

MINISTRY OF EDUCATION AND SCIENCE OF THE REPUBLIC OF KAZAKHSTAN

KARAGANDA UNIVERSITY NAMED AFTER ACADEMICIAN E.A.BUKETOV

«Agreed»

Head of the Republican State Institution  
«Karaganda Regional Territorial Inspection  
of Forestry and Wildlife»

«18» 05

Kim A. V.

2021



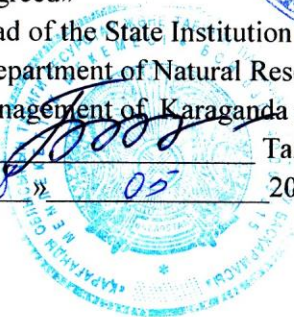
«Agreed»

Head of the State Institution  
«Department of Natural Resources and Environmental  
Management of Karaganda region»

«18» 05

Tazabekov A. N.

2021



«Approved by»  
Chairman of the management Board – rector

Dulatbekov N. O.

2021



**EDUCATIONAL PROGRAM**  
**in the field of study «8D051 Biological and related sciences»**

8D05101 - Biology  
Level: Doctoral

Degree: doctor of philosophy PhD educational program «8D05101 - Biology»

Karaganda, 2021

**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 March 31, 2021),
- Law of the Republic of Kazakhstan dated July 11, 1997 No. 151-I. «On Languages in the Republic of Kazakhstan» (with amendments and additions as of 24.05.2018):
  - State Compulsory Standard of Postgraduate of August 31, 2018 No. 604 (with amendments and additions as of May 05, 2020 No. 182)
  - National Qualifications Framework dated 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 organizing the educational process on credit technology” dated October 2, 2018 No. 152
  - Classifier of areas of training with higher and postgraduate education from October 13, 2018. №569.
  - Professional standards «of the national qualifications framework (2016)» (Approved by the Protocol of March 16, 2016 by the Republican tripartite Commission on social partnership and regulation of social and labor relations)
  - Sectoral qualifications framework «Sectoral qualifications framework in the sphere of education» (Approved by Protocol No. 2 of the meeting of the sectoral tripartite Commission on social partnership and regulation of social and labor relations under the Ministry of education and science of the Republic of Kazakhstan dated November 23, 2016)

Recommended by the decision of the Academic Council of the University for entry into force on September 1, 2021.

## Educational program «8D05101 - Biology»

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  - 1.1 General information about the educational program
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# 1. Passport of the educational program

## 1.1 General information about the educational program

1. Area of Education: 8D05 Natural Sciences, mathematics and statistics
2. Direction of preparation: 8D051 Biological and related sciences, 8D05101 - Biology
3. Duration of study: 3
4. Language of study: Kazakh, Russian
5. Annex to the state license to engage in educational activities: KZ83LAA00018495, date of issue 28.06.2020.
6. Accreditation of the educational program: IQAA, Certificate No. SA-A No. 0135/3, date of issue 05.02.2018, valid from 28.04.2023.
7. Admission Requirement: Master of Science in Biology
8. Type of educational program: current
9. Established prerequisites for mastering the program:
  - if the profile of the doctoral education program coincides with the program of postgraduate education - not required
  - if the profile of the doctoral education program does not coincide with the program of postgraduate education: - Cell biology, 3 ESTC
10. Information about foreign partners in the implementation of the program:  
University of Poitiers (France), Ben-Gurion University of the Negev (Israel), Wroclaw University of Environmental and Life Sciences (Poland), Kazan State Medical University (Russia), Lomonosov Moscow State University (Russia), BAU International University Batumi (Georgia)
12. The main practice base for the educational program:
  - pedagogical:  
Department of physiology, botany, zoology, Karaganda University named after Academician E.A. Buketov
  - research:  
Research park of biotechnology and environmental monitoring, of the Karaganda University named after academician E.A. Buketov.
13. The main scientific organizations, organizations of relevant industries or fields of activity, including foreign, for conducting scientific internships:  
Federal State Budgetary Educational Institution «Research Institute for Complex Problems of Hygiene and Occupational Diseases», Novokuznetsk (Russia), National Research Tomsk State University (Russia), Ben-Gurion University of the Negev (Israel), Wroclaw University of Environmental and Life Sciences (Poland), Kazan State Medical University (Russia), Lomonosov Moscow State University (Russia).
14. The main scientific organizations, research institutes, centers for performing research work:  
Research park of biotechnology and environmental monitoring, of the Karaganda University named after academician E.A. Buketov, Wroclaw University of Environmental and Life Sciences (Poland), Lomonosov Moscow State University (Russia).
15. Opportunities for continuing education: post-doctoral program

