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MINISTRY OF SCIENCES AND HIGHER EDUCATION OF THE REPUBLIC OF
KAZAKHSTAN
M. AUEZOV SOUTH KAZAKHSTAN UNIVERSITY



EDUCATION PROGRAMME

7M05110 - Biology

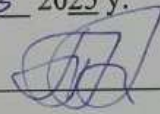
Registration Number	7M05100008
Code and Classification of Education	7M05 Natural Science, mathematics and statistics
Code and Classification of Areas of Training	7M051 Biological and related sciences
Group of educational programs (EP)	M080-Biology
Type of EP	acting
ISCE level	7
NQF level	7
IQF level	7
Language of learning	Kazakh, Russian
The complexity of EP	120 credits
Distinctive features of EP	-
Partner University (JEP) -	-
University partner (DDEP) -	-

Shymkent, 2025

Developers:


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The OP was considered at a meeting of the Academic Quality Committee of the Natural Sciences and Pedagogy Higher School,
Minutes # 6 « 17 » 03 2025 y.

Chairman of the Committee  A. Tursynbaev

The EP was considered and recommended for approval at Educational-methodical meeting of M. Auezov SKU

Minutes # 4 « 18 » 03 2025 y.

Chairman of the EMM  E. Imangaliyev

The EP was approved by the decision of the Academic Council of the University
Minutes # 10 « 27 » 03 2025 y.

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1 Concept of the Educational program

Mission of the University	SKU strategically positions itself as a leading research center for technology and innovation in the southern region, generating new competencies for leaders who promote research thinking and culture
University Values	<ul style="list-style-type: none"> – <i>Openness</i> - open to change, innovation and cooperation. – <i>Creativity</i> - generates ideas, develops them and turns them into values – <i>Academic freedom</i> - free to choose, develop and act. – <i>Partnership</i> - creates trust and support in a relationship where everyone wins. – <i>Social responsibility</i> - ready to fulfill obligations, make decisions and be responsible for their result
Graduate Model	<p><i>Competence:</i> general educational. <i>Purpose:</i> to apply and further develop the competence. <i>Competence:</i> impact <i>Purpose:</i> for the effective implementation of professional competencies by graduates in order to better solve complex issues covering different fields of knowledge; <i>Competence:</i> skills - critical thinking and problem solving; - communication skills; - information and communication technologies; - legal. <i>The goal:</i> to increase the effectiveness of productive collaborative and open work, as well as the application of acquired experience in the study of new professional problems, a creative approach in solving them, taking into account multinational groups and in a non-cultural framework. <i>Competence:</i> professional <i>Purpose:</i> to strengthen integrity, trust and personal resilience and the ability to cope with problems and uncertainty</p>
Uniqueness of the EP	The Master's Degree program in Biology is unique in its combination of fundamental scientific training, practice-oriented research technologies, integration of artificial intelligence into biology, and international academic mobility opportunities. The program forms a modern researcher capable of working in the field of science and higher education.
Academic Integrity and Ethics Policy	<p>The university has taken measures to maintain academic integrity and academic freedom, protection from any type of intolerance and discrimination:</p> <ul style="list-style-type: none"> • Rules of academic integrity (order No. 212 of October 10, 2022); • Anti-corruption standard (order No. 8 n/a dated 08/01/2025). • Code of Ethics (Order No. 212 of October 10, 2022)
Regulatory and legal framework for the development of EP	<ol style="list-style-type: none"> 1. Law of the Republic of Kazakhstan “On Education”; 2. «Model Rules for the Activities of Organisations of Higher and Postgraduate Education», approved by order of the Ministry of Education and Science of the Republic of Kazakhstan dated October 30, 2018 No. 595 as reworded by order of the Minister of Science and Higher Education of the Republic of Kazakhstan dated June 24, 2024. No. 307; 3. Standard rules for admission to training in educational organizations implementing educational programs of higher and postgraduate education, approved by order of the Ministry of Education and Science of the Republic of Kazakhstan dated October 31, 2018 No. 600 as reworded by order of the Minister of Science and Higher Education of the Republic of Kazakhstan

