on environmental protection and rational use of natural resources, preservation of the state nature reserve fund and natural ecological systems.

Learning outcomes by discipline

1) Describe the tasks, methods and principles of bioindication.
2) Apply bioindication research methods to assess the ecological state of the environment.
3) Choose the most sensitive types of bioindicators among representatives of different levels of the organization of the living.

Prerequisites

Biological ecology

Postrequisites

Environmental monitoring and environmental quality controls

Biological levels of impact of pollution of the biosphere

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

Short description of discipline

The discipline is aimed at studying the main types of pollution of the global ecosystem – the biosphere and the specific features of their impact on different levels of organization of living organisms. This course describes the biological levels of organization of living organisms, examines the features of reactions to environmental pollution of representatives of lower and higher hierarchical systems, uses a systematic analysis of complex ecological systems.

Purpose of studying of the discipline

types of biological pollution and their influence on other processes in the biosphere are considered

Learning Outcomes

ON3 Systematize the basic laws of the fundamental disciplines of the natural science cycle, possess professionally oriented knowledge and practical skills in the field of chemistry, biogeochemistry, ecotoxicology, soil science, biogeography with their use in ecology.
ON4 To describe the basic general professional ideas about the theoretical foundations of the doctrine of the biosphere, biological ecology, systemic ecology, social ecology, radiation ecology, geoecology, bioindication.
ON11 To monitor compliance with environmental legislation, standards and regulations on environmental protection and rational use of natural resources, preservation of the state nature reserve fund and natural ecological systems.

Learning outcomes by discipline

1) List the main types of pollution of the biosphere and describe the specific features of their impact on living organisms.
2) To distinguish the features of reactions to pollution of the biosphere of representatives of biosystems of different hierarchical levels.
3)Propose the use of system analysis of complex ecosystems.

Prerequisites

Biological ecology

Postrequisites

Environmental monitoring and environmental quality controls

Biotecting of urban areas

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

Short description of discipline

The discipline is aimed at studying biotesting as a method of assessing the toxicity of the environment using test objects. This course describes the specifics of urban ecosystems, the main sources of pollution of urban environmental objects and bioindication methods for determining pollution of urbanized territories. The possibilities of such test systems as microorganisms, plants and animals, as well as cell culture are characterized in detail for the detection of ecotoxicants. The requirements for the characteristic features of test objects are considered.

Purpose of studying of the discipline

Familiarization of students with the methodological foundations of biological monitoring of the state of urbanized territories by the main methods of biotesting.

Learning Outcomes

ON3 Systematize the basic laws of the fundamental disciplines of the natural science cycle, possess professionally oriented knowledge and practical skills in the field of chemistry, biogeochemistry, ecotoxicology, soil science, biogeography with their use in ecology.
ON4 To describe the basic general professional ideas about the theoretical foundations of the doctrine of the biosphere, biological ecology, systemic ecology, social ecology, radiation ecology, geoecology, bioindication.
ON11 To monitor compliance with environmental legislation, standards and regulations on environmental protection and rational use of natural resources, preservation of the state nature reserve fund and natural ecological systems.

Learning outcomes by discipline

1) Describe biotesting as a method of assessing the toxicity of the environment using test objects.
2) Diagnose the pollution of urbanized areas using biotesting methods.
3) Formulate the requirements for test objects.

Prerequisites

Biological ecology

Postrequisites

Environmental monitoring and environmental quality controls

Protection of land ecosystems

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

Short description of discipline

The discipline is aimed at studying the ecological principles of terrestrial ecosystems, ecosystems of the Earth (polar deserts, tundra and forest tundra; coniferous forests; deciduous forests; temperate steppes; deserts: grasses and shrubs; mountains), their classification, features and protection. The climatic zones of Kazakhstan and the environmental foundations of terrestrial ecosystems of the biosphere are considered. The course introduces the legal foundations of the protection of terrestrial ecosystems, the priorities of conservation of the nature reserve fund and natural ecological systems.

Purpose of studying of the discipline

Know the characteristics and problems of protecting terrestrial ecosystems.. An urgent problem of environmental protection and natural resources is the protection of ecosystems on land and in water. To familiarize students with the types of environmental activities, the system of norms and rules, regulatory documentation, design, environmental protection, rational use of natural resources, environmental safety, as well as environmental expertise, audit and EIA.

Learning Outcomes

ON3 Systematize the basic laws of the fundamental disciplines of the natural science cycle, possess professionally oriented knowledge and practical skills in the field of chemistry, biogeochemistry, ecotoxicology, soil science, biogeography with their use in ecology.
ON4 To describe the basic general professional ideas about the theoretical foundations of the doctrine of the biosphere, biological ecology, systemic ecology, social ecology, radiation ecology, geoecology, bioindication.
ON11 To monitor compliance with environmental legislation, standards and regulations on environmental protection and rational use of natural resources, preservation of the state nature reserve fund and natural ecological systems.

Learning outcomes by discipline

) Analyze the main local, regional environmental problems and rational measures to eliminate violations of the structure and functions of ecosystems.
2) Distinguish between quantitative and qualitative indicators that allow you to determine the natural zone of the globe.
3) To carry out measures for the conservation of flora and fauna, control and analysis of the state of the environment.

Prerequisites

Introduction to Specialty

Postrequisites

Elementary System Ecology

Basis of Biochymistry

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

Short description of discipline

The discipline is aimed at studying the chemical structure and transformation of molecules that make up living matter, i.e. studies the chemical foundations of life processes.
Introduces future specialists to
the structure and properties of chemical compounds
that make up the human body.
Allows you to master theoretical knowledge in the main sections of biochemistry, the skills of setting up biochemical research, the ability to apply the theoretical knowledge and practical skills in professional activities

Purpose of studying of the discipline

the study methodology for establishing the major structures of biomolecules, secondary metabolites

Learning Outcomes

ON3 Systematize the basic laws of the fundamental disciplines of the natural science cycle, possess professionally oriented knowledge and practical skills in the field of chemistry, biogeochemistry, ecotoxicology, soil science, biogeography with their use in ecology.
ON4 To describe the basic general professional ideas about the theoretical foundations of the doctrine of the biosphere, biological ecology, systemic ecology, social ecology, radiation ecology, geoecology, bioindication.
ON11 To monitor compliance with environmental legislation, standards and regulations on environmental protection and rational use of natural resources, preservation of the state nature reserve fund and natural ecological systems.

Learning outcomes by discipline

1) To reveal the essence and significance of the molecular processes occurring in the cells and tissues of the animal body under various conditions.
2) To know the structure and properties of the main classes of organic compounds that make up the human body, the mechanisms and chemisms of the main processes of metabolism and energy in the body.
3) Apply the acquired theoretical knowledge and practical skills in professional activities.

Prerequisites

Introduction to Specialty

Postrequisites

Elementary System Ecology

Protection of terrestrial and aquatic ecosystems

Discipline cycle	Basic disciplines

Course	2
Credits count	5
Knowledge control form	Examination

Short description of discipline
The discipline is aimed at studying the ecological principles of terrestrial and aquatic ecosystems, ecosystems of the Earth (polar deserts, tundra and forest tundra; coniferous forests; broad-leaved forests; temperate steppes; deserts: grasses and shrubs; mountains), their classification, features and protection. Freshwater ecosystems (artificial, natural freshwater and marine ecosystems) and their protection, land and water ecosystems, as well as climatic zones of Kazakhstan are considered.

Purpose of studying of the discipline
Study of the problem of conservation of terrestrial and aquatic ecosystems, their flora and fauna.

Learning Outcomes
ON3 Systematize the basic laws of the fundamental disciplines of the natural science cycle, possess professionally oriented knowledge and practical skills in the field of chemistry, biogeochemistry, ecotoxicology, soil science, biogeography with their use in ecology.
ON4 To describe the basic general professional ideas about the theoretical foundations of the doctrine of the biosphere, biological ecology, systemic ecology, social ecology, radiation ecology, geoecology, bioindication.
ON11 To monitor compliance with environmental legislation, standards and regulations on environmental protection and rational use of natural resources, preservation of the state nature reserve fund and natural ecological systems.

Learning outcomes by discipline
1) Analyze the main local, regional environmental problems and rational measures to eliminate violations of the structure and functions of ecosystems.
2) Distinguish between quantitative and qualitative indicators that allow you to determine the natural zone of the globe.
3) To carry out measures for the conservation of flora and fauna, control and analysis of the state of the environment.

Prerequisites
Introduction to Specialty

Postrequisites
Elementary System Ecology

Global social and environmental issues and sustainable development

Discipline cycle	Basic disciplines
Course	2
Credits count	3
Knowledge control form	Examination

Short description of discipline
The discipline is aimed at studying the tasks and subject of social ecology and global ecology. The biosphere is characterized as a global ecosystem; the evolution of the biosphere and environmental crises; modern global environmental problems (climate warming, desertification, etc.). International cooperation in solving global problems is considered; the main tasks and global initiatives in the field of sustainable development; indicators of sustainable development of society, as well as sustainable development of Kazakhstan.

Purpose of studying of the discipline
The purpose of studying the discipline
- cognition of value orientations and attitudes aimed at recreating, preserving and developing the natural and social wealth accumulated by society over a long period of historical development;
- study of the main causes of the contradictory development of the biosphere and the anthroposphere, the resulting global environmental problems and forms of their resolution;
- the development of an ecological worldview based on the study of the history of the origin, development and current state of the relationship "nature-society".

Learning Outcomes
ON6 To set goals and objectives of the experiment, to work with laboratory equipment, to use modern methods of scientific research, tools and devices used in conducting environmental studies and ensuring the safety of the production environment
ON8 Demonstrate the skills of operating treatment facilities and implement technological processes for the processing, disposal and disposal of solid, liquid, radioactive waste with the introduction of low- waste technologies and the organization of work on the reclamation of disturbed lands and the creation of cultural landscapes.
ON9 To assess the possibilities and ways of economic use of natural resources, their distribution and condition, the quality of the natural environment and the level of man-made load to ensure the environmental safety of the region and the republic.

Learning outcomes by discipline
1) Describe the main tasks and subject of social ecology and global ecology.
2) Explain the causes and consequences of environmental crises in the evolution of the biosphere.
3) Analyze the causes and propose solutions to modern global environmental problems, taking into account international experience and the concept of sustainable development.

Prerequisites
Bases of economics, law and ecological knowledge

Postrequisites
Ecology of Kazakhstan

Modern ecology and global environmental problems

Discipline cycle	Basic disciplines
Course	2
Credits count	3
Knowledge control form	Examination

Short description of discipline
The discipline is aimed at studying modern ecology as a complex science of environmental protection. The course examines the purpose

and main tasks facing modern ecology, including solving such global environmental problems as climate change and adaptation, greenhouse gas emissions, ozone-depleting substances management, waste pollution of the Pacific Ocean, etc.

Purpose of studying of the discipline

Familiarization of students with the conceptual foundations of ecology as a modern complex fundamental science, considering various aspects of the interaction of all components of nature and members of the community, forming an idea of the current state of the biosphere as a result of increasing anthropogenic impact on it, about possible ways to reduce the power of this impact.

