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 № 4 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 21.06.2024

EDUCATIONAL PROGRAM

«8D05101 – Biology»

Level: Doctoral studies (PhD)

Karaganda,
2024

APPROVAL SHEET FOR THE

EDUCATIONAL PROGRAM «8D05101 – Biology»

«AGREED»

Director
Laboratory of «DNA diagnostics»

_____ G.P. Pogosyan

«__15__» _____04_____ 2024 y.

«AGREED»

Director
Scientific and educational center «BioHumusKZ»

_____ A.T. Serikbai

«__» _____ 2024 y

«AGREED»

Director
SRC "Biosphere Kazakhstan" LLP

_____ V.V. Zhirkov

«__16__» _____04_____ 2024 y.

The educational program "8D05101 - Biology" was developed on the basis of:

- Law of the Republic of Kazakhstan dated July 27, 2007 No. 319-III "On Education" (with amendments and additions as of 31.03.2021)
- State mandatory standards of higher and postgraduate education, approved by the Order of the Ministry of Education and Science of the Republic of Kazakhstan dated July 20, 2022 No. 2. (with amendments and additions dated 19.01.2023)
- The National Qualifications Framework of March 16, 2016 by the Republican Tripartite Commission on Social Partnership and Regulation of Social and Labor Relations.
- 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 (with amendments and additions dated 11.08.2023).
- Classifier of areas of training with higher and postgraduate education dated October 13, 2018 No. 569. (with amendments and additions as of 12.08.2023).

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1. Passport of the educational program

1. Code and name of the educational program: "8D05101 - Biology"

2. Code and classification of the field of education, areas of training: 8D05 - Natural sciences, mathematics and statistics, 8D051 Biological and related sciences

3. Group of educational programs: D080 - Biology

4. Volume of credits: 180

5. Form of study: full-time

6. Language of instruction: Kazakh, Russian

7. Degree awarded: Doctor of Philosophy PhD in the educational program "8D05101 - Biology"

8. Type of EP: current EP

9. The level of the ISQ: 8

10. The level of the NQF: 8

11. Level according to the IQF: 8

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 No. SA-A No.0271/3, date of issue 06.05.2023, validity period 05.05.2028.

15. Purpose of the EP: Training of competitive, highly qualified specialists for the development of the economy, industry and culture of the Republic of Kazakhstan, with knowledge and understanding of modern problems of biology, key areas of biological science that meet the current level of methodological approach in research and teaching, flexible application of research methods in solving.

16. Qualification characteristics of the graduate:

a) List of graduate positions: senior researcher at research institutes, research and production centers, laboratories in public health institutions, teacher at universities, chief specialist of environmental organizations, national parks and reserves, head of research groups.

b) The scope and objects of professional activity of the graduate:

- Doctor of Philosophy PhD in the educational program "8D05101-Biology" can carry out research, analytical, organizational and managerial, educational (pedagogical) activities in the following fields: molecular genetics, botany, zoology, human physiology, biochemistry, biophysics, microbiology, biological systems of various levels of organization, biotechnology, biological environmental technologies.

- the object of professional activity of a graduate under the educational program "8D05101-Biology" are: research institutes, research centers and laboratories, universities and colleges, environmental organizations.

c) Types of professional activity of the graduate:

- organizational and technological: management activities, research and development, analysis and control of compliance with management technology, scientific and organizational activities;

- production and management: development of modern and effective methods, rules and processes of innovative management planning in the field of biology, implementation of research and development work together with production;

- project: planning and development of scientific projects and stages of their implementation, participation in grants, analysis and evaluation of the research results;

- research: independent research work, development of innovative research methods, introduction of research results into production, 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 biology;
- collects and processes biological material in the field and in scientific laboratories;
- performs analysis, classification of objects and registration of research results;
- performs scientific research;
- implements the results of scientific research into production, educational process;
- provides methodically competent formulation of experiments;
- organizes information and search work in the chosen scientific direction;
- attracts employers and partners to carry out scientific research;
- provides teaching of biological disciplines in secondary vocational and higher educational institutions.
- manages the development of measures to improve the protection of the natural environment based on the generalization of the best practices of domestic and foreign scientists.