## 16. List of employers

№	Name of companies, enterprises, organizations	Contacts, phone, e-mail
1	JSK IRPH «Phytochemistry»	8(7212)433127, arglabin@phyto.kz
2	E. A. Buketov Karaganda University	8(7212)77-03-84, ksu.kz@mail.ru
3	State Department of natural resources and environmental management of Karaganda region	8(7212) 56-12-20, pr-resurs.kz@mail.ru
4	N JSK «Medical University of Karaganda»	8 (7212) 50 39 30, www.kgmu.kz
5	PU «Bolashak Academy»	8 (7212) 420425, kubolashak.kz
6	Karaganda State technical University	8(7212)56-03-28 kargtu@kstu.kz
7	Karaganda regional territorial inspection of forestry and fauna of the Committee of forestry and fauna of the Ministry of agriculture of the Republic of Kazakhstan	8(7212)41-58-65, karrin.skom.kz
8	LLP "NTC Industrial safety and audit»	87014134838, businessmap.kz

## 2. Qualification characteristics of doctoral graduates

### 2.1 List of qualifications and positions

A graduate doctoral degree is awarded doctor of philosophy PhD educational program «8D05101 - Biology»

### 2.2 Sphere of professional activity

The sphere of professional activity of graduates in doctor of philosophy PhD educational program «8D05101 - Biology» are:

- botany;
- zoology;
- human physiology;
- biochemistry;
- biophysics;
- microbiology;
- molecular genetics;
- biological systems of various levels of organization;
- biological environmental technologies;
- biotechnology.

### 2.3 Objects of professional activity

The objects of the professional activity of graduates in doctor of philosophy PhD educational program «8D05101 - Biology» are:

- research organizations;
- Higher and secondary special institutions;
- colleges;
- National parks;
- reserves;
- institutions requiring the presence of higher professional education in accordance with the legislation of the Republic of Kazakhstan.

#### **2.4 The subject of professional activity**

The subject of professional activity of graduates of the educational program doctor of philosophy PhD educational program «8D05101 - Biology» are:

- processes in biological systems at various levels of organization;
- identification of patterns in the formation and functioning of microorganisms, plant and animal objects;
- biological environmental technologies;
- consulting, methodical, educational work with students.

#### **2.5 Types of professional activity:**

- organizational and technological;
- production and management;
- project;
- research;
- pedagogical;
- environmental.:

#### **2.6 Functions of professional activity:**

- carries out the collection and processing of biological material in the field and laboratory;
- carries out analysis, classification of objects and presentation of results;
- performs research;
- introduces the results of scientific research into production;
- provides methodologically competent conduction of experiments;
- organizes information retrieval work in a selected scientific area;
- attracts employers and partners to perform research;
- carries out teaching of biological disciplines in secondary vocational and higher educational institutions.

#### **2.7 Typical tasks of professional activity:**

- ensuring the planning of its activities;
- increasing the level of knowledge of modern information technologies and their use in their daily work;
- improving the quality of teaching;
- planning the content of education at different levels of training in the biological sciences;
- implementation of educational work in accordance with the laws, laws, principles, educational mechanisms of the pedagogical process;
- design and implementation of integrated research in the biological sciences;
- the use of modern methods and technologies of scientific communications;
- determination of the ways of organizing and conducting the educational process;
- the formation of a multicultural personality;
- creation of favorable conditions and provision of pedagogical and scientific support for the upbringing and development of students

#### **2.8 Content of professional activity:**

- high-quality organization and management of the scientific and pedagogical process;
- the collection and preparation of scientific materials, qualified experiments, field studies;