Learning Outcomes

ON6 To set goals and objectives of the experiment, to work with laboratory equipment, to use modern methods of scientific research, tools and devices used in conducting environmental studies and ensuring the safety of the production environment

ON8 Demonstrate the skills of operating treatment facilities and implement technological processes for the processing, disposal and disposal of solid, liquid, radioactive waste with the introduction of low- waste technologies and the organization of work on the reclamation of disturbed lands and the creation of cultural landscapes.

ON9 To assess the possibilities and ways of economic use of natural resources, their distribution and condition, the quality of the natural environment and the level of man-made load to ensure the environmental safety of the region and the republic.

Learning outcomes by discipline

1) Describe modern ecology as a complex science of environmental protection.

2) Classify the main tasks facing modern ecology.

3) Propose solutions to global environmental problems.

Prerequisites

Bases of economics, law and ecological knowledge

Postrequisites

Ecology of Kazakhstan

Modern environmental problems of the environment

Discipline cycle	Basic disciplines
Course	2
Credits count	3
Knowledge control form	Examination

Short description of discipline

The discipline is aimed at studying general environmental problems, the negative impact of human economic activity. The features of atmospheric air pollution, degradation and protection of soil cover, the current state of forest ecosystems are considered. The characteristics of physical, chemical and biological pollution of the environment, the impact of environmental pollution on the health of the population are given. Ecological problems of cities and urban settlements, use and protection of water resources are described.

Purpose of studying of the discipline

An overview of environmental problems. The negative impact of human activities. Use and protection of water resources. Features air pollution. Degradation and soil protection. The current state of forest ecosystems. Physical pollution. Contamination of the environment and public health. Environmental problems of cities and urban settlements.

Learning Outcomes

ON6 To set goals and objectives of the experiment, to work with laboratory equipment, to use modern methods of scientific research, tools and devices used in conducting environmental studies and ensuring the safety of the production environment

ON8 Demonstrate the skills of operating treatment facilities and implement technological processes for the processing, disposal and disposal of solid, liquid, radioactive waste with the introduction of low- waste technologies and the organization of work on the reclamation of disturbed lands and the creation of cultural landscapes.

ON9 To assess the possibilities and ways of economic use of natural resources, their distribution and condition, the quality of the natural environment and the level of man-made load to ensure the environmental safety of the region and the republic.

Learning outcomes by discipline

1) Describe the features of the ecological state of the atmosphere, hydrosphere, soil cover, flora and fauna, radioecological situation in the world.

2) To assess the environmental consequences of anthropogenic activities, to find ways to prevent and solve emerging environmental violations.

3) Use the results of environmental studies in predicting the consequences of natural and socio-economic processes.

Prerequisites

Bases of economics, law and ecological knowledge

Postrequisites

Ecology of Kazakhstan

Theory and practice of nature conservation in the RK

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

Short description of discipline

The discipline is aimed at studying the system of specially protected natural territories (protected areas) of different countries. The course examines the distribution of protected areas by countries and regions of the world, studies protected areas of global, regional and local levels, the peculiarities of their protection regimes, as well as issues of ecological tourism in protected areas, including Kazakhstan (for example, Bayan-Aul State National Natural Park, Shchuchinsko-Borovskaya resort area, etc.).

Purpose of studying of the discipline

To study the theoretical and practical aspects of nature conservation in the Republic of Kazakhstan, as well as issues of creation, strengthening, functioning and development of specially protected natural areas (protected areas), primarily state nature reserves.

Learning Outcomes

ON3 Systematize the basic laws of the fundamental disciplines of the natural science cycle, possess professionally oriented knowledge and practical skills in the field of chemistry, biogeochemistry, ecotoxicology, soil science, biogeography with their use in ecology.
ON4 To describe the basic general professional ideas about the theoretical foundations of the doctrine of the biosphere, biological ecology, systemic ecology, social ecology, radiation ecology, geoecology, bioindication.
ON11 To monitor compliance with environmental legislation, standards and regulations on environmental protection and rational use of natural resources, preservation of the state nature reserve fund and natural ecological systems.

Learning outcomes by discipline

1) Discuss the features of the systems of specially protected natural territories of different countries.
2) Analyze the distribution of protected areas by countries and regions of the world and describe their features.
3) Recommend certain areas of protected areas for the development of ecological tourism.

Prerequisites

Protection of terrestrial and aquatic ecosystems

Postrequisites

Ecology of Kazakhstan

Reserved matter in RK

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

Short description of discipline

The discipline is aimed at studying the history of development, formation, and the current state of the nature reserve business of Kazakhstan. The article considers the biodiversity of the Republic of Kazakhstan and the problem of its conservation; the concept of specially protected natural territories (protected areas); types of protected areas of Kazakhstan, their composition, area; goals, objectives and history of the creation of reserves and national natural parks, characteristics of their flora and fauna. The activities of other types of protected areas of the Republic of Kazakhstan are briefly described

Purpose of studying of the discipline

To give Knowing of the existing especially protected natural territories in RK and methods of management over them.

Learning Outcomes

ON3 Systematize the basic laws of the fundamental disciplines of the natural science cycle, possess professionally oriented knowledge and practical skills in the field of chemistry, biogeochemistry, ecotoxicology, soil science, biogeography with their use in ecology.
ON4 To describe the basic general professional ideas about the theoretical foundations of the doctrine of the biosphere, biological ecology, systemic ecology, social ecology, radiation ecology, geoecology, bioindication.
ON11 To monitor compliance with environmental legislation, standards and regulations on environmental protection and rational use of natural resources, preservation of the state nature reserve fund and natural ecological systems.

Learning outcomes by discipline

1) To tell the history of the development, formation and current state of conservation in the Republic of Kazakhstan.
2) Describe the biodiversity of Kazakhstan and solve the problems of its conservation.
3) Evaluate the role of nature reserves and national nature parks in the conservation of flora and fauna.

Prerequisites

Protection of terrestrial and aquatic ecosystems

Postrequisites

Ecology of Kazakhstan

Protection of a plant and animal life

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

Short description of discipline

The discipline is aimed at studying methods and methods of plant and animal protection. The course examines the purpose, objectives and subject of the discipline, the concept of "nature protection", the main objectives of environmental protection activities, the legislative and regulatory framework of environmental protection activities. Specially protected natural territories are characterized as the basis for the sustainable existence of natural communities. The features of the protection of flora and fauna in the Republic of Kazakhstan are described.

Purpose of studying of the discipline

Formation of students` ideas about modern problems of biodiversity conservation on Earth, methods and principles of protection of flora and fauna.

Learning Outcomes

ON3 Systematize the basic laws of the fundamental disciplines of the natural science cycle, possess professionally oriented knowledge and practical skills in the field of chemistry, biogeochemistry, ecotoxicology, soil science, biogeography with their use in ecology.
ON4 To describe the basic general professional ideas about the theoretical foundations of the doctrine of the biosphere, biological ecology, systemic ecology, social ecology, radiation ecology, geoecology, bioindication.
ON11 To monitor compliance with environmental legislation, standards and regulations on environmental protection and rational use of natural resources, preservation of the state nature reserve fund and natural ecological systems.

Learning outcomes by discipline

1) Describe methods and methods of plant and animal protection.
2) Identify the main objectives of environmental protection activities and review its legislative and regulatory framework.
3) To organize the protection of flora and fauna in the Republic of Kazakhstan.

Prerequisites

Protection of terrestrial and aquatic ecosystems

Postrequisites

Ecology of Kazakhstan

Biogeography with fundamentals of ecology

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

Short description of discipline

The discipline is aimed at studying the unity of the organic world of the planet, the relationship of its flora and fauna, as well as the dependence of vegetation and animal population on factors of the physical and geographical environment and human influence. The history of the development of biogeography, its basic concepts, sections, the biosphere and the circulation of substances, the basic principles of the structure and structure of the ecosystem are considered. Environmental factors are characterized: climatic, biotic, anthropogenic.

Purpose of studying of the discipline

To form students` stable knowledge about the basic provisions and principles of ecology and biogeography, the patterns of geographical distribution of living organisms and their communities; to form the skills of applying the acquired knowledge in the field of nature conservation and nature management

Learning Outcomes

ON3 Systematize the basic laws of the fundamental disciplines of the natural science cycle, possess professionally oriented knowledge and practical skills in the field of chemistry, biogeochemistry, ecotoxicology, soil science, biogeography with their use in ecology.
ON4 To describe the basic general professional ideas about the theoretical foundations of the doctrine of the biosphere, biological ecology, systemic ecology, social ecology, radiation ecology, geoecology, bioindication.
ON11 To monitor compliance with environmental legislation, standards and regulations on environmental protection and rational use of natural resources, preservation of the state nature reserve fund and natural ecological systems.

Learning outcomes by discipline

1) Describe the areas and centers of origin of animals and plants.
2) To determine the features of the distribution of organisms on the globe in horizontal and altitude zones.
3) To assess the dependence of vegetation and animal population on the factors of the physical and geographical environment and human impact.

Prerequisites

Ecology of animals and plants

Postrequisites

Geoecology

Ecological biogeography

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

Short description of discipline

The discipline is aimed at studying the history of the development of biogeography and the emergence of ecological biogeography. The principles of the structure and structure of the ecosystem are considered; the concept of the area and features of the distribution of organisms on the planet. Floristic (Holarctic and Cape kingdoms) and faunal zoning (kingdoms of Paleogee, Arctogee, Neogee, Notogee) are studied. The types of anthropogenic impact on organisms are described, as well as the transition from species protection to community protection as a new vector of biodiversity conservation.

Purpose of studying of the discipline

To show the unity of the organic world of the planet, the interrelation of its flora and fauna, as well as the dependence of vegetation and animal population on the factors of the physical and geographical environment and human impact.

Learning Outcomes

ON3 Systematize the basic laws of the fundamental disciplines of the natural science cycle, possess professionally oriented knowledge and practical skills in the field of chemistry, biogeochemistry, ecotoxicology, soil science, biogeography with their use in ecology.
ON4 To describe the basic general professional ideas about the theoretical foundations of the doctrine of the biosphere, biological ecology, systemic ecology, social ecology, radiation ecology, geoecology, bioindication.
ON11 To monitor compliance with environmental legislation, standards and regulations on environmental protection and rational use of natural resources, preservation of the state nature reserve fund and natural ecological systems.

Learning outcomes by discipline

1) Describe the history of the development of ecological biogeography and explain the peculiarities of the distribution of organisms on the planet.
2) Compare the floristic and faunal biodiversity of biogeographic kingdoms.
3) Classify the types of anthropogenic impact on living organisms and propose effective ways to move from species protection to community protection.

Prerequisites

Ecology of animals and plants

Postrequisites

Geoecology

Ecological foundations of biodiversity

Discipline cycle	Basic disciplines

Course	2
Credits count	5
Knowledge control form	Examination

Short description of discipline
The discipline is aimed at studying the ecological foundations of the diversity of flora and fauna. The course examines the structure and basic patterns of the formation of biological diversity of different ecological systems. The role of biological diversity in ecosystems is demonstrated, as well as its economic importance. The biodiversity of individual ecosystems and regions is assessed. The fundamentals of environmental management for the conservation and maintenance of biological diversity are described.