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)	LO 3	Demonstrate the skills of independent research work and work in a research team, the ability to objectively evaluate the results of their professional activities
	LO 8	Demonstrates a high level of written scientific communication required for effective communication in an academic environment
	LO 14	Ability to maintain professional contacts abroad and improve their skills in the global and scientific space
2. Digital competencies: (Digital skills):	LO 13	Uses promising digital developments in his professional activity, substantiates scientific approaches to the use of digital technologies in professional practice, speaks the generally accepted language of international communication in the digital environment
	LO 4	Able to independently set research tasks, independently perform laboratory, computational and interpretive research in the field of biology
3. Professional competencies: (Hardskills)	LO 1	Demonstrates knowledge of the history and methodology of biological Sciences, expanding General professional, fundamental training
	LO 2	Owns international and national documents, standard operating procedures on ethics and Biosafety of scientific research
	LO 5	Applies modern methodological approaches of scientific research and modeling, chooses the optimal method for solving research goals and objectives, owns the basic statistical concept of evidence in biology and the statistical significance of research results
	LO 6	Knowledge of regulatory documents governing the organization and methodology of research and production and technological biological work
	LO 7	Generalizes knowledge and ideas about the fundamentals of biological processes at the molecular genetic level, adheres to the principles of biological ethics and genetic safety during research, owns modern methods of processing and analyzing scientific results on genetic engineering
	LO 9	Able to independently plan, organize and conduct research in the field of biology, taking into account scientific, social and ethical issues of professional activity, professionally present and justify the results of research work using modern research methods and devices.
	LO 10	The ability to formulate principles for solving biological problems based on the use of integrated biological information when conducting scientific and industrial research
	LO 11	Demonstrates a high level of professional culture, including the culture of professional communication, having a civil position to teach at universities, successfully carry out research activities
	LO 12	Can freely and argumentatively present ideas and thoughts on a scientific problem in writing and argue them, knows the techniques of structuring academic papers, is able to conduct and publish their own research in accordance with international requirements

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

Learning result code	Name of the module	Name of disciplines	Volume (ECTS)
LO 1, LO 2, LO 3, LO 4, LO 5, LO 6 LO 9, LO 10, LO 11, LO 13, LO 14	Methodological basics of research	Academic writing (in English)	5
		Methods of scientific research	5
LO 1, LO 2, LO 4, LO 5, LO 7, LO 8, LO 9, LO 10, LO 11, LO 12, LO 13, LO 14	Modern issues of biological science	Problems of modern biology	5
		Teaching practice	10
		Research practice	10
LO 1, LO 2, LO 3, LO 4, LO 5, LO 7, LO 8, LO 9, LO 10, LO 11, LO 12, LO 13, LO 14	Applied areas of biology	Experimental treatment in research and biostatistics	5
		Bioethics and biological safety	
		Molecular biology	5
		Molecular genetics	
LO 1, LO 2, LO 3, LO 5, LO 6, LO 8, LO 10	Research work by a doctoral candidate	Research work of a doctoral candidate, including internships and doctoral thesis	123
	Final assessment	Writing and defending doctoral thesis	12

Matrix of achievability of learning outcomes

NN п/п	Name of disciplines	Brief description of the discipline	Number of credits	Generated learning outcomes (codes)													
				LO 1	LO 2	LO 3	LO 4	LO 5	LO 6	LO 7	LO 8	LO 9	LO 10	LO 11	LO 12	LO 13	LO 14
Cycle of basic disciplines University component																	
D1	Academic writing (in English)	The discipline is studied in order to form competencies related to analytical research and textual activities; skills of analytical-synthetic, critical and pragmatic thinking. In the process of studying the discipline, the types, methods and ethical principles of writing scientific texts, the principles of constructing a scientific text and preparing it for publication, the design of a bibliographic list, the basic rules for quoting scientific literature, the types of annotations and the features of their compilation, reviewing a scientific text are considered.	5	+	+	+			+		+	+	+	+		+	+
D2	Methods of scientific research	The discipline is studied in order to form the skills of doctoral students to carry out independent research activities; the use of scientific research methods to achieve the objectives set in the dissertation research; the use of methods of processing empirical data on the topic of their dissertation research.	5	+	+	+	+	+			+	+	+			+	+
D3	Teaching practice	The purpose of teaching practice is the formation of professional competencies among doctoral students that ensure readiness for pedagogical activity in universities, the design of the educational process in accordance with the profile of training and conducting certain types of training sessions using innovative educational technologies.	10		+		+			+		+					
Cycle of basic disciplines Component of choice																	
D4	Experimental treatment in research and biostatistics	The study of technologies, principles of selection, systematization and statistical processing of research material. Mastering and using modern methods of scientific research and experimental processing of research results. Analysis of methods of statistical data processing, the use of digital technologies in processing the results of scientific research, work with application software packages SPSS, Statistica, Student's t–criterion.	5			+	+	+		+	+	+	+				+
	Bioethics and biological safety	Formation of knowledge about biological safety and bioethics, the category of bioethics, the functions of the international Association of bioethics in scientific research. Analysis of scientific and technological achievements and conventions on biological, toxic and chemical weapons. Knowledge of how to implement national Biosafety measures through national, regional and international			+	+	+				+				+	+	+