	<p>dated July 26, 2024. No. 372;</p> <p>4. State mandatory standards for higher and postgraduate education, approved by order of the Ministry of Education and Science of July 20, 2022 No. 2 as reworded by order of the Minister of Science and Higher Education of the Republic of Kazakhstan dated March 04, 2025. No. 90;</p> <p>5. Rules for organizing the educational process in credit technology of education, approved by order of the Ministry of Education and Science of the Republic of Kazakhstan dated April 20, 2011 No. 152 as reworded by order of the Minister of Science and Higher Education of the Republic of Kazakhstan dated April 29, 2024. No. 203;</p> <p>6. Qualification reference book for positions of managers, specialists and other employees, approved by order of the Minister of Labor and Social Protection of the Population of the Republic of Kazakhstan dated December 30, 2020 No. 553 as reworded by order of the Minister of Science and Higher Education of the Republic of Kazakhstan dated June 20, 2024. No. 207;</p> <p>7. Methodological recommendations for introducing ECTS principles into the educational process and expanding academic freedom. Appendix to the order of the Minister of Science and Higher Education. of the Republic of Kazakhstan dated February 12, 2024 No. 57</p> <p>8. Guidelines for the development of educational programs for higher and postgraduate education, Appendix 1 to the order of the Director of the National Center for the Development of Higher Education of the Ministry of Education and Science of the Republic of Kazakhstan dated May 4, 2023 No. 601</p>
Organization of the educational process	<ul style="list-style-type: none"> – Implementation of the principles of the Bologna Process – Student-centered learning – Availability – Inclusivity
Quality assurance of EP	<p><i>Academic quality</i> - is the regular examination of work programs of disciplines, updating the content in accordance with modern scientific data and the requirements of the labor market.</p> <p><i>Staffing</i> – the participation of qualified teachers with academic degrees and scientific publications.</p> <p><i>Research activity</i>- is the involvement of students in scientific projects and publication activities.</p> <p><i>The material and technical base</i>- is the use of modern laboratories, equipment, digital resources and information systems for training.</p> <p><i>Assessment of educational outcomes</i>- is a transparent and objective knowledge control procedure, including ongoing, intermediate and final control.</p> <p><i>External quality assessment</i> - is the participation of independent experts, employers, and representatives of scientific organizations in evaluating programs and practices.</p> <p><i>Feedback and improvement</i> – regular collection of feedback from students, teachers and employers, followed by adjustments to the program.</p>
Requirements for applicants	<p>They are established in accordance with the Standard Rules for admission to training in educational organizations implementing educational programs of higher and postgraduate education by order of the Ministry of Education and Science of the Republic of Kazakhstan No. 600 as reworded by order of the Minister of Science and Higher Education of the Republic of Kazakhstan dated July 26, 2024. No. 372</p>

<p>Conditions for the implementation of educational programs (EP) for persons with disabilities and special educational needs (SSN)</p>	<p>For students with SEN (special educational needs) and persons with disabilities (PSI), tactile PVC tiles, specially equipped toilets, a mnemonic diagram, and shower bars have been installed in educational buildings and student dormitories. Special parking spaces have been created. Crawler lift installed. There are desks for people with limited mobility (PLM), signs indicating the direction of movement, ramps. In the educational buildings (main building, building No. 8) there are 2 rooms with six working places adapted for users with disorders of the musculoskeletal system (DMS). For visually impaired users, the SARA™ CE Machine (2 pcs.) is available for scanning and reading books. The library website is adapted for the visually impaired. There is a special NVDA audio program with a service. The JIC website http://lib.ukgu.kz/ is open 24/7.</p> <p>An individual differentiated approach is provided for all types of classes and in the organization of the educational process.</p>
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2 Passport of the Educational program