Purpose of studying of the discipline
formation of ideas about the ecological features of different groups of living organisms and their communities, basic environmental laws and environmental problems; development of skills in collecting and processing field materials;
knowledge of the skills of identification and description of biological diversity; development of assessment skills by modern methods of quantitative information processing and analysis of the obtained materials; knowledge of the biological foundations of ecology and nature management understanding of the interdependence of phenomena and processes in wildlife, to identify and correctly interpret the observed reactions of organisms, populations and communities to environmental factors,

Learning Outcomes
ON3 Systematize the basic laws of the fundamental disciplines of the natural science cycle, possess professionally oriented knowledge and practical skills in the field of chemistry, biogeochemistry, ecotoxicology, soil science, biogeography with their use in ecology.
ON4 To describe the basic general professional ideas about the theoretical foundations of the doctrine of the biosphere, biological ecology, systemic ecology, social ecology, radiation ecology, geoecology, bioindication.
ON11 To monitor compliance with environmental legislation, standards and regulations on environmental protection and rational use of natural resources, preservation of the state nature reserve fund and natural ecological systems.

Learning outcomes by discipline
- Systematize the basic laws of the fundamental disciplines of the natural science cycle, possess professionally oriented knowledge and practical skills in the field of chemistry, biogeochemistry, ecotoxicology, soil science, biogeography with their use in ecology.
- To describe the basic general professional ideas about the theoretical foundations of the doctrine of the biosphere, biological ecology, systemic ecology, social ecology, radiation ecology, geoecology, bioindication.
- To monitor compliance with environmental legislation, standards and regulations on environmental protection and rational use of natural resources, preservation of the state nature reserve fund and natural ecological systems.
1) Determine the ecological basis of the diversity of flora and fauna and assess the biodiversity of different ecosystems.
2) To show the role of biodiversity in ecosystems and its economic importance.
3)Plan the management of environmental measures for the conservation and maintenance of biodiversity.

Prerequisites
Ecology of animals and plants

Postrequisites
Geoecology

Landscapes of Kazakhstan

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

Short description of discipline
The discipline is aimed at studying the diversity of landscapes of Kazakhstan. The course examines the classification of landscapes, the peculiarities of the ecology of forest-steppe, steppe, desert and mountain regions, their flora and fauna. Ecological problems of natural and anthropogenic landscapes of Kazakhstan are evaluated.
The basics of environmental management measures to maintain the biodiversity of landscapes and the measures taken to preserve the natural landscapes of Kazakhstan are described.

Purpose of studying of the discipline
Formation of basic ideas about environmental problems of natural and anthropogenic landscapes on the territory of Kazakhstan.

Learning Outcomes
ON6 To set goals and objectives of the experiment, to work with laboratory equipment, to use modern methods of scientific research, tools and devices used in conducting environmental studies and ensuring the safety of the production environment
ON8 Demonstrate the skills of operating treatment facilities and implement technological processes for the processing, disposal and disposal of solid, liquid, radioactive waste with the introduction of low- waste technologies and the organization of work on the reclamation of disturbed lands and the creation of cultural landscapes.
ON9 To assess the possibilities and ways of economic use of natural resources, their distribution and condition, the quality of the natural environment and the level of man-made load to ensure the environmental safety of the region and the republic.

Learning outcomes by discipline
1) Describe the diversity of landscapes of Kazakhstan and compare the features of the ecology of forest-steppe, steppe, desert and mountain regions.
2) To assess the environmental problems of natural and anthropogenic landscapes of Kazakhstan.
3) Plan environmental measures to preserve the natural landscapes of Kazakhstan.

Prerequisites
Reserved matter in RK

Postrequisites
Topical issues of radioecology of Kazakhstan

Environmental problems of RK

Discipline cycle	Basic disciplines

Course	3
Credits count	5
Knowledge control form	Examination

Short description of discipline
The discipline is aimed at studying environmental problems of the Republic of Kazakhstan of various ranks. The course examines global problems on the example of desertification, regional environmental problems on the example of the drying up of the Aral Sea and pollution of the Caspian Sea, studies local problems of soil contamination with heavy metals in East Kazakhstan, as well as historical pollution. The ways of solving environmental problems of the Republic of Kazakhstan are described.

Purpose of studying of the discipline
Formation of students` modern ideas about the environmental problems of the Republic of Kazakhstan and ways to solve them.

Learning Outcomes
ON6 To set goals and objectives of the experiment, to work with laboratory equipment, to use modern methods of scientific research, tools and devices used in conducting environmental studies and ensuring the safety of the production environment
ON8 Demonstrate the skills of operating treatment facilities and implement technological processes for the processing, disposal and disposal of solid, liquid, radioactive waste with the introduction of low- waste technologies and the organization of work on the reclamation of disturbed lands and the creation of cultural landscapes.
ON9 To assess the possibilities and ways of economic use of natural resources, their distribution and condition, the quality of the natural environment and the level of man-made load to ensure the environmental safety of the region and the republic.

Learning outcomes by discipline
1) Describe the environmental problems of the Republic of Kazakhstan.
2) To distinguish environmental problems of Kazakhstan of different ranks.
3) Propose ways to solve environmental problems of the Republic of Kazakhstan.

Prerequisites
Reserved matter in RK

Postrequisites
Topical issues of radioecology of Kazakhstan

Ecology of Kazakhstan

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

Short description of discipline
The discipline is aimed at studying the ecology of Kazakhstan. A general idea of global, regional and local environmental problems is given. The ecology of the atmosphere of Kazakhstan and the problem of pollution of the air basin of cities is considered; the ecology of the hydrosphere of Kazakhstan and the environmental problems of surface waters; the ecology of the lithosphere of Kazakhstan and the activities of military test sites. The state policy and the system of state management of environmental protection in the Republic of Kazakhstan are being studied.

Purpose of studying of the discipline
To form students` modern ideas about the environmental situation in the country, about the rates of environmental pollution and measures to reduce it.

Learning Outcomes
ON6 To set goals and objectives of the experiment, to work with laboratory equipment, to use modern methods of scientific research, tools and devices used in conducting environmental studies and ensuring the safety of the production environment
ON8 Demonstrate the skills of operating treatment facilities and implement technological processes for the processing, disposal and disposal of solid, liquid, radioactive waste with the introduction of low- waste technologies and the organization of work on the reclamation of disturbed lands and the creation of cultural landscapes.
ON9 To assess the possibilities and ways of economic use of natural resources, their distribution and condition, the quality of the natural environment and the level of man-made load to ensure the environmental safety of the region and the republic.

Learning outcomes by discipline
1) Describe global, regional and local environmental problems of Kazakhstan.
2) To solve the problems of pollution of the air basin, surface waters and lithosphere of Kazakhstan.
3) Analyze the methods of state management of environmental protection in the Republic of Kazakhstan.

Prerequisites
Reserved matter in RK

Postrequisites
Topical issues of radioecology of Kazakhstan

Environmental management economy

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

Short description of discipline
The discipline is aimed at studying the basic concepts of the course, sources of ecological and economic information, basic methods of analysis, assessment and practical solution of ecological and economic problems in the process of using, protecting and reproducing resources. The course examines: methods and techniques of ecological and economic analysis of the activities of economic entities; the economic value of natural resources and services; ecological and economic efficiency and calculation of the economic damage caused.

Purpose of studying of the discipline
The study of theoretical and practical issues in the field of rational use of natural resources, to solve ecological and economic problems

of production.

Learning Outcomes

ON6 To set goals and objectives of the experiment, to work with laboratory equipment, to use modern methods of scientific research, tools and devices used in conducting environmental studies and ensuring the safety of the production environment
ON8 Demonstrate the skills of operating treatment facilities and implement technological processes for the processing, disposal and disposal of solid, liquid, radioactive waste with the introduction of low- waste technologies and the organization of work on the reclamation of disturbed lands and the creation of cultural landscapes.
ON9 To assess the possibilities and ways of economic use of natural resources, their distribution and condition, the quality of the natural environment and the level of man-made load to ensure the environmental safety of the region and the republic.

Learning outcomes by discipline

1) Explain the basic concepts of the course, methods of analysis, evaluation and practical solutions to environmental and economic problems.
2) To apply in practice the methods and techniques of ecological and economic analysis of the activities of economic entities.
3) Establish the economic value of natural resources and services and calculates the economic damage caused to the environment.

Prerequisites

Environmental resource studies

Postrequisites

Recovery, recycling and disposal of consumer waste

Industrial ecology

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

Short description of discipline

The discipline is aimed at studying the resources of the natural system, their use, the quality of the natural environment and its main pollutants - industrial production. The course covers: assessment of total environmental impacts; pollution of the atmosphere and hydrosphere; reduction of the level of hazardous impacts of industrial production on the natural environment; methods of cleaning industrial emissions, discharges and bioprotective equipment; greening of production; legal norms for environmental protection.

Purpose of studying of the discipline

to acquaint students with the main stages of the formation of the relationship between man and nature; sources of industrial pollution of the environment, the impact of industrial pollution on living organisms;
** to show the contradictions between the production of material goods, the laws of the development of the natural system with OS resources and the peculiarities of their use;*
** to form theoretical knowledge and practical skills in the field of environmental protection, ecological outlook and ecological culture, taking into account the future professional activity of the student.*

Learning Outcomes

ON6 To set goals and objectives of the experiment, to work with laboratory equipment, to use modern methods of scientific research, tools and devices used in conducting environmental studies and ensuring the safety of the production environment
ON8 Demonstrate the skills of operating treatment facilities and implement technological processes for the processing, disposal and disposal of solid, liquid, radioactive waste with the introduction of low- waste technologies and the organization of work on the reclamation of disturbed lands and the creation of cultural landscapes.
ON9 To assess the possibilities and ways of economic use of natural resources, their distribution and condition, the quality of the natural environment and the level of man-made load to ensure the environmental safety of the region and the republic.

Learning outcomes by discipline

1) Explain the functioning of industrial production and their impact on various components of the biosphere.
2) To carry out the greening of technological processes and productions, analyzing permissible emissions, discharges of pollutants.
3) Assess the total impacts of industrial pollution and plan environmental protection measures.

Prerequisites

Environmental resource studies

Postrequisites

Recovery, recycling and disposal of consumer waste

Ecology and environmental managemen

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

Short description of discipline

The discipline is aimed at studying regulatory and legal documents in the field of ecology and nature management, principles of rational nature management, environmental regulation and forecasting the consequences of nature management. The course covers: the purpose and legal status of protected areas; the strategy of biodiversity conservation and nature protection; nature protection measures; monitoring, assessment of the state of the natural environment; forecast of changes in natural resources under the influence of anthropogenic factors; organization of project activities in the field of ecology and nature management.

Purpose of studying of the discipline

To acquaint students with the basic concepts of the relationship between man and nature, the contradictions between the production of material goods and the phenomena of the regularity of the development of the natural system with environmental resources and the peculiarities of their use.

Learning Outcomes

ON6 To set goals and objectives of the experiment, to work with laboratory equipment, to use modern methods of scientific research,

tools and devices used in conducting environmental studies and ensuring the safety of the production environment
ON8 Demonstrate the skills of operating treatment facilities and implement technological processes for the processing, disposal and disposal of solid, liquid, radioactive waste with the introduction of low- waste technologies and the organization of work on the reclamation of disturbed lands and the creation of cultural landscapes.
ON9 To assess the possibilities and ways of economic use of natural resources, their distribution and condition, the quality of the natural environment and the level of man-made load to ensure the environmental safety of the region and the republic.

