The list of academic disciplines of the university component

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

Semey 2023

Developed
By the Academic Committee of the EP
The head of the AC Nurimkhan Gulnur
EP Manager Sarsenbayeva Gulmira

Reviewed
At the meeting of the Quality Assurance Commission of the Faculty of Engineering and Technology
Recommended for approval by the Academic Council of the University
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Chairman of the Commission on Quality Assurance Abdilova G.B.

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Approved
at the meeting of the Academic Council of the University
Protocol № 1 "01" of September 2023
Chairman of the Academic Council of the University Orynbekov D.R.

Bases of economics, law and ecological knowledge

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

Short description of discipline

The integrated discipline includes the main issues and principles in the field of fundamentals of law and anti- corruption culture, economics, entrepreneurship and leadership, ecology and life safety. Features of the use of regulatory legal acts, the ability to use the business, ethical, social, economic, entrepreneurial and environmental standards of society. Specifics of environmental-legal, economic, entrepreneurial relations, leadership qualities and principles of combating corruption.

Purpose of studying of the discipline

It consists in studying the basic patterns of the functioning of living organisms, the biosphere as a whole and the mechanisms of their sustainable development under the conditions of anthropogenic impact and emergency situations; in understanding the concept of corruption, the legitimacy of the fight against it, the content of the state penal policy; in the formation of students` basic fundamental stable knowledge on the basics of economic theory, in instilling the skills and abilities of economic thinking; in introducing students to the theory and practice of entrepreneurship, to the basics of creating their own business; in the formation of theoretical knowledge and practical skills for the development and improvement of leadership qualities.

Learning Outcomes

ON1 Demonstrate socio-cultural, economic, legal, environmental knowledge, communication skills, apply information technologies taking into account current trends in the development of society.

Learning outcomes by discipline

* analyzes the issues of safety and conservation of the natural environment as the most important priorities of life;*
* demonstrates knowledge of the fundamentals of nature management and sustainable development, assesses the impact of man-made systems on the environment;*
* shows knowledge of the main regulatory legal acts of the Republic of Kazakhstan, their understanding and application;*
* shows knowledge of the patterns of development of economic processes, clearly formulates his own position, finds and clearly sets out arguments in its defense;*
* is able to characterize the types of entrepreneurial activity and the entrepreneurial environment, draw up a business plan, create an entrepreneurial structure and organize its activities;*
* knows the fundamental provisions about the role of leadership in managing large and small social groups.*

Prerequisites

School course

Postrequisites

Basic and profile disciplines of the EP

Biological ecology

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

Short description of discipline

The discipline is aimed at studying the living conditions of organisms and the relationship between organisms and the environment. The regularities determining the interaction of living organisms with the environment are taken into account. The distribution and dynamics of the number of organisms and communities, energy flows through the circulation of living systems and substances, biological productivity of communities and ecosystems are studied. The course is designed to preserve natural ecosystems

Purpose of studying of the discipline

Ecologization of students` consciousness and fostering a sense of responsibility for the surrounding nature. Knowledge of the basic laws of interaction of the components of the biosphere and the consequences of interference of human economic activity, especially in the conditions of intensification of environmental management, is necessary to solve practical problems in the plane of the relationship between society and the biosphere as a whole.

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 patterns that determine the interaction of living organisms with the environment, as well as the patterns of energy flow through living systems and the circulation of substances.
2) To analyze natural and anthropogenic ecological processes and possible ways of their regulation.
3) Apply theoretical knowledge about the laws of interaction between living organisms and the environment in practical activities in order to preserve sustainable development.

Prerequisites

School course

Postrequisites

Bioindicative methods of research

Educational practice

Discipline cycle	Basic disciplines
Course	1
Credits count	2
Knowledge control form	Total mark on practice

Short description of discipline
Educational practice is considered as a direct continuation of classroom classes. Theoretical knowledge, practical skills and skills acquired by students in the study of first- year disciplines are formed. Local objects of study are enterprises, institutions and organizations of production spheres. This practice also allows you to acquire new professionally- oriented knowledge in the field of ecology, striving for self-development, professional development and mastery.

