

**Ministry of Science and Higher Education of the Republic of Kazakhstan
Karaganda University of the name of academician E.A. Buketov**

«APPROVED BY»

The decision of the Administration of
NLC «Karaganda University of the name
of academician E.A. Buketov»

Protocol № 8 24.05.2024

 prof. N.O. Dulatbekov



«APPROVED BY»

The decision of the Directory Board of
NLC «Karaganda University of the name
of academician E.A. Buketov»

Protocol № 5 24.06.2024



EDUCATIONAL PROGRAM

«7M05201 – Ecology»

Level: Magistracy

Karaganda,
2024

**APPROVAL SHEET FOR THE
EDUCATIONAL PROGRAM «7M05201 – Ecology»**

«AGREED»

Director
«EcoProf KZ» LLP



I.U. Nurtakanova

« 15 » 04 2024 y.

«AGREED»

Director
SRC "Biosphere Kazakhstan" LLP



V.V. Zhirkov

« 16 » 04 2024 y.

«AGREED»

Director
«Karaganda Regional Ecological Museum»



D.E. Kalmykov

« 15 » 04 2024 y.

The educational program «7M05201 – Ecology» was developed on the basis of:

- Law of the Republic of Kazakhstan dated July 27, 2007 No. 319-III "On Education"
- Order of the Ministry of Education and Science of the Republic of Kazakhstan "On approval of the Rules for the organization of the educational process on credit technology" dated April 20, 2011 No. 152
- The National Qualifications Framework of March 16, 2016 by the Republican Tripartite Commission on Social Partnership and Regulation of Social and Labor Relations.
- Classifier of training areas with higher and postgraduate education dated October 13, 2018 No. 569.
- State mandatory standard of postgraduate education of education dated July 20, 2022 No. 2
- The standard "Teacher", approved by the Order of the Minister of Education of the Republic of Kazakhstan No. 500 dated 15.12.2022.
- Professional standard for teachers (teaching staff) of organizations of higher and (or) postgraduate education, approved by Order of the Minister of Science and Higher Education of the Republic of Kazakhstan No. 591 dated November 20, 2023.

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1. Passport of the educational program

1. Code and name of the educational program: «7M05201 – Ecology»
2. Code and classification of the field of education, areas of training: 7M05 - Natural sciences, mathematics and statistics, 7M052 Environment
3. Group of educational programs: M087 Environmental protection technology
4. Volume of credits: 120
5. Form of study: full-time
6. Language of instruction: Kazakh, Russian
7. Degree awarded: Master of Natural Sciences in the educational program "7M05201 - Ecology"
8. Type of EP: current EP
9. The level of the ISQ: 7
10. The level of the NQF: 7
11. Level according to the IQF: 7
12. Distinctive features of the EP: -
13. Number of the application to the license for the direction of training: KZ83LAA00018495, date of issue 28.07.2020. Appendix 16
14. The name of the accreditation body and the validity period of the EP accreditation: IKAQAE, certificate S-A № 0174/4, date of issue 23.12.2019, validity period 20.12.2024
15. Purpose of the EP: Training of qualified specialists for the development of the economy, industry and culture of the Republic of Kazakhstan, providing conditions for full education, professional competence of environmental specialists in the interests of environmentally safe development, practical and theoretical solutions of environmental problems in the scientific and practical sphere, teaching.
16. Qualification characteristics of the graduate:
 - a) List of graduate positions: researcher of research institutes and scientific and production centers of ecological profile, expert, specialist of the Department of Environmental Protection, environmental protection enterprises, national parks and reserves, ecologist at industrial enterprises, employee of laboratories for quality control and safety of products of the national economy, researcher of laboratories of medical institutions, sanitary and environmental supervision, teacher at universities and colleges;
 - b) The scope and objects of professional activity of the graduate: research institutes, research and production centers and laboratories of ecological profile, industrial enterprises, environmental protection departments, organizations of sanitary and environmental supervision, organizations in the field of certification and standardization, national parks and reserves, agricultural complexes, hydrometeorological organizations, agricultural plants universities and colleges;
 - c) Types of professional activity of the graduate:
 - organizational and technological: management and engineering activities, environmental impact analysis and assessment, research and engineering and technological developments, analysis and control of compliance with management technology, performance of tasks of state and industrial environmental control, scientific and organizational activities;