Learning outcomes by discipline

1) Demonstrates knowledge of regulatory and legal documents in the field of ecology and nature management, principles of rational nature management, environmental regulation and forecasting of the consequences of nature management.
2) Explains the purpose and legal status of protected areas, the strategy of biodiversity conservation and nature protection.
3)Predicts changes in natural resources under the influence of anthropogenic factors and organizes project activities in the field of ecology and nature management

Prerequisites

Environmental resource studies

Postrequisites

Recovery, recycling and disposal of consumer waste

Radiation ecology

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

Short description of discipline

The discipline is aimed at studying the history of the origin and development of radiation ecology, tasks and directions of modern radiation research. In this course, radioactivity is considered as a physical factor of the environment, radiation sources and units of measurement of radioactivity are described. The features of radiation pollution of natural objects and the effects of ionizing radiation on living organisms are characterized. The characteristics of radioactive waste are given, methods of their processing, disposal and burial are studied.

Purpose of studying of the discipline

to give students basic knowledge about the essence of radioecology, its tasks, the impact of radioactive radiation on all living organisms, as well as ways to protect the environment and solve modern radioecological problems,
to give students basic knowledge

Learning Outcomes

ON3 Systematize the basic laws of the fundamental disciplines of the natural science cycle, possess professionally oriented knowledge and practical skills in the field of chemistry, biogeochemistry, ecotoxicology, soil science, biogeography with their use in ecology.
ON4 To describe the basic general professional ideas about the theoretical foundations of the doctrine of the biosphere, biological ecology, systemic ecology, social ecology, radiation ecology, geoecology, bioindication.

Learning outcomes by discipline

1) Describe the history of the origin, development, tasks and directions of radiation ecology.
2) To assess the features of contamination by radionuclides of environmental objects and the consequences of their impact on living organisms.
3) Recommend methods of processing, disposal and disposal of radioactive waste.

Prerequisites

Chemistry

Postrequisites

Topical issues of radioecology of Kazakhstan

Radiation Safety Basic

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

Short description of discipline

The discipline is aimed at studying the history of the origin and development of radiation ecology, tasks and directions of modern radiation research. In this course, radioactivity is considered as a physical factor of the environment, radiation sources and units of measurement of radioactivity are described. The features of radiation pollution of natural objects and the effects of ionizing radiation on living organisms are characterized. The characteristics of radioactive waste are given, methods of their processing, disposal and burial are studied.

Purpose of studying of the discipline

Theoretical and practical training of students on radiation safety, ensuring safe work with ionizing radiation sources, their dosimetry and control.

Learning Outcomes

ON3 Systematize the basic laws of the fundamental disciplines of the natural science cycle, possess professionally oriented knowledge and practical skills in the field of chemistry, biogeochemistry, ecotoxicology, soil science, biogeography with their use in ecology.
ON4 To describe the basic general professional ideas about the theoretical foundations of the doctrine of the biosphere, biological ecology, systemic ecology, social ecology, radiation ecology, geoecology, bioindication.

Learning outcomes by discipline

1) Describe ways to protect the public and personnel from different types of radiation.
2) Explain the legal aspects of radiation safety.
3) Plan radiation monitoring of the facility and recommend methods and devices for radiation monitoring.

Prerequisites
Chemistry
Postrequisites
Topical issues of radioecology of Kazakhstan

Ecological safety of the Republic of Kazakhstan

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

Short description of discipline
The discipline is aimed at studying legislative acts and principles of ensuring environmental safety, as well as problems and ways to solve them (climate change, ozone layer destruction, biodiversity conservation, desertification and land degradation, environmental disaster zones, problems related to the development of resources of the Caspian Sea shelf, the impact of military space and test complexes, radioactive, chemical and bacteriological contamination). The issues of environmental monitoring and statistics, international cooperation are considered.
Purpose of studying of the discipline
to train young professionals who know the basic principles of environmental safety, focused on the transition to sustainable development;
** to familiarize students with the main strategic directions of the state policy in the field of environmental safety of the Republic of Kazakhstan;*
** to form theoretical knowledge and practical skills in the field of environmental safety, environmental outlook and environmental culture, taking into account the future professional activity of the student.*
Learning Outcomes
ON6 To set goals and objectives of the experiment, to work with laboratory equipment, to use modern methods of scientific research, tools and devices used in conducting environmental studies and ensuring the safety of the production environment
ON8 Demonstrate the skills of operating treatment facilities and implement technological processes for the processing, disposal and disposal of solid, liquid, radioactive waste with the introduction of low- waste technologies and the organization of work on the reclamation of disturbed lands and the creation of cultural landscapes.
ON9 To assess the possibilities and ways of economic use of natural resources, their distribution and condition, the quality of the natural environment and the level of man-made load to ensure the environmental safety of the region and the republic.
Learning outcomes by discipline
1) Apply in practice the main provisions of legislative acts and the principles of ensuring environmental safety.
2) Analyze the problems of environmental safety of the environment and outline ways to solve them.
3) Assess the state of environmental monitoring, statistics and international cooperation.
Prerequisites
Environmental chemistry
Postrequisites
Quality management and control environment

Legal basis and procedure for state environmental control

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

Short description of discipline
The discipline is aimed at studying state environmental control in the field of environmental protection, conservation, reproduction and use of natural resources. The course covers:the legal basis and procedure for the organization of state environmental control, based on the current regulatory framework of the Republic of Kazakhstan;state bodies exercising environmental control; functional rights and duties of officials exercising state environmental control.
Purpose of studying of the discipline
familiarization with the basic theoretical provisions of the legal framework and the procedure for conducting state environmental control, mastering knowledge in the field of current environmental legislation and practice
Learning Outcomes
ON6 To set goals and objectives of the experiment, to work with laboratory equipment, to use modern methods of scientific research, tools and devices used in conducting environmental studies and ensuring the safety of the production environment
ON8 Demonstrate the skills of operating treatment facilities and implement technological processes for the processing, disposal and disposal of solid, liquid, radioactive waste with the introduction of low- waste technologies and the organization of work on the reclamation of disturbed lands and the creation of cultural landscapes.
ON9 To assess the possibilities and ways of economic use of natural resources, their distribution and condition, the quality of the natural environment and the level of man-made load to ensure the environmental safety of the region and the republic.
Learning outcomes by discipline
1 Describe the work of the state environmental control in the field of environmental protection, protection, reproduction and use of natural resources.
2 Demonstrate knowledge of the legal foundations and organization of state environmental control in the Republic of Kazakhstan.
3 Explain the functional rights and obligations of officials exercising state environmental control.
Prerequisites
Environmental chemistry
Postrequisites
Quality management and control environment

Ecological safety of the Republic of Kazakhstan

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

Short description of discipline

The discipline is aimed at studying the state and problems of environmental safety of the Republic of Kazakhstan, the relevance and basic principles of their provision. The course covers: global, national, local environmental problems, issues of greening the economy, legislation and society, as well as international cooperation of the Republic of Kazakhstan in the field of environmental protection and nature management, international environmental conventions and agreements ratified by the Republic of Kazakhstan.

Purpose of studying of the discipline

to train young professionals who know the basic principles of environmental safety, focused on the transition to sustainable development;

** to familiarize students with the main strategic directions of the state policy in the field of environmental safety of the Republic of Kazakhstan;*

** to form theoretical knowledge and practical skills in the field of environmental safety, environmental outlook and environmental culture, taking into account the future professional activity of the student.*

Learning Outcomes

ON6 To set goals and objectives of the experiment, to work with laboratory equipment, to use modern methods of scientific research, tools and devices used in conducting environmental studies and ensuring the safety of the production environment

ON8 Demonstrate the skills of operating treatment facilities and implement technological processes for the processing, disposal and disposal of solid, liquid, radioactive waste with the introduction of low- waste technologies and the organization of work on the reclamation of disturbed lands and the creation of cultural landscapes.

ON9 To assess the possibilities and ways of economic use of natural resources, their distribution and condition, the quality of the natural environment and the level of man-made load to ensure the environmental safety of the region and the republic.

Learning outcomes by discipline

1) Analyze the ecological state and environmental problems in the Republic of Kazakhstan, the principles of ecological zoning, the levels of environmental destruction of the environment.

2) Demonstrate the legal aspects of solving environmental problems of the Republic of Kazakhstan.

3) To establish the causes of environmental destabilization and to draw up a set of measures for the protection and rational use of natural resources of the Republic of Kazakhstan

Prerequisites

Environmental chemistry

Postrequisites

Quality management and control environment

Research Methods of Ecology

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

Short description of discipline

The discipline is aimed at studying the research work of students in higher education. As part of the course, students learn to work with scientific literature, choose directions, problems, and topics of scientific research. Their methodological foundations of scientific knowledge and creativity are being developed. The methods of empirical and theoretical research, stages and directions of scientific research are considered. The characteristics of fundamental, applied and exploratory research are given

Purpose of studying of the discipline

The purpose of studying the discipline: training of specialists with high general scientific and professional training, capable of independent creative work, having an idea of methodological patterns common to all sciences.

Learning Outcomes

ON2 Possess the basics of professional knowledge, methods of scientific research used in ecology, generalize the results obtained taking into account the experience previously accumulated in science.

ON9 To assess the possibilities and ways of economic use of natural resources, their distribution and condition, the quality of the natural environment and the level of man-made load to ensure the environmental safety of the region and the republic.

Learning outcomes by discipline

1) Develop projects of Maximum Permissible Emissions, Maximum Permissible Discharges, A Waste management Program.

2) Organize an environmental impact assessment (EIA) procedure.

3)Collect information for screening the impact of planned and ongoing activities on the environment.

Prerequisites

Introduction to Specialty

Postrequisites

Development of environmental projects

Nature conservation and rational use of natural resources

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

Short description of discipline

The discipline is devoted to the study of the history of human interaction with the environment and the stages of development. The main modern problems of the environment, trends of their changes, prospects for solving global problems in ecology are considered. The methods of environmental assessment, protection of natural resources, the main legislative documents in the field of nature protection and rational use of natural resources are being studied, a system of environmental protection measures is being implemented

Purpose of studying of the discipline

Formation of basic knowledge related to the development of the study of the human environment and nature with the protection and use of resources and natural conditions

Learning Outcomes

ON2 Possess the basics of professional knowledge, methods of scientific research used in ecology, generalize the results obtained taking into account the experience previously accumulated in science.
ON9 To assess the possibilities and ways of economic use of natural resources, their distribution and condition, the quality of the natural environment and the level of man-made load to ensure the environmental safety of the region and the republic.

Learning outcomes by discipline

1) describe methods for assessing the state of the environment, the basics of protecting natural resources, flora and fauna, the main legislative, legal and regulatory documents in the field of nature protection and rational use of natural resources.
2)to analyze the causality of various situations in the field of environmental protection
3) implement a system of environmental protection measures and solve specific tasks in the field of nature protection.