Purpose of studying of the discipline
the deepening of the theoretical training of the student

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) Possess in practice new professionally-oriented knowledge in the field of ecology, management and control of environmental quality
2)Strive for self-development, professional development and mastery
3) Use the acquired knowledge in solving global, regional and local environmental problems.

Prerequisites
Origin and Evolution of the Biosphere

Postrequisites
Production practice I

World of Abai

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

Short description of discipline
The discipline is aimed at studying historical facts, the philosophical and artistic foundations of the works of Abay Kunanbaev, Shakarim Kudaiberdiev, which form worldview and aesthetic values, the student`s ability to express his opinion, practical skills and perception of such human qualities as morality, honesty, artistic character. The genius of the writers of Kazakh literature and the role of M. Auezov in the study and popularization of Abai`s heritage, the significance of his works for history, literature and science are determined.

Purpose of studying of the discipline
Formation of the meaning of philosophical and ideological being, understanding of the problems raised in the works of Abai Kunanbayuly, Shakarim Kudaiberdiuly, Mukhtar Auezov and application of the acquired knowledge in the practice of everyday life.

Learning Outcomes
ON1 Demonstrate socio-cultural, economic, legal, environmental knowledge, communication skills, apply information technologies taking into account current trends in the development of society.

Learning outcomes by discipline
1) Analyzes the philosophical and artistic foundations of works, historical facts related to the creative heritage of Abai Kunanbayev, Shakarim Kudaiberdiyev, Mukhtar Auezov
2) Uses in practice the humanistic ideas of Abai`s philosophical and artistic works
3) Assesses the place and significance of Abai`s works in the history of literature and science

Prerequisites
Kazakh language The module of socio-political knowledge (sociology, political science, cultural studies, psychology)

Postrequisites
Basic and profile disciplines of the EP

Pedology

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

Short description of discipline
The discipline is mainly devoted to the patterns of geographical distribution of soils, the influence of soils on their development, education and environmental factors aimed at improving the ways of their effective use by soils. The structure and composition of soils, their properties and patterns of geographical distribution are used in the study of the processes of formation, development on earth, the influence of environmental factors on soil formation and its place in nature, ways of its effective use and improvement.

Purpose of studying of the discipline
To show the functioning of the soil as a complex independent subsystem in the system of biogeocenosis and higher-level systems, as well as the formation of knowledge about soil ecology, the study of the ecological functions of the soil cover.

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 structure and composition of soils, their properties and patterns of geographical distribution
2)Demonstrate the ability and readiness for the practical use of in-depth knowledge in the field of soil
3)Explain the ways of effective use and improvement of soil formation
Prerequisites
Biological ecology
Postrequisites
Environmental resource studies

Chemistry

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

Short description of discipline
The discipline is aimed at studying the basic concepts and laws of chemistry, classical and quantum- mechanical ideas about the structure of the atom and chemical bonds; consideration of periodic laws and structure of the periodic system of chemical elements, types of chemical bonds; mastering the laws of thermodynamics, chemical kinetics and chemical equilibrium, corrosion of metals, ways of expressing the concentration of solutions; promote the ability to apply the knowledge gained in practice, to solve problems in professional training.
Purpose of studying of the discipline
Familiarization of students with modern ideas about the structure of substances, with the basic theories of chemical processes, with the properties of catalytic and complex systems, as well as with the properties of elements. Knowledge of the basic theory of chemical processes necessary in the study and deeper understanding of all subsequent special disciplines, also give students scientific and practical training in the basics of analytical chemistry.
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
- possess fundamental chemical concepts, theories, laws and patterns.
- describe the main methods of scientific knowledge used in chemistry, such as observation, description, measurement, experiments.
- be able to give quantitative estimates and make calculations using chemical formulas and equations.
Prerequisites
School course
Postrequisites
Environmental chemistry