<p>Purpose of the EP</p>	<p>Training of highly qualified masters with in-depth scientific and pedagogical knowledge, able to plan and carry out research, educational, pedagogical and production activities in various branches of biology.</p>
<p>Tasks of the EP</p>	<ol style="list-style-type: none"> 1. Formation of in-depth scientific and theoretical knowledge in key areas of modern biology and related disciplines. 2. Development of practical skills in organizing and conducting scientific research, including experiment planning, data analysis, and interpretation of results. 3. Improving the pedagogical competence of undergraduates for the effective conduct of training sessions and the development of educational materials in biological disciplines. 4. Preparation for professional production activities in biological and biotechnological organizations, laboratories and research centers. 5. Formation of skills of independent scientific and pedagogical activity, including the development of curricula, teaching aids and research projects. 6. Development of a research, analytical and project culture that ensures readiness to solve professional problems in various branches of biology and to participate in interdisciplinary research.
<p>Harmonization of EP</p>	<ul style="list-style-type: none"> - harmonization establishes a clear correspondence between the goals, objectives, learning outcomes and professional activities of graduates, forming a holistic and modern model for the training of biological masters. - The content, structure and final learning outcomes of the Biology educational program have been developed based on the requirements of modern standards of national and international accreditation agencies. - The OP was developed based on the principles of consistency, scientific reliability and continuity, which make it possible to compare fundamental biological knowledge with practice-oriented and research competencies. - The content of the disciplines is systematically updated, interdisciplinarity is enhanced and integrated with the achievements of modern biology. The educational process meets the needs of the scientific field and the labor market.
<p>Connection of the EP with the professional sphere</p>	<p>The sectoral qualifications framework Education, approved by Protocol No. 2 of the meeting of the sectoral Tripartite Commission on Social</p>

	Partnership and Regulation of Social and Labor Relations under the Ministry of Education and Science of the Republic of Kazakhstan dated November 23, 2016.
Name of the degree awarded	«Master degree in natural sciences 7M05110 – Biology»
List of qualifications and positions	<p>Masters of biology of a scientific profile can hold the following positions:</p> <p><i>In research institutes</i> (research institutes) (junior researcher; researcher; senior researcher; research biologist, molecular biologist; geneticist, laboratory researcher, etc.;</p> <p><i>In educational organizations</i>: university lecturer (assistant, lecturer, senior lecturer); methodologist of the educational and scientific laboratory; specialist in educational biological programs.</p> <p><i>In applied industries</i>: specialist in biotechnological production; specialist in quality control of biological products; expert biologist (in environmental, sanitary, veterinary centers); specialist in bioresources and biodiversity; analyst in the field of pharmaceutical and biomedical research.</p>
Field of professional activity	<p><i>Fundamental and applied scientific research</i>: the study of biological systems at the molecular, cellular, organismic and ecosystem levels; conducting experimental and analytical research in various fields of biology.</p> <p><i>Research and design activities</i>: development and implementation of scientific projects; participation in innovative developments.</p> <p><i>Laboratory and analytical activities</i>: conducting molecular genetic, microbiological, biochemical and environmental analyses; work in scientific and industrial laboratories of various profiles.</p> <p><i>Educational and teaching-methodical activities</i>: teaching biological disciplines in educational organizations; development of teaching materials and participation in educational projects.</p> <p><i>Environmental monitoring and conservation activities</i>: assessment of the state of the environment; analysis of biodiversity and development of measures for its conservation; participation in environmental assessments.</p>
Objects of professional activity	<ul style="list-style-type: none"> - living organisms and biological systems; - biological processes at the molecular, cellular and organismic levels; - biological materials, resources, laboratory and biotechnological equipment; - natural and anthropogenic ecosystems; - educational processes, educational materials and biological educational resources.
Subjects of professional activity	<ul style="list-style-type: none"> - biological systems, structures and processes at the molecular, cellular, organismic and ecosystem levels; - methods and technologies of biological, molecular, genetic, biochemical, microbiological and environmental research; - biological materials, bioresources and objects of laboratory and biotechnological activity; - processes of environmental monitoring, assessment of the state of natural and anthropogenic ecosystems; - educational processes, teaching materials and biological educational resources;
Types of professional activity	<p><i>Research activity</i>: conducting fundamental and applied biological research;</p> <p><i>Experimental and laboratory activities</i>: work with biological materials, cell cultures, laboratory facilities and measuring systems.</p> <p><i>Environmental and environmental protection activities</i>: environmental monitoring; assessment of the state of natural and anthropogenic ecosystems;</p> <p><i>Educational and teaching-methodical activities</i>: teaching biological disciplines; development of teaching materials, educational resources and programs.</p>
Learning outcomes	ROI Use a foreign language in interpersonal communication,