Prerequisites

Introduction to Specialty

Postrequisites

Development of environmental projects

Agricultural ecology

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

Short description of discipline

This course studies agroecosystems, technogenic pollution of soil- biotic complexes, rational use of soil and water resources, environmental problems of chemicalization and agricultural radiology, agroecomonitoring, optimization of agricultural landscapes, production of environmentally safe agricultural products, environmental protection activities in agriculture. Innovative and technical solutions are being formed for the rational use of the potential of soil, plants and animals in the production of agricultural products

Purpose of studying of the discipline

To form ideas, theoretical knowledge, practical skills and abilities about the laws and features of the functioning of agricultural ecosystems in the general system of cenoses and the biosphere as a whole, environmental problems of agriculture

Learning Outcomes

ON2 Possess the basics of professional knowledge, methods of scientific research used in ecology, generalize the results obtained taking into account the experience previously accumulated in science.
ON9 To assess the possibilities and ways of economic use of natural resources, their distribution and condition, the quality of the natural environment and the level of man-made load to ensure the environmental safety of the region and the republic.

Learning outcomes by discipline

1) Demonstrate basic knowledge and features of technogenic impact on agroecosystems and their consequences, as well as the impact of agroecosystems on the components of the biosphere.
2) assess the state of ecosystems and possess methods for determining the biological activity of soils and the resistance of the soil-biotic complex to the negative effects of anthropogenesis.
3)Apply information and communication technologies in solving typical tasks in the field of agricultural ecology and agronomy

Prerequisites

Introduction to Specialty

Postrequisites

Development of environmental projects

Methods, control devices and analysis environment

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

Short description of discipline

The discipline is aimed at studying the regulatory framework for environmental quality control. The indicators of the quality of atmospheric air, surface and sea waters, soils, as well as control and quality assurance of the analysis results are considered. Weight and volume analytical, electrochemical, optical, chromatographic, remote methods and devices in the analysis of environmental quality are studied. Metrological requirements for methods and instruments for analyzing the composition of the biosphere are described.

Purpose of studying of the discipline

to prepare bachelors for orientation in the field of metrology, and work at enterprises, the realization of knowledge, skills and abilities acquired at the university, students should know the types of environmental devices most used in practice.

Learning Outcomes

ON4 To describe the basic general professional ideas about the theoretical foundations of the doctrine of the biosphere, biological ecology, systemic ecology, social ecology, radiation ecology, geoecology, bioindication.
ON6 To set goals and objectives of the experiment, to work with laboratory equipment, to use modern methods of scientific research, tools and devices used in conducting environmental studies and ensuring the safety of the production environment
ON7 Create and implement environmental monitoring programs and systems in areas of anthropogenic impact, develop effective

prevention measures or take prompt and competent decisions to reduce pollution of environmental objects.

Learning outcomes by discipline

1) Describe the classification of measuring instruments and controls, methods and principles of measurement of basic physical quantities and their dimensions.
2)Work with various types of measuring instruments and devices.
3) To determine the nature of the interaction of the human body with the dangers of the environment, taking into account the specifics of the mechanism of toxic effects of harmful substances, energy effects and the combined effects of harmful factors.

Prerequisites

Bioindicative methods of research

Postrequisites

Final examination

Ecological Monitoring

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

Short description of discipline

The discipline is aimed at studying the concepts, principles of organization and functioning of modern monitoring systems as complex information systems affecting all complex relationships and all components of the environment. During the course, methods for assessing the state of natural and anthropogenic modified ecosystems, methods for assessing and predicting pollution levels of environmental components, as well as abiotic components of the environment by chemical, physico-chemical and biological indicators are considered.

Purpose of studying of the discipline

In the environmental monitoring system, two goals should be constantly implemented:
1. Constant assessment of the "comfort" conditions of the human habitat and other biological objects.
2. Providing an information component for the purposes of forecasting, modeling and management decision-making.

Learning Outcomes

ON4 To describe the basic general professional ideas about the theoretical foundations of the doctrine of the biosphere, biological ecology, systemic ecology, social ecology, radiation ecology, geoecology, bioindication.
ON6 To set goals and objectives of the experiment, to work with laboratory equipment, to use modern methods of scientific research, tools and devices used in conducting environmental studies and ensuring the safety of the production environment
ON7 Create and implement environmental monitoring programs and systems in areas of anthropogenic impact, develop effective prevention measures or take prompt and competent decisions to reduce pollution of environmental objects.

Learning outcomes by discipline

1) Explain the organization and structure of environmental monitoring, types of monitoring.
2) Describe modern methods and means of environmental monitoring.
3) Characterize the surface layer of the atmosphere, soils and aquatic environment for a comprehensive geoecological assessment of the territory.

Prerequisites

Bioindicative methods of research

Postrequisites

Final examination

Environmental monitoring and environmental quality controls

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

Short description of discipline

The discipline is aimed at studying environmental monitoring and its tasks, the main directions of environmental monitoring, levels, scales, methods, principles and monitoring blocks. The means and methods of environmental quality control are considered. In this course, methods and means of measuring and controlling polluted substances, devices for monitoring atmospheric air, drinking water, natural water, water quality assessment indicators are studied.

Purpose of studying of the discipline

To study types of measuring instruments, measuring devices and the characteristic of measuring instruments.

Learning Outcomes

ON4 To describe the basic general professional ideas about the theoretical foundations of the doctrine of the biosphere, biological ecology, systemic ecology, social ecology, radiation ecology, geoecology, bioindication.
ON6 To set goals and objectives of the experiment, to work with laboratory equipment, to use modern methods of scientific research, tools and devices used in conducting environmental studies and ensuring the safety of the production environment
ON7 Create and implement environmental monitoring programs and systems in areas of anthropogenic impact, develop effective prevention measures or take prompt and competent decisions to reduce pollution of environmental objects.

Learning outcomes by discipline

1) Possess knowledge of the basics of environmental monitoring, rationing and expertise.
2) Describe environmental monitoring programs and systems in areas of anthropogenic impact, develop effective prevention measures or take prompt and competent decisions to reduce pollution of environmental objects.
3) Work with laboratory equipment and uses modern methods of scientific research, tools and devices used in environmental research.

Prerequisites

Bioindicative methods of research

Postrequisites
Final examination

Recovery technology and recycling of waste production and consumption

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

Short description of discipline
The discipline is aimed at studying ways and methods of waste management, the construction of landfills. This course covers the processing of solid household waste and the basics of technological processes for processing industrial waste. Burial, incineration, disposal of paper, glass containers, plastic packaging, slags, ash and waste of petroleum products, disposal of agricultural waste, recycling and auto-recycling, microbial waste recycling are characterized.

Purpose of studying of the discipline
Ways and methods of waste management. The recycling of solid waste. The device of the polygons. Fundamentals of technological processes of industrial waste processing. Burial, burning. Recycling of paper, glass containers, plastic packaging, slag, ash, waste oil. Recycling of agricultural waste. Recycling. Auto recycling. Microbial waste processing.

Learning Outcomes
ON6 To set goals and objectives of the experiment, to work with laboratory equipment, to use modern methods of scientific research, tools and devices used in conducting environmental studies and ensuring the safety of the production environment
ON8 Demonstrate the skills of operating treatment facilities and implement technological processes for the processing, disposal and disposal of solid, liquid, radioactive waste with the introduction of low- waste technologies and the organization of work on the reclamation of disturbed lands and the creation of cultural landscapes.
ON9 To assess the possibilities and ways of economic use of natural resources, their distribution and condition, the quality of the natural environment and the level of man-made load to ensure the environmental safety of the region and the republic.

Learning outcomes by discipline
1) identify the sources, types and extent of man-made impacts
2)have the skills to calculate the hazard class of waste, the maximum permissible discharge, the pollution index
3) develop measures to protect the environment and ensure environmental safety

Prerequisites
Industrial ecology

Postrequisites
Final examination

Recovery, recycling and disposal of consumer waste

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

Short description of discipline
This course examines the classification of waste, methods of its disposal, the occurrence of waste and waste disposal processes in a historical perspective. Decomposition of solid household waste in landfills, collection and neutralization of filtrate are described. The extraction and utilization of biogas, the organization of the collection and disposal of solid household waste in urban conditions and the processing of solid household waste, the characteristics of solid household waste as an object of processing are also considered.

Purpose of studying of the discipline
The formation of a high level of theoretical and vocational training, Knowing of general concepts and methodological issues of utilization of industrial waste, a deep understanding of the main sections of chemistry and the ability to apply their Knowing to solve research and applications.

Learning Outcomes
ON6 To set goals and objectives of the experiment, to work with laboratory equipment, to use modern methods of scientific research, tools and devices used in conducting environmental studies and ensuring the safety of the production environment
ON8 Demonstrate the skills of operating treatment facilities and implement technological processes for the processing, disposal and disposal of solid, liquid, radioactive waste with the introduction of low- waste technologies and the organization of work on the reclamation of disturbed lands and the creation of cultural landscapes.
ON9 To assess the possibilities and ways of economic use of natural resources, their distribution and condition, the quality of the natural environment and the level of man-made load to ensure the environmental safety of the region and the republic.

Learning outcomes by discipline
1) Explain the general patterns of waste disposal processes
2) describe the characteristics of industrial waste and methods and technologies of disposal
3) Formulate legal, economic and environmental aspects of industrial waste disposal.

Prerequisites
Industrial ecology

Postrequisites
Final examination

Recycling and disposal of waste

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

Short description of discipline
This course describes the general characteristics of waste, their structure and classification, the causes of waste. Industrial waste, toxic and household waste, radioactive waste (RAW) are characterized. The impact of waste on the environment is assessed and the placement of solid household waste in Kazakhstan is described. The ways of solving problems with production and consumption waste are considered.
Purpose of studying of the discipline
Protection of the environment from waste pollution is one of the elements of the system of rational use of natural resources. Environmental protection is related to solving social and economic problems
Learning Outcomes
ON6 To set goals and objectives of the experiment, to work with laboratory equipment, to use modern methods of scientific research, tools and devices used in conducting environmental studies and ensuring the safety of the production environment
ON8 Demonstrate the skills of operating treatment facilities and implement technological processes for the processing, disposal and disposal of solid, liquid, radioactive waste with the introduction of low- waste technologies and the organization of work on the reclamation of disturbed lands and the creation of cultural landscapes.
ON9 To assess the possibilities and ways of economic use of natural resources, their distribution and condition, the quality of the natural environment and the level of man-made load to ensure the environmental safety of the region and the republic.
Learning outcomes by discipline
1)to assess the current state of the waste management system
2) implement technological processes for the processing, disposal and disposal of solid and liquid waste
3) organize the production of works on the reclamation of disturbed lands, the restoration of disturbed agrogeosystems and the creation of cultural landscapes
Prerequisites
Industrial ecology
Postrequisites
Final examination

Industrial toxicology

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

Short description of discipline
The study of the discipline is aimed at studying the basic concepts, directions and terminology of industrial toxicology. The following issues are considered: parameters and basic laws of toxicometry; fundamentals of sanitary and hygienic rationing; specifics and mechanism of toxic effect of harmful substances; toxicokinetics; possible effects of industrial poisons; basic theoretical and practical aspects of individual toxicology; antidotes. long-term effects of the poison on the human body.
Purpose of studying of the discipline
The ability to identify toxic substances, to know the characteristics and properties of toxic substances, their impact on the environment and the living organism.
Learning Outcomes
ON6 To set goals and objectives of the experiment, to work with laboratory equipment, to use modern methods of scientific research, tools and devices used in conducting environmental studies and ensuring the safety of the production environment
ON8 Demonstrate the skills of operating treatment facilities and implement technological processes for the processing, disposal and disposal of solid, liquid, radioactive waste with the introduction of low- waste technologies and the organization of work on the reclamation of disturbed lands and the creation of cultural landscapes.
ON9 To assess the possibilities and ways of economic use of natural resources, their distribution and condition, the quality of the natural environment and the level of man-made load to ensure the environmental safety of the region and the republic.
Learning outcomes by discipline
1) Consider the theoretical and methodological foundations of toxicometry.
2) Explain the mechanism of toxic effect of harmful substances, sanitary and hygienic rationing.
3) To assess the technogenic toxic effects of xenobiotics on the environment and humans.
Prerequisites
Global social and environmental issues and sustainable development
Postrequisites
Final examination

Fundamentals of Ecotoxicology

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

Short description of discipline
The discipline is devoted to familiarization with the main sources of formation of toxic compounds, migration and transformation in the environment. The characteristics of harmful and dangerous factors of the working environment that can have a negative impact on the employee, the main ways to ensure protection from harmful factors in the course of work, the classification of industrial poisons, the degree of toxicity and danger of harmful substances are given
Purpose of studying of the discipline
Formation of students` knowledge about possible pollution of ecosystems by toxic chemicals and their effect on various types of organisms, as well as the development of skills and
skills for analyzing the risks of contamination by toxicants of soil and vegetation cover.