- implementation of technological control over the processes of biological production, the solution of design and production problems that require basic and special biological training;
- implementation of research and teaching activities in accordance with modern requirements in the field of natural sciences;
- organization of activities in the field of nature conservation and rational nature management, the implementation of biomonitoring and biological control of the state of the environment, the assessment of anthropogenic impact on it

**3. The purpose of the educational program:** Training of competitive, highly qualified specialists with knowledge and understanding of modern problems of biology, key areas of biological science that meet the modern level of methodological approach in research and teaching activities, flexible application of scientific research methods in solving practical problems in innovative conditions, motivation for scientific research, providing it with priority demand and sustainable competitiveness in the Kazakh and international labor market and ample opportunities for self-realization.

**3.1 The general goal of the educational program:** training of qualified specialists for regional, national and foreign scientific and practical organizations and educational institutions, research institutes and universities, providing conditions for full-fledged education, professional competence in the field of biology for further use of fundamental biological concepts in their professional activities.

**3.2 The purpose of the cycle of basic disciplines:** preparation of PhD for regional, national and foreign scientific and practical organizations, educational institutions with fundamental life in the field of modern biology to ensure the competitiveness of Kazakhstan's science.

**3.3 The purpose of the cycle of the main disciplines:** the study of information on key areas of biological science, the development of skills and knowledge that meet the current level of the methodological approach in the performance of research work.

**3.4 Objective of theoretical research / experimental research:** development of the ability to independently carry out research work, the flexible application of scientific research methods in solving practical problems in innovative conditions, the motivation for scientific research.

**3.5 The purpose of the final certification:** systematization, consolidation and expansion of theoretical and practical, professional knowledge of doctoral students, they received in the learning process, mastering the methodology of independent scientific research and experimentation in the development and study of issues and problems of biology.

#### 4. Graduate key competencies

<b>Competence Code</b>	<b>Competency description</b>
<b>Personal Competences</b>	
<b>PC1</b>	possession of new information technologies and their critical use, knowledge of foreign languages.
<b>PC 2</b>	knowledge of the general laws of development of society and nature, including the synergistic principles of the structure of the world, environmental responsibility for professional activities.
<b>PC 3</b>	formation of skills of professional communication and information processing.
<b>PC 4</b>	possession of skills and skills of reflection, self-development and self-improvement, a high level of culture of speech, culture of behavior.
<b>Specialized Competences</b>	
<b>SC 1</b>	knowledge of basic modern theoretical and methodological approaches in the field of biology.
<b>SC 2</b>	the ability to apply modern experimental methods of working with biological objects in the field and laboratory conditions, knowledge of the methods of obtaining, processing, analyzing and synthesizing biological information, skills in working with modern equipment.
<b>SC 3</b>	knowledge and practical application of the principles of bioethics, understanding of the social and environmental consequences of their professional activities.
<b>SC 4</b>	practical skills in the field of organization and management during the research and production of biological work.



## 5. Main learning outcomes

<b>Learning outcome code</b>	<b>Outcome</b>
LO1	Demonstrates knowledge of the history and methodology of biological sciences, expanding general professional, fundamental training
LO2	Owens international and national documents, standard operating procedures on ethics and biological safety of scientific research
LO3	Skills of research work and work in a scientific team, objectively assesses the results of his professional activity
LO4	Demonstrates a high level of professional culture, including the culture of professional communication, has a civic position to teach at universities, successfully carries out research activities
LO5	Develops and implements research tasks and performs laboratory, computational and interpretive research in the field of biology
LO6	Owens normative documents regulating the organization and methodology of research and production and technological works in biology
LO7	Demonstrates a high level of written scientific communication necessary for effective communication in an academic environment
LO8	Develops, plans, organizes and conducts research work in the field of biology, taking into account scientific, social and ethical issues of professional activity, professionally presents and justifies the results of research work using modern research methods and devices
LO9	Summarizes the principles of solving biological problems based on the use of complex biological information in scientific research
LO10	Develops and applies methods of statistical processing of experimental data obtained in ongoing research
LO11	Freely and argumentatively expounds ideas and thoughts on a scientific problem in writing, knows the techniques of structuring academic papers, conducts and publishes his own research in accordance with international requirements
LO12	Demonstrates fundamental knowledge at the intersection of sciences to ensure broad horizons and guarantee professional mobility in the developing world
LO13	Maintains professional contacts abroad and improves his qualifications in the global and scientific space
LO14	Evaluates the main trends in the development of advanced ideas and new methods in genetics and molecular biology to solve genetic problems
LO15	Develops proposals for the modernization of genetic and genetic engineering activities in research centers and laboratories of biological profile