		partnerships. Application of methods of scientific knowledge, increasing the level of knowledge on biological safety.																
Cycle of profile disciplines University component																		
D5	Problems of modern biology	Formation of knowledge in the field of modern biology and related fields, conservation of biological diversity and sustainable development. Analysis of issues in the field of conservation of biological resources of the Republic of Kazakhstan, scientific knowledge on modern achievements and fundamental concepts in the field of modern biology. Application of knowledge and methods for conducting fundamental and applied research in biology.	5	+	+		+				+		+	+	+	+	
D6	Research practice	The purpose of the research practice is for doctoral students 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.	10					+		+			+	+			+
Cycle of profile disciplines Component of choice																		
D7	Molecular genetics	Formation of knowledge about the main molecular mechanisms of genetic processes. Analysis of modern information in the field of molecular genetics. Ability to apply methods of electrophoresis in agarose gel, isolation of nucleic acid molecules in scientific research. Application of knowledge to perform research using modern equipment, demonstrate responsibility for the quality of work and scientific reliability of the results.	5	+	+		+				+			+	+	+	+
	Molecular biology	Improving knowledge about fundamental molecular biological processes: protein synthesis, transcription, translation, folding, genetic recombination. Mastering the stages of protein biosynthesis. The ability to identify gene mutations. Analysis of the possibilities of genetic recombination of DNA. Study of mechanisms of regulation of gene action, expression of genes and transcription factors, intercellular and intracellular signaling substances.				+	+	+		+		+			+		
Research work of the doctoral student																		
D8	NIRD	The purpose of the research work of a doctoral students is the formation of the level of knowledge necessary for the implementation of professional activity, the abilities and skills of scientific research activity and the preparation for defense of a doctoral dissertation. It includes conducting independent scientific research, a foreign scientific internship, preparing scientific publications and completing a doctoral dissertation.	123	+	+	+		+	+		+		+				

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
LO 1	Demonstrates knowledge of the history and methodology of biological Sciences, expanding General professional, fundamental training	round table	preparation of the presentation
LO 2	Owns international and national documents, standard operating procedures on ethics and Biosafety of scientific research	project training	writing an essay
LO 3	Demonstrates knowledge of the history and methodology of biological Sciences, expanding General professional, fundamental training	case methods	participation in the colloquium
LO 4	Able to independently set research tasks, independently perform laboratory, computational and interpretive research in the field of biology	the method of analyzing specific situations	project preparation
LO 5	Applies modern methodological approaches of scientific research and modeling, chooses the optimal method for solving research goals and objectives, owns the basic statistical concept of evidence in biology and the statistical significance of research results	business game	preparation of the presentation
LO 6	Knowledge of regulatory documents governing the organization and methodology of research and production and technological biological work	case methods	participation in the colloquium
LO 7	Generalizes knowledge and ideas about the fundamentals of biological processes at the molecular genetic level, adheres to the principles of biological ethics and genetic safety during research, owns modern methods of processing and analyzing scientific results on genetic engineering	project method	preparation of the presentation
LO 8	Demonstrates a high level of written scientific communication required for effective communication in an academic environment	round table	preparation of a scientific article
LO 9	Able to independently plan, organize and conduct research in the field of biology, taking into account scientific, social and ethical issues of professional activity, professionally present and justify the results of research work using modern research methods and devices.	discussion	writing an essay
LO 10	The ability to formulate principles for solving biological problems based on the use of integrated biological information when conducting scientific and industrial research	interactive lecture	testing
LO 11	Demonstrates a high level of professional culture, including the culture of professional communication, having a civil position to teach at universities, successfully carry out research activities	research method	participation in the colloquium
LO 12	Can freely and argumentatively present ideas and thoughts on a scientific problem in writing and argue them, knows the techniques of structuring academic papers, is able to conduct and publish their own research in accordance with international requirements	problematic presentation	project preparation
LO 13	Uses promising digital developments in his professional activity, substantiates scientific approaches to the use of digital technologies in professional practice, speaks the generally accepted language of international communication in the digital environment	interactive lecture	testing
LO 14	Ability to maintain professional contacts abroad and improve their skills in the global and scientific space	the method of analyzing specific situations	project preparation