- management: control of production and management activities, development and application of modern and effective methods, rules and processes of innovative and environmental management planning, analysis of the effectiveness of management decisions in the field of sustainable development and standard tasks of the management system in the field of ecology;

- project: implementation of organizational design aimed at developing and substantiating organizational management structures, submission of a feasibility study aimed at developing documentation on environmental impact assessment, industrial environmental control, protection and rational use of natural resources, introduction of new types of products, environmental supervision for compliance with professional standards and regulatory documents;

- research: independent research work, development and participation in research projects, grants, scientific and organizational activities in environmental areas, scientific cooperation;

- educational: professional work with students and specialists, deepening professional knowledge with the help of modern information and educational technologies;

d) Functions of the graduate's professional activity:

- participates in the development of state programs in the field of ecology;

- draws up long-term plans and exercises control over environmental protection;

- develops measures to comply with environmental regulations and standards of enterprises, prevent the possibility of accidents and catastrophes in accordance with current state, international and industry standards;

- provides environmental expertise of feasibility studies, scientific and technical projects, new technologies and equipment;

- carries out work on the organization of investigation of the causes and consequences of emissions of harmful substances into the environment, prepares documentation on their prevention, calculates risks to the state of the environment during the implementation of environmental protection measures;

- develops and implements the results of scientific research in the field of ecology and environmental monitoring data into production;

- manages the development of measures to improve environmental protection based on the generalization of best practices of domestic and foreign enterprises, waste disposal documentation and other environmental information;

- develops environmental training programs at the enterprise, an effective environmental information system, introduces employees to the requirements of environmental legislation.

Formulation of learning outcomes based on competencies

Type of competencies	Learning result code	Learning result (according to Bloom's taxonomy)
1. Behavioral skills and personal qualities: (Soft skills)	LR 3	Plans and solves the tasks of his own professional and personal development, takes responsibility for the decision made, shows personal enthusiasm, knows how to work in a team.
	LR 7	Reads, analyzes, referees literature in a foreign language and studies foreign sources, uses knowledge of a foreign language in professional and interpersonal communication
2. Digital competencies: (Digital skills):	LR 1	Carries out research activities in the relevant professional field using modern research methods and information and communication technologies
	LR 11	Uses various information environments to study issues and prospects for the development of ecology, global trends and practices of STEAM technologies, analyzes the state of the environment, calculates environmental risks using digital technologies and the digital ecosystem
	LR 2	He has methodological techniques and skills of teaching environmental disciplines in higher school, secondary and vocational schools
	LR 4	Demonstrates the ability to analyze scientific literature in order to choose the direction of research, independently makes a research plan, has the theory and skills of practical work in the chosen field of ecology, is able to work with modern equipment, analyzes the results, makes the necessary conclusions and formulates proposals
	LR 5	Demonstrates an understanding of the main problems and current trends in the development of environmental science, has general scientific methods of research and is able to apply them in professional activities
	LR 6	Owns methods and methods of management of innovative activity, generalizes the advanced achievements and actual tendencies of development in the field of ecology, owns approaches of practical application of tools of commercialization in the conditions of the market relations
	LR 8	Assesses the consequences of anthropogenic impacts on the biosphere and modern biosphere processes, linking their effectiveness with evolutionary historical processes, applies modern environmental technologies in professional activities
	LR 9	Demonstrates knowledge of the main stages and laws of development of ecology, understanding the objective need for new directions, has ideas about the system of fundamental environmental concepts, methodological aspects, forms and methods of scientific knowledge, their role in General education training of environmentalists
	LR 10	Assesses the state of the natural environment and the level of anthropogenic load to ensure the environmental safety of biotic components and humans, promptly and competently makes decisions to reduce the anthropogenic load on natural objects
	LR 12	Adheres to the principles of a comprehensive assessment of the use of natural resources, develops resource-saving measures, assesses the effects of anthropogenic factors on the environment, human genetic safety, applies regulatory documents, environmental approaches to determine the toxicity of harmful substances

Determination of modules of disciplines in accordance with the results of training