Environmental chemistry

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

Short description of discipline
The discipline is aimed at studying environmental chemistry as a scientific direction. Chemical processes occurring in environmental objects are considered; the main groups of chemical pollutants (heavy metals, dioxins, etc.); the transformation of xenobiotics after entering the natural environment. The main geospheres of the Earth are characterized; chemical pollution of the atmosphere, hydrosphere and lithosphere. The specifics of chemical monitoring methods, as well as chemical principles of environmental management and control are described.
Purpose of studying of the discipline
Familiarization of students with the scientific and methodological foundations of studying the chemical aspects of the influence of human activity on natural objects, on the processes occurring in the air, water and soil when pollutants enter and the possibility of preventing environmental pollution; studying the transformation of chemical compounds in the environment, forecasting the possible consequences of such changes and the formation of decision-making skills taking into account environmental requirements.
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) List chemical processes occurring in environmental objects.
2) Distinguish the main groups of chemical pollutants and predict their transformation in the main geospheres of the Earth.
3)Recommend chemical principles of environmental management and control.
Prerequisites
Chemistry
Postrequisites
Biogeochemistry and Ecotoxicology

Environmental resource studies

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

Short description of discipline
The discipline is aimed at studying the location and structure of certain types of natural resources and their complexes, issues of their protection, reproduction, economic assessment, rational use and resource availability. The most important types of natural resources, opportunities and ways of economic use of natural resources, their distribution and condition are described. Ideas are given about the environmental consequences of the placement of certain types of natural resources and resource conservation and resource production.

Purpose of studying of the discipline
Formation of the main provisions of the strategy and tactics of assessing the compliance of natural resources with the current level of consumption and rational use, taking into account environmental consequences, theoretical and practical knowledge about natural resources, developed and the prospects for the development of the natural resource potential of the Republic of Kazakhstan.

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 types of natural resources and their classifications, the current state and location of natural raw materials and mineral resources on the globe and the territory of the Republic of Kazakhstan.
2) To show the place of the Republic of Kazakhstan in the distribution of natural resources on Earth and solve the main problems of resource use.
3) Operate with legislative and regulatory legal acts regulating legal relations of resource use.

Prerequisites
Pedology

Postrequisites
Geoecology

Elementary System 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 theoretical and methodological foundations of systemic ecology. This course examines the methodology of system analysis; a general idea of systems; the system organization of the surrounding world; ecosystem and geoecosystem as a set of interrelated components; models and modeling, modeling capabilities of ecosystems and geosystems; stages and scientific and practical capabilities of ecosystem and geosystems analysis; fundamentals of forecasting in ecology from a systemic perspective.

Purpose of studying of the discipline
discipline:summarize the Knowing of ecology based on a systematic approach to theoretical questions of general ecology and the application of systems analysis to environmental issues, give the same positions characteristic of all major components of ecosystems, to describe their relationship with each other and with the environment

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) Summarize the theoretical and methodological foundations of system ecology and describe the system organization of the world.
2)Use models and modeling of ecosystems.
3) Propose to implement environmental forecasts from a systemic perspective.

Prerequisites
Protection of terrestrial and aquatic ecosystems

Postrequisites
Final examination

Production practice I

Discipline cycle	Basic disciplines
Course	2
Credits count	5
Knowledge control form	Total mark on practice

Short description of discipline
The industrial practice of I students is aimed at training highly qualified specialists, at acquiring practical skills and professional competencies in the experience of professional activity. As part of the practice, students study the work of environmental protection departments; environmental protection measures carried out at the enterprise; methods of economic stimulation of environmental protection activities of the enterprise, assessment of the level of environmental sustainability to the anthropogenic load of this territory.