Learning Outcomes
ON6 To set goals and objectives of the experiment, to work with laboratory equipment, to use modern methods of scientific research, tools and devices used in conducting environmental studies and ensuring the safety of the production environment
ON8 Demonstrate the skills of operating treatment facilities and implement technological processes for the processing, disposal and disposal of solid, liquid, radioactive waste with the introduction of low- waste technologies and the organization of work on the reclamation of disturbed lands and the creation of cultural landscapes.
ON9 To assess the possibilities and ways of economic use of natural resources, their distribution and condition, the quality of the natural environment and the level of man-made load to ensure the environmental safety of the region and the republic.
Learning outcomes by discipline
1)Identify hazardous areas and acceptable risk areas
2) Analyze the mechanisms of the impact of hazards on humans
3) Own measurement and calculation methods
Prerequisites
Global social and environmental issues and sustainable development
Postrequisites
Final examination

Ecobiotechnology

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

Short description of discipline
The discipline is aimed at studying modern methods and techniques of environmental biotechnologies. This course examines the possibilities of using microorganisms for environmental purification; biotechnological methods of processing plant waste; solid waste processing by composting; biological wastewater treatment; sewage sludge; obtaining environmentally friendly fuel; bioremediation of oil-contaminated territories and phytoremediation of soils contaminated with heavy metals.
Purpose of studying of the discipline
To form students` modern ideas about the level of scientific achievements in the field of environmental biotechnology and the use of biotechnological processes and systems for environmental protection and environmental management.
Learning Outcomes
ON6 To set goals and objectives of the experiment, to work with laboratory equipment, to use modern methods of scientific research, tools and devices used in conducting environmental studies and ensuring the safety of the production environment
ON8 Demonstrate the skills of operating treatment facilities and implement technological processes for the processing, disposal and disposal of solid, liquid, radioactive waste with the introduction of low- waste technologies and the organization of work on the reclamation of disturbed lands and the creation of cultural landscapes.
ON9 To assess the possibilities and ways of economic use of natural resources, their distribution and condition, the quality of the natural environment and the level of man-made load to ensure the environmental safety of the region and the republic.
Learning outcomes by discipline
1) Describe modern methods and techniques of environmental biotechnologies.
2) Use the capabilities of living organisms to clean up environmental objects.
3) Apply bioremediation methods to clean up areas contaminated with oil and heavy metals.
Prerequisites
Global social and environmental issues and sustainable development
Postrequisites
Final examination

Ecological design

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

Short description of discipline
The discipline is aimed at studying the basic concepts, principles and methods of environmental design. This course examines the introduction of theoretical as well as practical skills of design objects taking into account the requirements of nature protection, the formation of experience working with regulatory documents in the field of environmental projects.
Purpose of studying of the discipline
Study of the procedure for environmental support of economic activity projects, including environmental justification of projects, environmental expertise of projects and modern state expertise of projects within the framework of the state- legal mechanism for environmental quality management and rational use of natural resources.
Learning Outcomes
ON4 To describe the basic general professional ideas about the theoretical foundations of the doctrine of the biosphere, biological ecology, systemic ecology, social ecology, radiation ecology, geoecology, bioindication.
ON5 Possess knowledge of the basics of environmental monitoring, standardization and expertise, industrial ecology, environmental design, legal foundations of environmental management, and the ability to use theoretical knowledge in practical activities.
ON10 Develop environmental projects, coordinating environmental documentation at enterprises, environmental protection action plans with the implementation and implementation of industrial environmental control and compliance with requirements, labor protection and safety standards.
ON12 To make decisions on modern environmental problems of various levels based on the achievements of science and practice, advanced domestic and foreign experience

Learning outcomes by discipline
1) analyze the project documentation for compliance with environmental legislation
2) identify environmentally significant environmental impacts based on project documentation
3) develop environmental protection measures for objects of various types of economic activity
Prerequisites
Research Methods of Ecology
Postrequisites
Final examination

Development of environmental projects

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

Short description of discipline
The discipline is aimed at studying the theoretical foundations and practical skills of environmental design. This course covers the basics of the development of draft standards for maximum permissible emissions and standards for maximum permissible discharges (MPD and MPD), Waste Management Programs, the project "Environmental Impact Assessment (EIA)" as one of the stages of Environmental assessment, Screening of the impact of planned activities and post- project analysis of actual impacts during the implementation of activities
Purpose of studying of the discipline
Familiarization with the development of all types of project documentation related to environmental protection and nature management, subject to mandatory state environmental expertise in accordance with the Environmental Code of the Republic of Kazakhstan.
Learning Outcomes
ON4 To describe the basic general professional ideas about the theoretical foundations of the doctrine of the biosphere, biological ecology, systemic ecology, social ecology, radiation ecology, geoecology, bioindication.
ON5 Possess knowledge of the basics of environmental monitoring, standardization and expertise, industrial ecology, environmental design, legal foundations of environmental management, and the ability to use theoretical knowledge in practical activities.
ON10 Develop environmental projects, coordinating environmental documentation at enterprises, environmental protection action plans with the implementation and implementation of industrial environmental control and compliance with requirements, labor protection and safety standards.
ON12 To make decisions on modern environmental problems of various levels based on the achievements of science and practice, advanced domestic and foreign experience
Learning outcomes by discipline
1) Develop projects of Maximum Permissible Emissions, Maximum Permissible Discharges, A Waste management Program.
2) Organize an environmental impact assessment (EIA) procedure.
3)Collect information for screening the impact of planned and ongoing activities on the environment.
Prerequisites
Research Methods of Ecology
Postrequisites
Final examination

Energy-saving environmental technologies

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

Short description of discipline
The discipline is aimed at studying energy- saving environmental protection technologies for established or operating industries. The course describes modern energy-saving production technologies, as well as low- and waste-free systems. The methods of purification of atmospheric air, wastewater from polluting components and the possibility of recycling the resulting waste to obtain, for example, biogas are considered. The energy balance of production is analyzed for optimal use of resources and improvement of environmental safety of the facility.
Purpose of studying of the discipline
Formation of a system of scientific knowledge and introduction of technologies
Learning Outcomes
ON4 To describe the basic general professional ideas about the theoretical foundations of the doctrine of the biosphere, biological ecology, systemic ecology, social ecology, radiation ecology, geoecology, bioindication.
ON5 Possess knowledge of the basics of environmental monitoring, standardization and expertise, industrial ecology, environmental design, legal foundations of environmental management, and the ability to use theoretical knowledge in practical activities.
ON10 Develop environmental projects, coordinating environmental documentation at enterprises, environmental protection action plans with the implementation and implementation of industrial environmental control and compliance with requirements, labor protection and safety standards.
ON12 To make decisions on modern environmental problems of various levels based on the achievements of science and practice, advanced domestic and foreign experience
Learning outcomes by discipline
1) Recommend methods for cleaning atmospheric air and wastewater, waste disposal.
2) Analyze the energy balance of production.
3)To put into practice energy-saving environmental technologies, as well as low- and waste-free systems.
Prerequisites

Research Methods of Ecology

Postrequisites

Final examination

Bases of ecological rationing and examination

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

Short description of discipline

The discipline is aimed at studying the theoretical foundations of environmental regulation and expertise. The basic concepts of rationing, types and mechanisms of environmental rationing are considered. Attention is paid to the regulation of the quality of atmospheric air, the assessment of the quality of water resources, environmental regulation of the soil. The environmental impact assessment is given, taking into account ideal and temporary norms, regulations and standards of anthropogenic impact. The skills of environmental audit, environmental insurance, environmental expertise in the Republic of Kazakhstan are being mastered.

Purpose of studying of the discipline

To familiarize students with the types of environmental activities, the system of norms and rules. regulatory documentation, design, environmental protection, rational use of natural resources, environmental safety, as well as with environmental expertise, audit and EIA.

Learning Outcomes

ON4 To describe the basic general professional ideas about the theoretical foundations of the doctrine of the biosphere, biological ecology, systemic ecology, social ecology, radiation ecology, geoecology, bioindication.

ON5 Possess knowledge of the basics of environmental monitoring, standardization and expertise, industrial ecology, environmental design, legal foundations of environmental management, and the ability to use theoretical knowledge in practical activities.

ON10 Develop environmental projects, coordinating environmental documentation at enterprises, environmental protection action plans with the implementation and implementation of industrial environmental control and compliance with requirements, labor protection and safety standards.

Learning outcomes by discipline

To describe the basic general professional ideas about the theoretical foundations of the doctrine of the biosphere, biological ecology, systemic ecology, social ecology, radiation ecology, geoecology, bioindication.

Possess knowledge of the basics of environmental monitoring, standardization and expertise, industrial ecology, environmental design, legal foundations of environmental management, and the ability to use theoretical knowledge in practical activities..

Develop environmental projects, coordinating environmental documentation at enterprises, environmental protection action plans with the implementation and implementation of industrial environmental control and compliance with requirements, labor protection and safety standards.

1) Describe the principles and categories of environmental regulation; mechanisms and regulations in force in the field of protection and rational use of land, subsoil, water resources, atmospheric air, flora and fauna, rationing and environmental safety.

2) Apply national and international legislation in the field of environmental regulation in their practical activities.

3) To compile comprehensive documentation on the regulation of anthropogenic impacts for economic entities

Prerequisites

Environmental monitoring and environmental quality controls

Postrequisites

Final examination

Social ecology and sustainable development

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

Short description of discipline

The discipline is aimed at studying the tasks and subject of social ecology and sustainable development. The biosphere is characterized as a global ecosystem; the evolution of the biosphere and environmental crises; modern global environmental problems (climate warming, desertification, etc.). The concept of the environment in social ecology is considered; natural and social components, their ratio; assessment of the quality of the natural environment and the level of anthropogenic load.