Criteria for assessing the achievability of learning outcomes

Codes of LO	Criteria
LO 1	**Knows:** methodological foundations of scientific research and modeling in research and practical implementation of biological science
	Can: to analyze the relevance, scientific novelty and the choice of the direction of scientific research
	Owns: modern research methods using educational and information technologies
LO 2	**Knows:** fundamentals of biological safety and bioethics, when conducting scientific research
	Can: to analyze the regulatory framework governing research activities in biological research
	Owns: international and national documents, standard operating procedures on ethics and biological safety of scientific research
LO 3	**Knows:** basic principles of research activity, formulation of scientific and technical problems and stages of research work
	Can: to carry out statistical data processing using digital technologies in processing the results of scientific research
	Owns: skills of research work and work in a scientific team, objectively assesses the results of their professional activities
LO 4	**Knows:** modern technologies of information collection, processing and interpretation of experimental and empirical data obtained
	Can: independently set the tasks of scientific research, perform laboratory, computational and interpretive research in the field of biology
	Owns: skills of practical work with modern equipment and methods of analysis of the obtained research results
LO 5	**Knows:** the latest theoretical, methodological and technological achievements of domestic and foreign science
	Can: to analyze regulatory documents regulating the organization and methodology of research and production and technological work in biology
	Owns: technologies, principles of selection, systematization and statistical processing of research material
LO 6	**Knows:** promising and developing areas of modern biological science
	Can: systematize fundamental biological knowledge for planning experiments in biological research
	Owns: regulatory documents regulating the organization and methodology of research and production and technological work in biology
LO 7	**Knows:** fundamentals of biological processes at the molecular genetic level, principles of biological ethics and genetic safety during research
	Can: identify gene mutations, apply genetic engineering methods, work with RNA and DNA molecules
	Owns: modern methods of processing and analysis of scientific results on genetic engineering
LO 8	**Knows:** modern aspects of academic literacy and academic writing, concepts and principles of presentation of academic and scientific information
	Can: navigate scientometric databases, conduct peer review and expert evaluation
	Owns: skills of working in scientometric databases
LO 9	**Knows:** a system of fundamental biological concepts, methodological aspects, forms and methods of scientific cognition
	Can: plan, organize and conduct research in the field of biology, taking into account scientific, social and ethical issues of professional activity
	Owns: modern methods of research and skills of working with devices
LO 10	**Can:** formulate principles for solving biological problems based on the use of complex biological information in scientific research
	Owns: modern methods of scientific research, processing and interpretation of experimental data in dissertation research
LO 11	**Can:** design the educational process, conduct training sessions using innovative educational technologies, carry out research activities
	Owns: culture of professional communication, creative approach to their own professional activities
LO 12	**Can:** freely and argumentatively present ideas and thoughts on a scientific problem in writing, argues them
	Owns: methods of structuring academic papers, is able to conduct and publish his own research in accordance with international requirements
LO 13	**Knows:** promising digital developments, technological innovations, digital technologies and scientific developments in the field of biology
	Can: substantiate scientific approaches to the use of digital technologies in professional practice
	Owns: the generally accepted language of international communication in the digital environment, technologies and principles of selection, systematization and statistical processing of research material
LO 14	**Knows:** general laws of the development of society and nature, including the synergetic principles of the structure of the world, environmental responsibility for professional activity
	Can: maintain professional contacts abroad and improve their skills in the global and scientific space
	Owns: skills of reflection, self-development and self-improvement, a high level of culture of speech and behavior

Graduate Model EP «8D05101 – Biology»

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)	Ability to critical thinking, analysis, independent organization of their professional activities. The ability to quickly solve tasks, act in non-standard situations, take responsibility for yourself. The ability to independently develop, define and solve problems of professional and personal development, engage in self-education. Knowledge of work ethics, discipline, sense of responsibility, ability to work in a team.
2. Digital competencies (Digital skills):	The ability to develop and use information and communication technologies in professional activities, to have awareness of the basic technologies of digital learning. The ability to analyze the principles, prospects for the development of biological science and substantiate scientific approaches using digital technologies Ability to master the generally accepted language of international communication in the digital environment, knowledge about information security in the field of blockchain technology application
3. Professional competencies (Hardskills)	Ability to develop, implement and apply innovative technologies, modern methodological approaches of scientific research in the field of biology The need to present and substantiate the results of research work using modern research methods and equipment The ability to use promising digital developments in professional activity, to substantiate scientific approaches to the use of digital technologies in professional practice The ability to navigate scientometric databases, carry out peer review and expert evaluation of research activities, present research results in the form of a scientific report, article, report, dissertation, professional conduct of scientific discussions The ability to defend their position on modern problems of biology and compliance with biological safety, to justify and develop plans for the use of alternative technology to solve biological problems. The ability to determine scientific approaches to the development of practical recommendations and modern research methods for the conservation of biodiversity, to develop programs for the safe operation of

	hazardous production facilities, to manage technological processes The ability to justify, implement and implement technological processes of production, apply modern methods of processing, analysis and synthesis of biological information in production

Developers:

Members of the working group:

Head of the Department of Physiology, Candidate of Biological Sciences, assistant professor — G.Zh. Mukasheva

Doctor of Biological Sciences, Associate Professor — M.A. Mukasheva

Candidate of Biological Sciences, Professor — A.M. Aitkulov

Doctoral student 2 years of study — A.D. Orazbai

Employers:

Director Laboratory of «DNA diagnostics» — G.P. Pogosyan

Director SRC "Biosphere Kazakhstan" LLP — V.V. Zhirkov

Director Scientific and educational center «BioHumusKZ» — A.T. Serikbai

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
8D05101-Biology

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**