	<p>professional activity, when communicating with both specialists and a wider circle of people.</p> <p>RO 2 Analyze the main ideological and methodological problems, including interdisciplinary ones, arising in science at the present stage of its development, evaluate various facts and phenomena based on the provisions and categories of the philosophy of science.</p> <p>RO 3 Evaluate the development and effective use of personnel in the organization, possess socio-psychological technologies for managing mass behavior.</p> <p>RO 4 The application of effective teaching methods, practice-oriented methods and technologies of teaching using artificial intelligence (AI), modern trends in biology, a critical assessment of the scientific organization of the work of a higher school teacher.</p> <p>RO 5 Apply modern trends in the development of biology in the world and Kazakhstan, reveal the most effective directions in biological science, independently assess key problems in the field of biology.</p> <p>RO 6 analyze the main methodological problems arising in biological science at the present stage and in their historical development;</p> <p>RO 7 Apply modern methods of analysis using the latest instruments, as well as physico-biological approaches, including artificial intelligence, for data processing and interpretation.</p> <p>RO 8 it is reasoned to substantiate their views on modern problems of biology and the principles of solving current research problems based on the use of modern equipment and computing facilities.</p> <p>RO 9 Independently carry out experimental research in interdisciplinary related fields of biology, substantiate research results when discussing with specialists and a wider audience.</p> <p>RO 10 Possess methods of biological cognition and technologies for planning solutions to fundamental professional tasks in the field of scientific biological research.</p>
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3. Competencies of a graduate of the EP

GENERAL COMPETENCIES (SOFTSKILLS). Behavioral skills and personal qualities	
GC 1. Competence in managing one's literacy	GC 1.1. The ability of self-learn, self-develop and constantly update their knowledge within the chosen trajectory and in an interdisciplinary environment. GC 1.2. The ability to express thoughts, feelings, facts and opinions in the professional field. GC 1.3. The ability for mobility in the modern world and critical thinking.
GC 2. Language competence	GC 2.1. The ability to build communication programs in the state, Russian and foreign languages. GC 2.2. The ability for interpersonal social and professional communication in the conditions of intercultural communication.
GC 3. Mathematical competence and competence in the field of science	GC 3.1. The ability and willingness to apply the educational potential, experience and personal qualities acquired during the study of mathematical, natural science, technical disciplines at the university to solve professional problems.
GC 4. Digital competence, technological literacy	GC 4.1. The ability to demonstrate and develop information literacy through the mastery and use of modern information and communication technologies in all areas of their lives and professional activities. GC 4.2. The ability to use various types of information and communication technologies: Internet resources, cloud and mobile services for searching, storing, protecting and disseminating information.
GC 5. Personal, social and educational competencies	GC 5.1. The ability for physical self-improvement and focus on a healthy lifestyle to ensure full-fledged social and professional activities through the methods and means of physical culture. GC 5.2. The ability to social and cultural development based on the manifestation of citizenship and morality. GC 5.3. The ability to build a personal educational trajectory throughout life for self-development, career growth and professional success. GC 5.4. The ability to successfully interact in a variety of socio-cultural contexts during study, work, home and leisure.
GC 6. Entrepreneurial competence	GC 6.1. The ability to be creative and entrepreneurial in a variety of environments. GC 6.2. The ability to work in a mode of uncertainty and rapidly changing task conditions, make decisions, allocate resources and manage your time. GC 6.3. The ability to work with consumer requests.
GC 7. Cultural awareness and ability to express yourself	GC 7.1. The ability to show worldview, civil and moral positions. GC 7.2. The ability to be tolerant of the traditions and culture of other peoples of the world, to have high spiritual qualities.
PROFESSIONAL COMPETENCE (PC)	
PC1 scientific research	PC1.1 The ability to creatively use knowledge of fundamental and applied sections of biology in scientific and technological activities using the latest domestic and foreign experience.
PC2 scientific and innovative	PC2.1 The ability to apply the methodological foundations of design, implementation of field and laboratory, biological, physiological and medical research, use modern equipment, computer systems in accordance with the direction of the master's program.
PC3 organizational and managerial	PC3.1 The ability to plan and carry out activities to assess the state and protection of the environment, to organize activities for the rational use of natural resources, assessment and restoration of biological resources;