**6. Matrix of correlation of learning outcomes for the educational program as a whole with the form of competence**

	<b>LO1</b>	<b>LO2</b>	<b>LO3</b>	<b>LO4</b>	<b>LO5</b>	<b>LO6</b>	<b>LO7</b>	<b>LO8</b>	<b>LO9</b>	<b>LO10</b>	<b>LO11</b>	<b>LO12</b>	<b>LO13</b>	<b>LO14</b>	<b>LO15</b>
<b>CC1</b>	+		+				+				+				
<b>CC2</b>		+							+	+		+	+		
<b>CC3</b>				+											
<b>CC4</b>		+						+							
<b>CC5</b>														+	+
<b>CC6</b>	+		+		+										
<b>CC7</b>					+	+		+					+		
<b>CC8</b>	+								+			+			

## 7. Competency Map

Module code	Module name	Module discipline code	Name of discipline	Learning outcome code	Competence Code
1	2	3	4	5	6
CC1	Problems of modern biology	AW1201 MSR1202	Akademic letter Research Methods	LO1, LO3, LO7, LO11	PC 1, PC 3, SC 1, SC 4.
CC2	Problems of modern biology (continuation of the module)	PMB1203	Problems of modern biology	LO2, LO9, LO10, LO12, LO13	PC 2, PC 4, SC 1, SC 2.
		ETRB1203	Experimental treatment in research and biostatistics		
CC3	Problems of modern biology (continuation of the module)	PP 1204	Pedagogical practice	LO2	PC 1,PC 4, SC 1, SC4.
CC4	Biological research methods and biosecurity	BBS1305	Bioethics and biological safety	LO2, LO8	PC 2, PC 4, SC 2, SC 4
CC5	Biological research methods and biosafety (continued module)	MG1306	Molecular genetics	LO14, LO15	PC 2, PC 3, PC 1, SC 2, SC 4.
		MB1306	Molecular biology		
CC6	Biological research methods and biosafety (continued module)	RP 2307	Research practice	LO1, LO3, LO5	PC 1, PC 2, PC 3, SC 1, SC 2, SC 3.
CC7	Research work of the doctoral student, including internship and doctoral dissertation	RWMDSIIDD3308	Research work of the doctoral student, including internship and doctoral dissertation	LO5, LO6, LO8, LO13	PC 1, PC 3, SC 1, SC 4.
CC8	Final attestation	FDDD3309	Formalization and defense of the doctoral dissertation	LO1, LO9, LO12	PC 1, PC 2, PC 3, SC 1, SC 2, SC 3.

## 8. Content of the educational program

### 8.1 Map of the educational program

Module code	Cycle and component	Discipline Code	Form of control	Semester	ESTC	Module learning outcomes
<b>1 course</b>						
CC1	BD UC	AW1201	Exam	1	5	<p><i>Knowledge:</i> about modern aspects of academic literacy and academic writing, concepts and principles of presentation of academic and scientific information; understanding the methodological foundations of scientific research, modeling in scientific research and practical implementation of biological science.</p> <p><i>Skills:</i> be guided in scientometric databases, conduct peer review and expert evaluation of the basic principles of research activities; knowledge of new research methods using modern educational and information technologies.</p> <p><i>Abilities:</i> conduct biological research, knowledge of modern methods of processing and interpreting data using computer technology.</p> <p><i>Competences:</i> PC 1, PC 3, SC 1, SC 4.</p> <p><i>Evaluation criteria:</i> knows the contribution of foreign and domestic biological scientists to the development of biology in all areas of biological research, correctly expresses and substantiates the provisions of the subject area of knowledge, knows various research methods and selects the optimal method when solving the goals and objectives of the study.</p>
		MSR1202	Exam	1	5	
CC2	BD EC	PMB1203	Exam	1	5	<p><i>Knowledge:</i> the main problems of biology at the present stage of the development of science; promising and developing areas of modern biological science, scientific principles of development and concepts of biology, the nature of the distribution of components of phenotypic variability, variational statistics <i>using methods of processing experimental data and observations.</i></p> <p><i>Skills:</i> apply knowledge for the formulation and solution of research tasks; use fundamental biological concepts in the field of professional activity, plan quantitative experiments in biological research.</p> <p><i>Abilities:</i> creatively use knowledge of fundamental and applied sections of biology, as well as statistical methods in scientific and technological activities.</p> <p><i>Competences:</i> PC 2, PC 4, SC 1, SC 2.</p> <p><i>Evaluation criteria:</i> demonstrates a complete understanding of the issues of modern problems of biology, independently acquires and applies new knowledge in the field of biology in practice.</p>
		ETRB1203	Exam	1	5	
CC3	BD UC	PP 1204	Passed	2	10	<p><i>Knowledge:</i> 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</p>