Learning result code	Name of the module	Name of disciplines	Volume (ECTS)
LR 1, LR 2, LR 3, LR 4, LR 5	Philosophical and historical aspects of social and humanitarian knowledge	History and philosophy of science	4
		Pedagogy of higher education	4
		Management psychology	4
		Pedagogical practice	4
LR 1, LR 3, LR 4, LR 7, LR 11, LR 12	Professional languages	Foreign language (professional)	4
		Scientific-research communications	5
		English for STEM Program	
LR 1, LR 4, LR 5, LR 6, LR 8, LR 9, LR 10	Issues of modern science and technology	Commercialization of the results of scientific and technical services	5
		Innovation in ecology	
		Research methods in ecology (in English)	5
		Ecological aspects of genetic engineering (in English)	
LR 1, LR 4, LR 5, LR 6, LR 8, LR 9, LR 10	Природопользование	Rational use of natural resources	5
		Modern problems of ecology	5
		Technology of using sustainable energy (in English)	5
LR 1, LR 4, LR 5, LR 6, LR 8, LR 9, LR 10, LR 11, LR 12	Прикладные направления экологии	Environmental risk	5
		Bioecological basis of pathological processes	
		Ecology of agrobiocenoses	6
		Environmental safety of industrial enterprises	
		Communal ecology of the city	6
		Environmental epidemiology	
		Ecological physiology	7
Ecological toxicology			
LR 1, LR 4, LR 6, LR 9, LR 11	Научно-исследовательская работа	Research practice	14
		Scientific research work of a master student, including an internship and a master's thesis (NIRM)	24
	Итоговая аттестация	Writing and defending a doctoral dissertation	8

Matrix of achievability of learning outcomes

NN π/π	Name of disciplines	Brief description of the discipline (30-40 words)	Number of credits	Generated learning outcomes (codes)											
				LR1	LR2	LR3	LR4	LR5	LR6	LR7	LR8	LR9	LR10	LR11	LR12
Cycle of basic disciplines University component															
D1	History and philosophy of science	It is studied with the aim of forming knowledge about the significance of scientific knowledge in its tendency to development and sociocultural profile. Questions about the philosophy, methodology of science, science as a cognitive activity and tradition are considered.	4	+			+	+							
D2	Pedagogy of higher education	Studied to form ideas about the modern paradigm of higher education and the theory of scientific activity in higher education. The issues of pedagogy, education of professionals-specialists, professional skills of teaching in educational organizations, pedagogical control and evaluation of knowledge in higher education are considered.	4		+		+	+							
D3	Psychology of management	It is studied with the aim of forming knowledge about the psychological laws of managerial activity, skills in analysis of socio-psychological principles, the characteristics of the psychology of management, the personal characteristics of the leader.	4		+		+	+							
D4	Pedagogical practice	Formation of knowledge about the legal and regulatory framework for the functioning of the higher education system; the order of implementation of the main provisions and documents regulating the activities of the University to improve educational, methodological and scientific work. Analysis of active teaching methods and the use of modern educational technologies in teaching, monitoring and evaluating the effectiveness of educational activities, organization of students' educational activities	4	+	+	+		+							
D5	Foreign language (professional)	The course is taken for developing the skills and abilities of foreign language speech activity in the subject area for effective communication in situations of professional interaction. The course is designed to teach how to work with specialized literature, to practice of oral and written bilingual translation. There are considered the issues of a foreign language for specific purposes and norms of professional speech.	4			+					+				

D6	Scientific-research communications	The course is designed to study the mechanisms of promotion of scientific ideas within the scientific community and beyond, issues of dissemination of scientific knowledge about the surrounding reality through various forms and institutions of communication. It is studied in order to form knowledge about the actual problems of experimental, design and research activities. Analysis of the laws of the development of the natural environment, society, technology.	5	+		+	+							+	+
	English for STEM	The content of the discipline is aimed at improving the competencies of possession of the necessary skills of professional communication in a foreign language and writing, the use of professional English in practice. It is studied in order to form an idea of academic and professional interaction, global trends and practices of STEM technologies. The course is designed to improve skills in professional 3D modeling programs.								+				+	+
Cycle of basic disciplines Component of choice															
D7	Commercialization of scientific and technological activities	It is studied in order to form skills to use the results of scientific and scientific and technical activities, including the results of intellectual activity in order to withdraw new or improved goods aimed at extracting income to the market.	5	+			+		+				+		
	Innovation in ecology	The content of the discipline is aimed at the formation of knowledge about innovation activities in the field of applied ecology, environmental safety and management in the field of environmental protection, criteria of innovation. The issues of innovative scientific and technical developments of domestic and foreign scientists, the development of innovative ecological potential, innovative activities in the field of ecology, analysis of information and forecasts of the feasibility of implementing innovative ideas are considered.		+				+	+			+	+		
D8	Research methods in ecology (in English)	It is studied in order to form undergraduates' ideas about the integral assessment of environmental quality, the development of modern scientific approaches and research methods in ecology. The course is designed to study methods of processing, analysis and synthesis of field and laboratory environmental information, organization and conduct of laboratory and field research, forecasting the state and changes of natural environments and biota.	5	+			+	+	+				+		
	Ecological aspects of genetic engineering (in English)	The content of the discipline is aimed at studying the methodology of genetic and cellular engineering, revealing the general laws of the mechanisms of molecular		+			+	+	+				+		