	PC3.2 Assessment and restoration of biological resources; PC3.3 To organize scientific seminars and conferences; the ability to use the skills of preparation and design of scientific and technical documentation, scientific reports, reports and articles.
PC4 pedagogical and educational	PC4.1 The ability to methodically competently make plans for lectures and practical training in the sections of academic disciplines and publicly present the theoretical and practical sections of academic disciplines in accordance with the approved teaching AIDS; PC4.2 To possess the skills and abilities of designing and implementing a holistic pedagogical process, to be able to positive thinking, attached to the system of national values, committed to ethical values, prone to humanism and optimism; PC4.3 To possess Kazakh, Russian, foreign languages, knowledge in the field of biology, pedagogical rhetoric and conflictology, communication strategies, skills and constructive dialogue, communication in a multicultural, multiethnic and multi-confessional society, to be tolerant and capable of pedagogical cooperation.
PC5 innovation and design	PC5.the ability to organize and direct scientific research; develop scientific apparatus, process and evaluate research results using artificial intelligence, summarize the data obtained and formulate conclusions.

3.1 Matrix of correlation of the learning outcomes of the educational program as a whole with the competences formed

	LO 1	LO 2	LO 3	LO 4	LO 5	LO 6	LO 7	LO 8	LO 9	LO 10
GC 1	+									
GC 2		+							+	
GC 3			+							
GC 4				+		+				
GC 5					+					
GC 6								+		
GC 7							+			+
PC1	+					+				
PC2				+			+			
PC3			+							+
PC4		+						+		
PC5					+				+	

4. Matrix of the influence of modules and disciplines on the formation of learning outcomes and information on labor intensity

Module	Cycle	Component	Name of the discipline	Brief description of the discipline	Quantity loans	The generated RO (codes)													
						RO1	RO2	RO3	RO4	RO5	RO6	RO7	RO8	RO9	RO10				
Module Scientific and Pedagogical Training	BD	HsC	History and Philosophy of Science	<p>Purpose: Study of the problems of the phenomenon of science as a subject of special philosophical analysis, patterns and trends in the development of special activities for the production of scientific knowledge taken in a socio-cultural context.</p> <p>Identification of the specifics and relationship of the main problems of history and philosophy of science. Study of the laws of the development of science and the structure of scientific knowledge, methods of scientific research.</p> <p>Knowledge of the main concepts and directions of the non-classical and post-classical stage of the development of science. Analysis of the realities of modern theory and practice based on understanding the methodology of natural science, socio-humanitarian and technical knowledge. Critical thinking as a</p>	4		✓												