						<p>teaching and educational, methodical and scientific work at the University of modern educational technologies, methods, techniques, teaching methods in higher educational institutions.</p> <p><i>Skills:</i> possess active teaching methods, apply modern educational technologies in teaching activities, carry out methodological work on designing and organizing the educational process, speak to an audience and create a creative atmosphere in the process of training sessions.</p> <p><i>Abilities:</i> diagnostics, monitoring and evaluation of the effectiveness of educational activities, the organization of educational activities of students, scientific and methodological work, the acquisition of teaching experience in high school.</p> <p><i>Competences:</i>PC 1,PC 4, SC 1, SC4.</p> <p><i>Evaluation criteria:</i> ability of the high-level execution of the planned workload required by the internship program; the ability to solve methodical tasks of high quality, self-reliance in work, creativity and pedagogical tact.</p>
CC4	CD UC	BBS1305	Exam	1	5	<p><i>Knowledge:</i> concepts of biological safety in the laboratory, basic concepts of biosafety, fundamentals of biomedical ethics, international documents, standard operating procedures for research ethics.</p> <p><i>Skills:</i> use of bioethical principles in experimental studies, propaganda of bioethical views.</p> <p><i>Abilities:</i> use of the regulatory framework governing research activities in the field of biomedical research.</p> <p><i>Competences:</i>PC 2, PC 4, SC 2, SC 4</p> <p><i>Evaluation criteria:</i> owns the basic concepts of the worldview and scientific principles of biosafety and bioethics, owns the formulation and solution of bioethical problems in accordance with modern regulatory documents, has a deep conviction in the need for strict adherence to ethical and moral norms, rules and principles in their practical activities.</p>
CC5	CD EC	MG1306	Exam	1	5	<p><i>Knowledge :</i> the basic mechanisms of regulation of gene expression, methods of human genomic identification, the use of DNA markers to study the evolution and population history of man, the mechanisms of rhythmic organization of the physiological functions of the human body and animals, the importance of biorhythmology to preserve the health and human health, the rhythmic dynamics of the body's vital activity with the environment.</p> <p><i>Skills:</i> use methods for estimating the frequency of genes and genotypes in human populations; use physiological methods to record daily and seasonal rhythms of the main functions of the body.</p> <p><i>Abilities:</i> quantitative assessment of the biorhythms of a particular person methods of statistical processing of the data.</p> <p><i>Competences:</i>PC 2, PC 3, SC 1, SC 2, SC 4.</p> <p><i>Evaluation criteria:</i> understands, sets out and critically analyzes biological information, independently sets research tasks, independently performs</p>
		MB1306	Exam	1	5	