		genetic processes. It is studied in order to form certain skills for working with DNA and RNA molecules. The issues of mastering the basic techniques of gene cloning, the construction of recombinant molecules, methods and possibilities of gene therapy are considered.													
Cycle of profile disciplines University component															
D9	Rational use of natural resources	The content of the discipline is aimed at studying the peculiarities of the distribution of raw materials of Kazakhstan, their reserves and prospects for development. It is studied in order to form the skills of analyzing modern effective technologies for the use of natural resources. The course is designed to study the generalization of advanced achievements and current development trends in the field of rational use of natural resources.	5					+	+			+	+	+	
D10	Modern problems of ecology	It is studied in order to form undergraduates' ideas about current environmental problems and ways to solve them, knowledge about the optimization of the natural environment, the conditions of environmentally sustainable development of society. The course is designed to develop forecasts of changes in the biosphere and the state of the environment under various scenarios of economic and social development of mankind, ecological and economic assessment of the impact of harmful emissions on the environment.	5	+				+	+			+		+	
D11	Sustainable Energy using Technology (in English)	The content of the discipline is aimed at the formation of students' knowledge and skills in the field of prospects for the use of alternative energy sources in domestic and foreign practice. The course is designed to study the characteristics and features of renewable energy sources, modern methods of their use, problems and prospects for the development of alternative energy, the development of the ability to objectively assess the advantages and disadvantages of such systems and their elements.	5	+				+					+	+	
Cycle of profile disciplines Component of choice															
D12	Environmental risk	The content of the discipline is aimed at studying the main environmental risk factors and ways out of the ecological crisis, methodological approaches aimed at solving the problems of ensuring safe and sustainable human interaction with the natural environment. The course is designed to study analyses of the causes and mechanisms of impact, practical applications of risk assessment methodology as a basis for forecasting hazardous natural processes.	5	+				+	+			+		+	
	Bioecological basis of	The course is designed to study the influence of the main						+	+			+		+	

	pathological processes	bioecological factors on the occurrence and development of pathological processes in the body, as well as methodological achievements and promising areas of biology and medicine in the study and prevention of pathologies. The influence of the main bioecological factors on the occurrence and development of pathological processes is revealed.													
D13	Ecology of agrobiocenses	The content of the discipline is aimed at studying the features and promising areas of functioning of agroecosystems in the conditions of modern technogenesis. The issues of problems of ecologization of land use, economizing and agroecological monitoring are considered. The course is designed to master the methods of production of environmentally safe agricultural products, calculation of pollutants in soil and agricultural crops in accordance with the MPC.	6					+							+
	Environmental safety of industrial enterprises	The content of the discipline is aimed at studying the types and sources of man-made impacts, legal, organizational bases of labor protection, a system of measures for the safe operation of hazardous production facilities. It is being studied in order to carry out justifications on the requirements and provisions for ensuring industrial safety and industrial hygiene at technological enterprises. The course is designed to master safe working methods in the workplace.								+		+	+		
D14	Communal ecology of the city	It is studied in order to form knowledge of environmental aspects of specific problems of municipal services of the city, analysis of current regulations, technical and technological characteristics of the urban environment. The course is designed to gain practical skills in the use of modern protection technologies in the assessment of atmospheric air, water, soil of the city, sanitary cleaning of household waste.	6	+			+	+			+	+	+		
	Environmental epidemiology	The content of the discipline is aimed at studying the influence of adverse environmental factors on the health indicators of the population. It is studied in order to develop skills for determining environmentally caused changes in human health, assessing the medical and ecological safety and quality of environmental components. The roles of the immunological structure of the population as an important factor in the development of the epidemic process are considered.								+		+			+
D15	Ecological physiology	The content of the discipline is aimed at forming undergraduates' understanding of the physiological foundations of the functioning of the human body as an integral system, taking into account interaction with the environ-	7	+			+	+			+		+		