			prerequisite for the development and functioning of modern society. Technologies for the development of critical thinking: consideration and study of the logic of arguments. Formation of critical reflexive thinking and metacognitive abilities.												
BD	HsC	Foreign Language (Professional)	The aim is systemic deepening of communicative competence within the framework of foreign language education's international standards based on the further skills and abilities' active language proficiency development in the professional activities of the future master's student The contents. Levels B2, C1 are presented in the form of a pragma-professional orientation for professional and academic aims at an advanced level: scientific information base, interpretation of scientific information, argumentation, persuasion, scientific controversy, academic writing. Use of innovative methods and technologies, and attraction of modern means (Internet resources). Demonstration of language material's knowledge in any related discipline	4	✓										
BD	HsC	Psychology of Management	Purpose: to ensure the competence of a psychologist by	3			✓								

			<p>mastering his knowledge in the field of psychological management, developing skills in managing the organization's human resources.</p> <p>Content: methodological foundations of management psychology. Development of psychological theories of management. General theoretical questions of management psychology. Psychology of managerial communication. Psychological characteristics of the staff. Psychology of employee motivation. Technologies of human resource management of the organization. Psychological support of the personnel policy of the organization. Psychology of conflict in the organization. Technologies for preventing professional deformation of personality. Practical implementation in the form of creating diagnostic tools, developing digital methods for training leaders, and management consulting.</p>												
BD	HsC	Pedagogy and psychology of higher education	The purpose of the course is to develop undergraduates' skills and abilities to effectively organize professional and pedagogical activities at a university based on modern	5				✓							

				<p>psychological and pedagogical knowledge.</p> <p>Course content: Modern paradigms of higher education. History, trends and strategies of higher education development in Kazakhstan. The subject, tasks, and categories of higher school pedagogy and psychology. Methodological foundations of higher school pedagogy and psychology. Professional competence of a university teacher. The communicative competencies of a university teacher. Higher school didactics. Psychological features of student age. The university learning process and its patterns. The content of education at the university. Forms of organization of the educational process at the university. Technologies of organization and implementation of the educational process at the university. Features of the credit training system. Methods and methods of teaching.</p>											
Module Methodical Basics of Teaching	PD	HsC	Teaching Methods of Special Disciplines	<p>Purpose: Formation of professional and pedagogical competence and methodological preparation of undergraduates for future pedagogical activity in new socio-economic conditions.</p> <p>Content: Features of the construction of goals, content,</p>	5				✓						

				application of modern methods, methodologies and organizational forms of teaching specialized disciplines. Methods of organizing and conducting various types of classes. Development of course programs, methodological support of specialized disciplines. Methods of organizing and conducting quality control and training in special disciplines at the university											
	BD	HsC	Pedagogical Practice	<p>Purpose: Mastering pedagogical skills, formation of skills of independent teaching and educational activities in higher education.</p> <p>Content: Study of teaching experience by leading university teachers. Independent conduct of training sessions, management of research work of students. The use of skills for collecting and accumulating empirical material, structuring, systematizing knowledge and presenting it in various ways. Improving the skills of public speaking and presentation of accounting documentation.</p>	4				✓						
Scientific and Technological Module	BD	EC	Scientific Advances in Recent Years in the Field of Biology	The purpose is to familiarize with the latest trends in the development of biology at the present stage, to highlight the main directions of its	4					✓					✓

			<p>development, to introduce new sciences, the subject of their research, the history of their origin, practical application and significance of each direction at present and in the future.</p> <p>Content</p> <p>Objective knowledge of the latest scientific achievements in the field of biology. Current trends in the development of biological science in the world. Synthetic biology, "Nanoscience", Bionics. Nutrigenomics and nutrigenetics. Memetics, recombinant memetics. Neuroeconomics. Sociology. Quantum biology. Neuroparasitology</p>												
BD	EC	Modern State of Biological Sciences Development in the RK	<p>The purpose of the course is to provide objective knowledge about the history and current state of biological science in the Republic of Kazakhstan.</p> <p>Content. Overview of the history and status, main directions, trends and prospects for the development of biological science in the Republic of Kazakhstan. The role of domestic scientists in the formation and development of biological science in Kazakhstan. The role of the Academy of Sciences, educational and scientific centers in the development of biological science in Kazakhstan.</p>	4						✓					