						laboratory, computational and interpretive biological studies.
CC6	CD PR	RP 2307	Passed	3	10	<p><i>Knowledge:</i> fundamentals of the organization of scientific activity in research organizations and departments, the problems of modern Kazakh and foreign studies in the field of biology, principles of construction and editing, criteria for evaluating a scientific text.</p> <p><i>Skills:</i> conduct an experiment and describe its results, develop original scientific ideas for the preparation of a doctoral dissertation, apply adequate methods of research and processing of factual material.</p> <p><i>Abilities:</i> possession of modern methods of searching and processing scientific information, qualified analysis, commenting, generalizing and summarizing the results of scientific research.</p> <p><i>Competences:</i> PC 1, PC 2, PC 3, SC 1, SC 2, SC 3.</p> <p><i>Evaluation criteria:</i> knows how to apply the methodology and methods of scientific research, correctly builds a program of theoretical and empirical research, shows individual creative abilities in solving research problems, performs the full scope of tasks provided by the program of research practice.</p>
CC7	AM PR	RWMDSI- IDD3308	Passed	1,2,3,4,5,6	123	<p><i>Knowledge:</i> basic principles of selection and systematization of material for research; actual scientific problems in the field of biology, requirements for bibliographic description of literature on the topic of the thesis.</p> <p><i>Skills:</i> conduct independent research in accordance with the developed program and schedule, carry out statistical processing of data obtained in the course of research work.</p> <p><i>Abilities:</i> conducting independent research activities, the application of methodological knowledge in conducting scientific research, the use of biological equipment, writing scientific articles, theses, speeches at conferences, symposia, round tables, discussions and disputes.</p> <p><i>Competences:</i> PC 1, PC 3, SC 1, SC 4.</p> <p><i>Evaluation criteria:</i> independently works with educational, scientific and reference literature, writing scientific work in accordance with the requirements, summarizes and critically evaluates the results of the</p>

						research, presents the results of the research in the form of a scientific report, article, report, presentation.
CC8	FA	FDDD3309	Exam	6	12	<p><i>Knowledge:</i> perspective and developing directions of modern biological science, scientific principles of development and concepts of biology, problems of modern Kazakh and foreign studies in the field of biology.</p> <p><i>Skills:</i> use of modern methods of scientific research in the field of physiology, experimental processing of research.</p> <p><i>Abilities:</i> the use in research activities of knowledge of fundamental and applied sections of biology, the conduct of independent research activities, the application of methodological knowledge in conducting scientific research.</p> <p><i>Competences:</i> PC 1, PC 2, PC 3, SC 1, SC 2, SC 3.</p> <p><i>Evaluation criteria:</i> demonstrates a complete understanding of the issues of modern problems of biology, works independently with educational, scientific and reference literature, presents the results of the study in the form of a scientific report, article, dissertation.</p>

## 8.2 Summary table on the volume of the educational program

Course of study	Semester	The number of mastered modules	The number of subjects studied		Amount of credits							Total hours	ECTS	Amount	
			UC	CC	Theoretical study	Teaching practice	Internship	Research practice	DRP	Final examination	Total			Exam	Pass-fail test
1	1	6	3	2	25	-	-	-	5	-	30	1365	30	5	1
	2		-	-	-	10	-	-	20	-	30	915	30	-	2
2	3	2	-	-	-	-	-	10	20	-	30	915	30	-	2
	4		-	-	-	-	-	-	30	-	30	615	30	-	1
3	5	2	-	-	-	-	-	-	30	-	30	615	30	-	1
	6		-	-	-	-	-	-	18	12	30	975	30	-	1
<b>Total</b>			<b>3</b>	<b>2</b>	<b>25</b>	<b>10</b>		<b>10</b>	<b>123</b>	<b>12</b>	<b>180</b>	<b>5400</b>	<b>180</b>	<b>5</b>	<b>8</b>

### Compilers:

Head of the Department of Physiology

Tykezhanova G.M.

### Agreed by:

Chairman of the Quality Assurance Commission of the Faculty of Biology and Geography

Zhomartova G.Zh.

### Notes.

The educational program was reviewed and recommended by the Faculty Council from 18.05.2024 Protocol №9

The educational program was reviewed at the meeting of the Academic Council of the University and recommended for approval from 24.05.2024 Protocol №5.1

The educational program was reviewed and approved at a meeting of the Academic Council from 09.06.2024 Protocol №18

Member of the Management Board, vice-rector for Research

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Member of the Management Board, acting vice-rector for Academic Affairs

Nusupbekov B. R.

Head of postgraduate education department

Karstina S.G.

Dean of biological and geographical Faculty

Talzhanov S.A.