		ment. The issues of mechanisms of regulation, management and integration of physiological systems of the body that provide homeostasis in various environmental conditions are considered; the analysis of ecological principles of the formation of various levels of adaptations.													
	Environmental toxicology	It is studied in order to form an idea of industrial intoxication of biota, the behavior of chemicals in the environment, the mechanisms of action and the influence of environmental factors on the toxic effect. The course is designed to master methods for determining classes of toxic substances, the polytropicity of poisons, the analysis of regulatory documents, hygienic approaches, scientific and legislative tasks in the field of ecotoxicology.				+				+			+		+
D16	Research practice	The purpose of the research practice is to study the latest theoretical, methodological and technological achievements of domestic and foreign science, as well as to consolidate practical skills in applying modern methods of scientific research, processing and interpretation of experimental data in dissertation research.	14	+			+		+			+		+	

Coordination of the planned learning outcomes with the methods of teaching and evaluation within the module

Learning outcomes	Planned learning outcomes for the module	Teaching methods	Assessment methods
LR 1	Carries out research activities in the relevant professional field using modern research methods and information and communication technologies	round table	preparation of the presentation
LR 2	He has methodological techniques and skills of teaching environmental disciplines in higher school, secondary and vocational schools	interactive lecture	testing
LR 3	Plans and solves the tasks of his own professional and personal development, takes responsibility for the decision made, shows personal enthusiasm, knows how to work in a team.	business game	preparation of the presentation
LR 4	Demonstrates the ability to analyze scientific literature in order to choose the direction of research, independently makes a research plan, has the theory and skills of practical work in the chosen field of ecology, is able to work with modern equipment, analyzes the results, makes the necessary conclusions and formulates proposals	case study method	project preparation
LR 5	Demonstrates an understanding of the main problems and current trends in the development of environmental science, has general scientific methods of research and is able to apply them in professional activities	method of projects	preparation of the presentation
LR 6	Owens methods and methods of management of innovative activity, generalizes the advanced achievements and actual tendencies of development in the field of ecology, owns approaches of practical application of tools of commercialization in the conditions of the market relations	interactive lecture	testing
LR 7	Reads, analyzes, referees literature in a foreign language and studies foreign sources, uses knowledge of a foreign language in professional and interpersonal communication	method of analysis of specific situations	project preparation
LR 8	Assesses the consequences of anthropogenic impacts on the biosphere and modern biosphere processes, linking their effectiveness with evolutionary historical processes, applies modern environmental technologies in professional activities	discussion	project preparation
LR 9	Demonstrates knowledge of the main stages and laws of development of ecology, understanding the objective need for new directions, has ideas about the system of fundamental environmental concepts, methodological aspects, forms and methods of scientific knowledge, their role in General education training of environmentalists	research method	participation in the colloquium
LR 10	Assesses the state of the natural environment and the level of anthropogenic load to ensure the environmental safety of biotic components and humans, promptly and competently makes decisions to reduce the anthropogenic load on natural objects	research method	conducting a colloquium
LR 11	Uses various information environments to study issues and prospects for the development of ecology, global trends and practices of STEAM technologies, analyzes the state of the environment, calculates environmental risks using digital technologies and the digital ecosystem	project method	preparation of the presentation
LR 12	Adheres to the principles of a comprehensive assessment of the use of natural resources, develops resource-saving measures, assesses the effects of anthropogenic factors on the environment, human genetic safety, applies regulatory documents, environmental approaches to determine the toxicity of harmful substances	research method	preparation of a program for the safe operation of production facilities