Purpose of studying of the discipline

Purpose of studying of the discipline: this consolidation and deepening of theoretical knowledge gained during the educational process, as well as the acquisition of practical skills for their application

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) apply the basic scientific concepts of ecology in solving professional tasks.
2) possess methods of processing, analysis and synthesis of field and laboratory environmental information and use theoretical knowledge in practice
3) understand the social significance of their future profession, have a high motivation to perform professional activities

Prerequisites

Educational practice

Postrequisites

Production practice II

Biogeochemistry and Ecotoxicology

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

Short description of discipline

The discipline is aimed at studying the theoretical foundations of biogeochemistry and ecotoxicology. This course examines the formation and development of biogeochemistry; the origin and evolution of the main outer shells of the Earth; biogeochemical cycles of chemical elements, as well as the purpose and main objectives of environmental toxicology; the influence of the structure of a substance on its degree of toxicity; methods of studying toxicants and the practical significance of ecotoxicology.

Purpose of studying of the discipline

Teaching the basics of biogeochemistry and ecotoxicology – the processes of migration and mass exchange of chemical elements between living organisms and the environment; studying the effect of toxic compounds on ecosystems and the biological adaptability of living organisms to toxic effects.

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 theoretical foundations of biogeochemistry and ecotoxicology.
2) Analyze biogeochemical cycles of chemical elements.
3) To establish the influence of the structure of the substance on the degree of its toxicity and to propose methods for the study of toxicants

Prerequisites

Environmental chemistry

Postrequisites

Bases of ecological rationing and examination

Production practice II

Discipline cycle	Basic disciplines
Course	3
Credits count	5
Knowledge control form	Total mark on practice

Short description of discipline

This production practice 2 is aimed at mastering the skills of creating and implementing an environmental monitoring program and system in anthropogenic impact zones. Considers the development of effective measures to prevent or take prompt and competent decisions to reduce pollution of environmental objects. Independently determine the tasks of professional and personal development, engage in self-education, consciously plan professional development in the field of industrial ecology.

Purpose of studying of the discipline

training are to consolidate and deepen the theoretical training of the student and to acquire practical skills and competences in the field of professional activity, purposeful and active work of the student in collecting the necessary material for the coursework.

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 about environmental impact assessment and legal bases of nature management and environmental protection;

2) know the methodology for finding optimal solutions to environmental problems of enterprises
3)apply modern models of development and management of organizations

Prerequisites

Production practice I

Postrequisites

Prediploma practice

Quality management and control environment

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

Short description of discipline

This course examines the development of theoretical foundations and regulatory documents on environmental quality assurance, the formation of knowledge, skills and skills in the use of management technologies in the field of environmental protection, familiarity with modern methods of ecological and economic analysis of the enterprise used in environmental management and water use. Students develop a willingness to use modern management tools and mechanisms aimed at reducing environmental pollution from economic entities.

Purpose of studying of the discipline

formation of students` skills in assessing the state of natural and man-made objects to justify the decisions made

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 international and state norms and standards in the field of environmental quality
2)diagnose problems of nature protection and determine the level of anthropogenic impact;
3) develop methodological recommendations on nature protection and sustainable development for management decision-making

Prerequisites

Introduction to Specialty

Postrequisites

Chemical analysis and environmental assessment

Geoecology

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

Short description of discipline

The discipline is aimed at studying the ecological state and patterns of spatial differentiation of natural and anthropogenic geosystems (landscapes). Ecological factors and their influence on geosystems, ecological problems of certain regions of Kazakhstan, nature protection tasks at the present stage, geosystem resistance to anthropogenic impact are considered. Geographical differences between ecosystem and geosystem, ecological properties of landscapes, geoecological zoning of Kazakhstan, geoecological forecast, ecological level of geosystem are studied.

Purpose of studying of the discipline

The purpose of studying the discipline
To give students fundamental knowledge about the essence of geoecology, the study of the scientific foundations of the doctrine of nature conservation, the study of the fundamental principles of geoecology, as a science of the ecological background of natural-anthropogenic systems of the earth, the practical application of the revealed patterns to the theory and practice of applied ecology.

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 ecological situation on the territory of a certain geographical system.
2) Evaluate the most important geoecological changes in nature and regulate these consequences.
3) To carry out professionally oriented activities in the field of nature management and environmental protection.

Prerequisites

Environmental resource studies

Postrequisites

Final examination