Purpose of studying of the discipline

Subject, tasks, laws social ecology. The concept environment in social ecology. Natural and social components, their ratio. Modern environmental problems. Assessment the quality the natural environment, the level anthropogenic load. Key challenges, global initiatives for sustainable development. Indicators sustainable growth society. Kazakhstan is on the way to sustainable development.

Learning Outcomes

ON4 To describe the basic general professional ideas about the theoretical foundations of the doctrine of the biosphere, biological ecology, systemic ecology, social ecology, radiation ecology, geoecology, bioindication.

ON5 Possess knowledge of the basics of environmental monitoring, standardization and expertise, industrial ecology, environmental design, legal foundations of environmental management, and the ability to use theoretical knowledge in practical activities.

ON10 Develop environmental projects, coordinating environmental documentation at enterprises, environmental protection action plans with the implementation and implementation of industrial environmental control and compliance with requirements, labor protection and safety standards.

Learning outcomes by discipline

1) Describe the main tasks and the subject of social ecology and sustainable development.

2) Explain the causes and consequences of environmental crises in the evolution of the biosphere.

3) Analyze the causes and propose solutions to modern environmental problems, taking into account international experience and the concept of sustainable development.

Prerequisites

Environmental monitoring and environmental quality controls

Postrequisites

Final examination

The main problems of ecology

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

Short description of discipline

The discipline is aimed at studying the territorial aspects of the formation of modern global environmental processes, problems of population growth, food and energy problems, the global raw materials crisis and nuclear threat, environmental problems of the oceans and the depletion of freshwater resources, interethnic mechanisms for regulating international ecological and economic relations. International cooperation in solving global environmental problems is considered; the main tasks and global initiatives in the field of sustainable development

Purpose of studying of the discipline

The course examines the territorial aspects the formation modern global environmental processes, the problems population growth, food and energy problems, the global raw materials crisis and nuclear threat, the environmental problems the Oceans and the depletion of freshwater resources, the international mechanism regulation international environmental and economic relations.

Learning Outcomes

ON4 To describe the basic general professional ideas about the theoretical foundations of the doctrine of the biosphere, biological ecology, systemic ecology, social ecology, radiation ecology, geoecology, bioindication.
ON5 Possess knowledge of the basics of environmental monitoring, standardization and expertise, industrial ecology, environmental design, legal foundations of environmental management, and the ability to use theoretical knowledge in practical activities.
ON10 Develop environmental projects, coordinating environmental documentation at enterprises, environmental protection action plans with the implementation and implementation of industrial environmental control and compliance with requirements, labor protection and safety standards.

Learning outcomes by discipline

1) Describe the basic biological, chemical and geographical concepts, knowledge of biological laws and phenomena, explains the chemical and geographical foundations of ecological processes.
2) Use the results of environmental studies in predicting the consequences of natural and socio-economic processes.
3) Analyze the causes and propose solutions to modern global environmental problems, taking into account international experience and the concept of sustainable development.

Prerequisites

Environmental monitoring and environmental quality controls

Postrequisites

Final examination

Chemical analysis

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

Short description of discipline

The discipline is aimed at studying chemical analysis and the possibilities of its application in environmental research. This course covers the basics of chemical analysis; the study of the chemical composition of natural and man-made compounds using qualitative and quantitative analysis; modern methods of chemical analysis of objects of anthropogenic activity and environmental components; the role of the analytical chemist and chemical analysis in ecological and analytical control.

Purpose of studying of the discipline

Fundamentals of analytical chemistry; qualitative and quantitative methods for studying the chemical composition of compounds and products; chemical methods for analyzing components and objects of industry and the environment

Learning Outcomes

ON4 To describe the basic general professional ideas about the theoretical foundations of the doctrine of the biosphere, biological ecology, systemic ecology, social ecology, radiation ecology, geoecology, bioindication.
ON5 Possess knowledge of the basics of environmental monitoring, standardization and expertise, industrial ecology, environmental design, legal foundations of environmental management, and the ability to use theoretical knowledge in practical activities.
ON10 Develop environmental projects, coordinating environmental documentation at enterprises, environmental protection action plans with the implementation and implementation of industrial environmental control and compliance with requirements, labor protection and safety standards.
ON12 To make decisions on modern environmental problems of various levels based on the achievements of science and practice, advanced domestic and foreign experience

Learning outcomes by discipline

1) Describe the role of chemical analysis in ecological and analytical control.
2) To investigate the chemical composition of natural and man-made compounds using qualitative and quantitative analysis.
3) To put into practice modern methods of chemical analysis.

Prerequisites

Quality management and control environment

Postrequisites

Final examination

Chemical analysis and environmental assessment

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

Short description of discipline
The discipline is aimed at developing practical skills of chemical analysis and studying the theoretical foundations of environmental assessment. This course covers the basic requirements for sampling; priority controlled environmental parameters and physico-chemical methods of their analysis. Methodological aspects of environmental assessment of the quality of a natural object, features and criteria of environmental assessment of atmospheric air, surface waters, soils are studied.

Purpose of studying of the discipline
Assessment of the impact of environmental pollution with harmful substances. Assessment of Environmental Quality by chemical analysis methods. Standards and regulations, regulatory documents, Environmental Quality Standards, Environmental Quality Control using instrumental control tools

Learning Outcomes
ON4 To describe the basic general professional ideas about the theoretical foundations of the doctrine of the biosphere, biological ecology, systemic ecology, social ecology, radiation ecology, geoecology, bioindication.
ON5 Possess knowledge of the basics of environmental monitoring, standardization and expertise, industrial ecology, environmental design, legal foundations of environmental management, and the ability to use theoretical knowledge in practical activities.
ON10 Develop environmental projects, coordinating environmental documentation at enterprises, environmental protection action plans with the implementation and implementation of industrial environmental control and compliance with requirements, labor protection and safety standards.
ON12 To make decisions on modern environmental problems of various levels based on the achievements of science and practice, advanced domestic and foreign experience

Learning outcomes by discipline
1) List the main requirements for sampling environmental objects.
2) Apply in practice physico-chemical methods of analysis of priority controlled pollutants.
3) Conduct an environmental assessment of the quality of the natural object.

Prerequisites
Quality management and control environment

Postrequisites
Final examination

Chemistry and physics of the environ-ment

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

Short description of discipline
The discipline is aimed at studying the basics of chemistry and physics of the environment. This course examines the physico-chemical processes occurring in natural objects. The features of atmospheric circulation and the processes of dispersion of pollutants in the atmospheric air, acid-base equilibrium in the hydrosphere and chemical pollution of natural waters, physico-chemical parameters of the lithosphere, soil chemistry and soil contamination are described.

Purpose of studying of the discipline
formation of professional competencies necessary for the successful implementation of various types of professional activities in the field of chemical analysis, organization and conduct of chemical and environmental monitoring. Environmental Chemistry. Atmospheric chemistry. Contaminants in the atmosphere. Chemistry of the hydrosphere. Chemical processes and integral characteristics of natural waters. The pollutants in natural waters. Chemistry lithosphere. Laws of formation of rocks. Laws of chemical weathering of rocks. Soil Chemistry. Physics environment.

Learning Outcomes
ON4 To describe the basic general professional ideas about the theoretical foundations of the doctrine of the biosphere, biological ecology, systemic ecology, social ecology, radiation ecology, geoecology, bioindication.
ON5 Possess knowledge of the basics of environmental monitoring, standardization and expertise, industrial ecology, environmental design, legal foundations of environmental management, and the ability to use theoretical knowledge in practical activities.
ON10 Develop environmental projects, coordinating environmental documentation at enterprises, environmental protection action plans with the implementation and implementation of industrial environmental control and compliance with requirements, labor protection and safety standards.
ON12 To make decisions on modern environmental problems of various levels based on the achievements of science and practice, advanced domestic and foreign experience

Learning outcomes by discipline
1) Name the physico-chemical processes occurring in natural objects.
2) Predict the behavior of pollutants in the atmosphere, hydrosphere and soil.
3)Investigate the pollution of environmental objects

Prerequisites
Quality management and control environment

Postrequisites
Final examination

Occupational Safety and Health

Discipline cycle	Profiling discipline
Course	4

Credits count	5
Knowledge control form	Examination

Short description of discipline
The discipline is aimed at studying the management system and the organizational and legal foundations of labor protection, the state of occupational injuries and occupational diseases. The course covers: industrial sanitation and occupational hygiene; certification of workplaces according to working conditions; harmful substances in the air of the working area; dust; lighting; microclimate; noise and vibration; ionizing radiation; intensity and severity of work; classification of protective equipment; safety; fire and electrical safety

Purpose of studying of the discipline
Eliminate the impact of dangerous and harmful production factors on humans, ensure the safety of the production process and production equipment, optimize labor processes and the production environment.

Learning Outcomes
ON4 To describe the basic general professional ideas about the theoretical foundations of the doctrine of the biosphere, biological ecology, systemic ecology, social ecology, radiation ecology, geoecology, bioindication.
ON5 Possess knowledge of the basics of environmental monitoring, standardization and expertise, industrial ecology, environmental design, legal foundations of environmental management, and the ability to use theoretical knowledge in practical activities.
ON10 Develop environmental projects, coordinating environmental documentation at enterprises, environmental protection action plans with the implementation and implementation of industrial environmental control and compliance with requirements, labor protection and safety standards.

Learning outcomes by discipline
1) Possess the basic provisions of legislative and regulatory acts in the field of labor protection and safety, demonstrate knowledge of the organization of state supervision and public control over labor protection, the labor protection management system in the organization, the procedure for certification of workplaces.
2) To organize work on labor protection at the production site and the enterprise as a whole, to monitor compliance with safety rules, to check the serviceability of technical means of protection; to teach safe techniques and methods of work of workers.
3) Solve the tasks of ensuring healthy and safe working conditions, analyze working conditions, causes of injuries and occupational diseases, take measures to protect people in the field of labor protection.

Prerequisites
Industrial ecology

Postrequisites
Final examination

Bases of management of labor protection

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

Short description of discipline
The discipline is aimed at studying a complex of issues of occupational safety management, including: principles of ensuring, state regulation and obligations of the employer to ensure safe working conditions; management of internal motivation of employees for safe work; social partnership of the employer and employees; certification of workplaces; development of instructions and organization of training on occupational safety; provision of employees with personal protective equipment; prevention occupational morbidity; documentation and reporting on labor protection.

Purpose of studying of the discipline
** formation of an understanding of the modern concept of safe work in direct relationship with the issues of occupational safety management at work;*
** providing future environmental engineers with theoretical knowledge and practical skills necessary to address issues related to ensuring safe working conditions in the organization of production, excluding negative impacts on humans and the environment.*

Learning Outcomes
ON4 To describe the basic general professional ideas about the theoretical foundations of the doctrine of the biosphere, biological ecology, systemic ecology, social ecology, radiation ecology, geoecology, bioindication.
ON5 Possess knowledge of the basics of environmental monitoring, standardization and expertise, industrial ecology, environmental design, legal foundations of environmental management, and the ability to use theoretical knowledge in practical activities.
ON10 Develop environmental projects, coordinating environmental documentation at enterprises, environmental protection action plans with the implementation and implementation of industrial environmental control and compliance with requirements, labor protection and safety standards.