Criteria for assessing the achievability of learning outcomes

Codes of LO	Criteria
LO 1	Knows: actual problems of ecology and ways to solve them, issues of optimization of the natural environment, conditions of environmentally sustainable development of society
	Can: to carry out research activities in the relevant professional field using modern research methods and information and communication technologies
	Owns: environmental assessment and protection technologies
LO 2	Knows: issues of organization and content of the system of modern pedagogical technologies
	Can: organize and implement the educational process
	Owns: methodological techniques and skills of teaching environmental disciplines in higher education, general education and secondary vocational educational institutions
LO 3	Knows: value orientations aimed at guiding the principles of tolerance in professional activity
	Can: plan and solve the tasks of your own professional and personal development, take responsibility for the decision made, show personal enthusiasm, work in a team
	Owns: skills of conducting independent research and scientific and pedagogical activities
LO 4	Knows: modern technologies of information collection, processing and interpretation of experimental and empirical data obtained
	Can: analyze the scientific literature in order to choose the direction of research, independently draw up a research plan, draw the necessary conclusions and formulate proposals
	Owns: skills of practical work with modern equipment and methods of analysis of the obtained research results
LO 5	Knows: the main problems and current trends in the development of environmental science
	Can: substantiate the results of research work using modern scientific approaches and research methods with the use of new technologies and devices
	Owns: general scientific methods of research and is able to apply them in professional activities
LO 6	Knows: methods of innovation management in ecology
	Can: analyze information and predict the feasibility of implementing an innovative idea for profit
LO 7	Knows: language tools for constructing statements and texts in accordance with the norms of language and speech forms
	Can: analyze, review literature in a foreign language and study foreign sources
	Owns: a foreign language as a means of intercultural and communication in the field of professional interests
LO 8	Knows: conceptual foundations, modern concepts and strategies of ecology
	Can: to evaluate modern biosphere processes and the consequences of anthropogenic impacts, to determine the main strategies for the conservation and restoration of biological diversity
	Owns: methods of analysis of the natural resource potential of the Republic of Kazakhstan and environmental technologies
LO 9	Knows: the main stages and patterns of ecology development, the system of fundamental ecological concepts, methodological aspects, forms and methods of scientific cognition
	Can: to develop forecasts of changes in the biosphere and the state of the environment under various scenarios of economic and social development of mankind
	Owns: methods of calculation of pollutants in the environment in accordance with the MPC
LO 10	Knows: the main types and sources of technogenic impact, legal and organizational bases of environmental protection, issues of reducing anthropogenic load on natural objects
	Can: work with devices, environmental controls in accordance with technical specifications
	Owns: methods of assessing the state of the natural environment and the level of technogenic load to ensure the environmental safety of biotic components and humans
LO 11	Knows: various information environments for the study of environmental issues and prospects, global trends and practices of STEAM-technologies
	Can: to apply in practice methodological approaches aimed at solving the problems of ensuring safe and sustainable human interaction with the natural environment
	Owns: methods of calculating environmental risks using digital technologies and digital ecosystem
LO 12	Knows: basic principles of integrated assessment of the use of natural resources
	Can: to analyze regulatory documents, environmental approaches, scientific and legislative tasks in the field of ecology, ecological and economic assessment of the impact of harmful emissions on the environment
	Owns: requirements and provisions for ensuring industrial and industrial safety at technological enterprises, regulatory documents for determining the toxicity of harmful substances

Graduate Model EP «7M05201 – Ecology»

Graduate Attributes:

- Deep professional knowledge in their field of study
- Interest in mastering trends in education and science
- Ability to collaborate in the professional community
- Independence in the search for opportunities for professional and personal development
- Communication skills
- Tolerance and good manners
- Academic integrity
- Willingness to participate in solving state tasks and strategies of Kazakhstan

Types of competencies	Description of competencies
1. Behavioral skills and personal qualities (Softskills)	<p>Ability to critical thinking, analysis, independent organization of their professional activities.</p> <p>The ability to quickly solve tasks, act in non-standard situations, take responsibility for yourself.</p> <p>The ability to independently develop, define and solve the tasks of their professional and personal development, engage in self-education.</p> <p>Knowledge of work ethics, discipline, sense of responsibility, ability to work in a team.</p>
2. Digital competencies (Digital skills):	<p>The ability to develop and use information and communication technologies in professional activities, to have awareness of the basic technologies of digital learning.</p> <p>Ability to analyze modern methodologies and principles of environmental project management, substantiate scientific approaches using digital technologies.</p> <p>The ability to master the generally accepted language of international communication in a digital environment.</p>
3. Professional competencies (Hardskills)	<p>The ability to develop, implement and apply innovative technologies for the protection and restoration of ecosystems using the latest results of scientific research.</p> <p>The ability to comply with the principles of a comprehensive assessment of the use of natural resources, to develop measures related to resource conservation and assessment of the environmental effectiveness of environmental protection measures.</p> <p>The ability to assess the effects of natural and anthropogenic factors on the environment, to develop programs for the safe operation of hazardous production facilities, to reduce the harmful effects on the environment and humans, to manage technological processes.</p> <p>The ability to develop plans and carry out sanitary and environmental supervision of the state of the urban environment, conduct examinations, surveys of public utilities in order to prevent harmful effects on public health.</p> <p>The ability to justify the choice and application of methods for solving professional tasks in the field of environmental protection in order to minimize the consequences of anthropogenic activities and reduce harm to human health.</p> <p>The ability to comply with the principles of environmental assessment based on environmental monitoring data, to calculate environmental risks in accordance with regulatory requirements, to make environmental justifications for projects at the stages of construction and operation.</p> <p>The ability to analyze the mechanisms of toxicity of chemical compounds, assess toxic damage at the level of organisms, populations and ecosystems.</p>

	<p>The ability to defend its position on modern environmental issues and compliance with environmental safety in a reasoned manner.</p> <p>The ability to justify, implement and implement technological processes of production, apply modern methods of processing, analysis and synthesis of environmental information in production.</p> <p>The ability to justify and develop plans for the use of alternative technology to solve environmental problems.</p> <p>The ability to determine scientific approaches and methods for studying the mechanisms of immunoregulation of biotechnological production, the principles of the organization of quality control of biological products and methods of immunodiagnostics for the management of biotechnological processes.</p>
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Developers:

Members of the working group:

Head of the Department of Physiology, Candidate of Biological Sciences, assistant professor

Candidate of Biological Sciences, Professor

Doctor of Philosophy PhD, Associate Professor

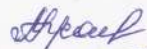
Master's student 2 years of study


Employers:

Director of the «EcoProf KZ» LLP

Director SRC "Biosphere Kazakhstan" LLP

Director «Karaganda Regional Ecological Museum»

 G.Zh. Mukasheva


 A.M. Aitkulov

 K.A. Nurlybaeva

 N. A. Adilkhan

 I.U. Nurtakanova

 V.V. Zhirkov

 D.E. Kalmykov

The educational program was reviewed by the Faculty Council from 18.04.2024 protocol № 9

The educational program was reviewed at the meeting of the Academic Council from 29.04.2024 protocol № 5

The educational program was reviewed and approved at the meeting of the University Board from 24.05.2024 protocol № 8.

Member of the Board – Vice-rector for academic affairs

 M.M. Umurkulova

Director of the Academic Work Department

 T.M. Khasenova

Dean of the Faculty of Biology and Geography

 S.A. Talzhanov

EDUCATIONAL PROGRAM DEVELOPMENT PLAN

7M05201 – Ecology

The purpose of the Plan is to contribute to improving the quality of the conditions for the implementation of the educational program, taking into account the current requirements of the labor market and the achievements of modern science.

Target indicators

№	Indicators	Unit of measurement	2023-2024	2024-2025	2025-2026	2026-2027
1	Human resources development					
1.1	Increase in the number of teachers with academic degrees	Number of people	-	1	1	-
1.2	Advanced training in the teaching profile	Number of people	4	2	3	3
1.3	Involvement of practitioners in teaching	Number of people	1	1	2	2
2	Promotion of the EP in the ratings					
2.1	IQAA	Position	3	2	2	1
2.2	IAAR	Position	3	2	2	1
3.	Development of educational and scientific-methodical literature, electronic resources					
3.1	Textbooks	Number	-	-	-	-
3.2	Training manuals	Number	-	1	1	1
3.3	Methodological recommendations/instructions	Number	-	1	1	1
3.4	Electronic textbook	Number	-	2	2	3
3.5	Video/audio lectures	Number	-	2	3	4
4.	Development of educational and laboratory facilities	Number				
4.1	Purchase of software products	Number	1	1	1	1
4.2	Purchase of equipment	Number	2	2	3	3
5.	Updating the content of the EP					
5.1	Updating the learning outcomes and the list of disciplines taking into account the requirements of the labor market, scientific achievements, professional standards	Year	-	-	+	-
5.2	Introduction to the EP of academic disciplines in foreign languages*	Year	+	+	+	+
5.3	Introduction of new teaching methods	Year	+	+	+	+

Head of the Department of Physiology



G.Zh. Mukasheva