Learning outcomes by discipline
1) Demonstrate knowledge of the legislative and regulatory framework in the field of occupational safety and health and possess the theoretical foundations of the classification of working conditions according to the degree of harmfulness and danger.
2) Analyze the state of the occupational health and safety management system on the issues of occupational safety of the organization, certification of workplaces according to working conditions.
3) Predict possible causes of dangerous situations in production conditions and implement measures to prevent them in the personnel management system

Prerequisites
Industrial ecology

Postrequisites
Final examination

Labor protection, safety measures at the enterprise

Discipline cycle	Profiling discipline
Course	4

Credits count	5
Knowledge control form	Examination

Short description of discipline
The discipline is aimed at studying legal support in the field of occupational health and safety, the state of occupational injuries and occupational morbidity at work. The course covers: occupational safety management at the enterprise; industrial sanitation and occupational hygiene; protection from hazardous and harmful production factors; electrical and fire safety; means and devices to ensure the safety of the production environment

Purpose of studying of the discipline
To study the legislation of the Republic of Kazakhstan and state legal acts on labor protection and safety of industrial activity. To study the responsibilities of employees and employers to ensure safe working conditions and labor protection.

Learning Outcomes
ON4 To describe the basic general professional ideas about the theoretical foundations of the doctrine of the biosphere, biological ecology, systemic ecology, social ecology, radiation ecology, geoecology, bioindication.
ON5 Possess knowledge of the basics of environmental monitoring, standardization and expertise, industrial ecology, environmental design, legal foundations of environmental management, and the ability to use theoretical knowledge in practical activities.
ON10 Develop environmental projects, coordinating environmental documentation at enterprises, environmental protection action plans with the implementation and implementation of industrial environmental control and compliance with requirements, labor protection and safety standards.

Learning outcomes by discipline
1) Demonstrate knowledge of the legislative and regulatory framework in the field of occupational safety and health and possess the theoretical foundations of the classification of working conditions according to the degree of harmfulness and danger.
2) Analyze the state of the occupational health and safety management system on the issues of occupational safety of the organization, certification of workplaces according to working conditions.
3) Predict possible causes of dangerous situations in production conditions and implement measures to prevent them in the personnel management system

Prerequisites
Industrial ecology

Postrequisites
Final examination

Topical issues of radioecology of Kazakhstan

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

Short description of discipline
The discipline is aimed at studying topical issues of radioecology of the Republic of Kazakhstan. This course examines the radioecological condition of the former Semipalatinsk
test site and adjacent territories, including the consequences of atmospheric and underground nuclear tests. The radioecological problems of territories with naturally elevated radiation parameters, other test sites of the republic, sites of reactor installations and sites with elevated concentrations of radionuclides are described.

Purpose of studying of the discipline
Mastering fundamental knowledge about the essence of radioecology, the effects of radiation on living organisms, ways to overcome modern radioecological problems in Kazakhstan.

Learning Outcomes
ON6 To set goals and objectives of the experiment, to work with laboratory equipment, to use modern methods of scientific research, tools and devices used in conducting environmental studies and ensuring the safety of the production environment
ON8 Demonstrate the skills of operating treatment facilities and implement technological processes for the processing, disposal and disposal of solid, liquid, radioactive waste with the introduction of low- waste technologies and the organization of work on the reclamation of disturbed lands and the creation of cultural landscapes.
ON9 To assess the possibilities and ways of economic use of natural resources, their distribution and condition, the quality of the natural environment and the level of man-made load to ensure the environmental safety of the region and the republic.

Learning outcomes by discipline
1) To assess the radioecological condition of the former Semipalatinsk test site and adjacent territories.
2) Identify radioecological problems of other territories of the republic.
3) Recommend ways to solve the problems of radiation pollution of territories.

Prerequisites
Radiation ecology

Postrequisites
Final examination

Radiation monitoring

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

Short description of discipline
The discipline is aimed at studying topical issues of radioecology of the Republic of Kazakhstan. This course examines the radioecological condition of the former Semipalatinsk test site and adjacent territories, including the consequences of atmospheric and underground nuclear tests. The radioecological problems of territories with naturally elevated radiation parameters, other test sites of the

republic, sites of reactor installations and sites with elevated concentrations of radionuclides are described.

Purpose of studying of the discipline

familiarization of students with the basics of radiation monitoring of the environment

Learning Outcomes

ON6 To set goals and objectives of the experiment, to work with laboratory equipment, to use modern methods of scientific research, tools and devices used in conducting environmental studies and ensuring the safety of the production environment

ON8 Demonstrate the skills of operating treatment facilities and implement technological processes for the processing, disposal and disposal of solid, liquid, radioactive waste with the introduction of low- waste technologies and the organization of work on the reclamation of disturbed lands and the creation of cultural landscapes.

ON9 To assess the possibilities and ways of economic use of natural resources, their distribution and condition, the quality of the natural environment and the level of man-made load to ensure the environmental safety of the region and the republic.

Learning outcomes by discipline

1) Have knowledge of the basics of radiation monitoring

2)to organize work with ionizing radiation sources

3) to predict, evaluate and carry out measures to ensure radiation safety

Prerequisites

Radiation ecology

Postrequisites

Final examination

Urboecology

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

Short description of discipline

This discipline is devoted to the study of the basic concepts of urban ecology and mastering the skills of urban monitoring management. The course examines the values of the urban environment as a component that guarantees human life in the city and affects his health, the development of observation systems for local, regional and global monitoring. The characteristics of the organization of environmental monitoring and green spaces are given

Purpose of studying of the discipline

formation of skills of ecological outlook; education of the ability to assess their professional activities from the point of view of the protection of the biosphere, understanding the role of the main components of urban ecosystems: flora and fauna, soils, surface and groundwater, air masses of the troposphere, the resistance of plant communities to the impact of factors of the urban environment.

Learning Outcomes

ON6 To set goals and objectives of the experiment, to work with laboratory equipment, to use modern methods of scientific research, tools and devices used in conducting environmental studies and ensuring the safety of the production environment

ON8 Demonstrate the skills of operating treatment facilities and implement technological processes for the processing, disposal and disposal of solid, liquid, radioactive waste with the introduction of low- waste technologies and the organization of work on the reclamation of disturbed lands and the creation of cultural landscapes.

ON9 To assess the possibilities and ways of economic use of natural resources, their distribution and condition, the quality of the natural environment and the level of man-made load to ensure the environmental safety of the region and the republic.

Learning outcomes by discipline

1) understand the principles of sustainability and productivity of wildlife and ways to change it under the influence of anthropogenic factors

2) systematically analyze global environmental problems and issues of the state of the environment and the rational use of natural resources

3) describe the methods of urban ecological studies of living and inert components of urobosystems

Prerequisites

Radiation ecology

Postrequisites

Final examination

Definition methods of the air, water and soil pollutants

Discipline cycle	Basic disciplines
Course	4
Credits count	5
Knowledge control form	Examination

Short description of discipline

The discipline is aimed at studying methods for determining pollutants in the main objects of the environment. This course examines the methods of sampling natural objects, the basics of sample preparation, conservation and storage of samples. The basic physico-chemical methods of analysis are described. The possibilities of using modern methods of experimental research, methods of mathematical statistics and mathematical modeling in practical activities are compared,

Purpose of studying of the discipline

Mastering the theoretical foundations of the discipline, mastering modern methods of analysis necessary for conducting eco-analytical monitoring.

Learning Outcomes

ON4 To describe the basic general professional ideas about the theoretical foundations of the doctrine of the biosphere, biological ecology, systemic ecology, social ecology, radiation ecology, geoecology, bioindication.

ON6 To set goals and objectives of the experiment, to work with laboratory equipment, to use modern methods of scientific research,

tools and devices used in conducting environmental studies and ensuring the safety of the production environment
ON7 Create and implement environmental monitoring programs and systems in areas of anthropogenic impact, develop effective prevention measures or take prompt and competent decisions to reduce pollution of environmental objects.

Learning outcomes by discipline

1) Use methods of sampling natural objects, the basics of sample preparation, conservation and storage of samples.
2) Apply basic physico-chemical methods of analysis, methods of mathematical statistics and modeling, information technology.
3) Describe the requirements for certification and accreditation of testing laboratories.

Prerequisites

Biological ecology

Postrequisites

Final examination

Heavy metals in the Environment

Discipline cycle	Basic disciplines
Course	4
Credits count	5
Knowledge control form	Examination

Short description of discipline

The discipline is aimed at studying heavy metals as priority pollutants of the environment, including East Kazakhstan. This course examines the physico-chemical properties of heavy metals, their classification, sources and methods of entry into environmental objects, forms of heavy metal compounds and ways of their migration in different environments. The characteristic of modern methods of studying the forms of existence of heavy metals in natural objects is given

Purpose of studying of the discipline

To familiarize students with Heavy metals as a group of ecotoxicants, as well as to study chemical processes involving Heavy Metals in various geospheres of the Earth.

Learning Outcomes

ON4 To describe the basic general professional ideas about the theoretical foundations of the doctrine of the biosphere, biological ecology, systemic ecology, social ecology, radiation ecology, geoecology, bioindication.
ON6 To set goals and objectives of the experiment, to work with laboratory equipment, to use modern methods of scientific research, tools and devices used in conducting environmental studies and ensuring the safety of the production environment
ON7 Create and implement environmental monitoring programs and systems in areas of anthropogenic impact, develop effective prevention measures or take prompt and competent decisions to reduce pollution of environmental objects.

Learning outcomes by discipline

1) Describe heavy metals as priority environmental pollutants.
2) Organize information about the physicochemical properties of heavy metals, their forms of location and behavior in natural objects.
3) Apply modern methods of studying forms of heavy metals.

Prerequisites

Biological ecology

Postrequisites

Final examination

Chemistry of heavy metals

Discipline cycle	Basic disciplines
Course	4
Credits count	5
Knowledge control form	Examination

Short description of discipline

The discipline is aimed at studying the basic laws that determine the interaction of living organisms with heavy metals; principles of nature protection from pollution, methods of purification and rational use of natural resources; social and environmental consequences of pollution. This course examines the sources and ways of heavy metals entering objects of the natural environment, forms of heavy metal compounds, biological and physiological effects of heavy metals on living organisms

Purpose of studying of the discipline

Formation of a holistic view of the basic chemical properties of heavy metals, the laws of their interaction with objects of the natural environment.

Learning Outcomes

ON4 To describe the basic general professional ideas about the theoretical foundations of the doctrine of the biosphere, biological ecology, systemic ecology, social ecology, radiation ecology, geoecology, bioindication.
ON6 To set goals and objectives of the experiment, to work with laboratory equipment, to use modern methods of scientific research, tools and devices used in conducting environmental studies and ensuring the safety of the production environment
ON7 Create and implement environmental monitoring programs and systems in areas of anthropogenic impact, develop effective prevention measures or take prompt and competent decisions to reduce pollution of environmental objects.

Learning outcomes by discipline

1) to identify and analyze natural and anthropogenic ecological processes and possible ways of their regulation
2)master the basics of chemical methods for detecting Heavy Metals in environmental objects
3)apply the basic geochemical laws affecting the behavior of HM in natural objects when performing calculations

Prerequisites

Biological ecology

Postrequisites

Final examination