	BD	EC	Current Issues of Specially Protected Natural Areas	<p>Purpose: formation of ideas about the modern problems of specially protected natural areas, including anthropogenic and biospheric aspects.</p> <p>Content: Problems of OOPR. National peculiarities and their connection with the specifics of nature, history, mentality of the population, scientific traditions. Similarities and differences in the organization of protected areas in different countries. Preservation of the diversity of cultural landscapes, natural landscapes, biological species and other natural objects.</p> <p>Legislative and regulatory documents in the field of environmental protection and biodiversity conservation.</p>	6					✓					
	BD	EC	Nature Reserve RK	<p>Goal. To give an idea of the basic principles and legislation of protection on the basis of scientific analysis of the features of the creation of specially protected natural territories in Kazakhstan and species of rare plants and animals.</p> <p>Content. Protection of flora and fauna in Kazakhstan. Problems of functioning of protected areas from the point of view of the impact of economic activity on the state of protected ecosystems.</p>	6							✓			

				The problem of preserving unique landscapes, standards of untouched biogeocenoses, species diversity of living organisms (gene pool). Protection of rare and endangered relict and endemic (local) species, providing the necessary conditions for their reproduction. Biosphere reserves. Natural monuments. Nature reserves. National parks. Nature reserves of Kazakhstan											
PD	EC	Micro and Macrophytes	<p>Purpose: Formation of knowledge of biodiversity and structural features of aquatic lower and higher plants.</p> <p>Contents: Groups of macrophytes.</p> <p>Species composition of aquatic plants, features of the life cycle. Systematics of aquatic plants, features of the structure of aquatic plant tissues. Adaptation of aquatic plants to the habitat, features of the life cycle and reproduction. Characteristic features of representatives of the departments of algae, higher aquatic plants. Indicators of pollution of the aquatic environment species, the importance of aquatic plants for water bodies and their role in aquatic ecosystems.</p>	4							✓				
PD	EC	Algology	Purpose: to deepen knowledge in	4							✓				

			the field of botany and develop practical skills of independent research work. Contents: Features of the structure of algae cells, classification and main groups. The main types of algae life cycles. Types of morphological differentiation of algae thalloma. Types of reproduction and life cycles of algae. Changing forms of development and nuclear phases. Ecological groups and algae ecology. The role of algae in nature and their practical significance. Methods of collecting and studying algae Microscopy technique and method of preparation of temporary algae preparations.											
BD	EC	Information Biology	Objective: to form a holistic view of information, the specifics of information processes in biological and ecological systems, to gain experience in applying information approaches to the analysis of biological objects, processes and systems. Content: Scientific and informational activity in biology and ecology. Information systems in biology and ecology. information approaches (semantic, biocybernetic, semiotic) to the analysis of biological and ecological processes and systems.	5								✓		

			Biodiversicology, informational aspects of studying the structure and dynamics of biological diversity. Information indexes. Computer biology. Information technologies for data analysis and documentation of biological and environmental research results												
	BD	EC	Genomics	<p>Purpose: Formation of knowledge about the structure and functioning of the genome, about scientific and applied aspects of the use of molecular genetics</p> <p>Contents: Methods of genomics. Functions and evolutions of genomes. Determination of the complete genetic characteristics of the entire cell. Structural and functional genomics. General principles of geological mapping and their functions outside the elements of genes. Sequencing, mapping. Heredity and variability, inheritance of traits, mutational variability. The sequence of chromosome abnormalities, heredity of genetic diseases. The future of genomics.</p>	5							✓			
Research Methodology Module			Research Practice	Objective: To consolidate the acquired theoretical knowledge and acquire practical skills and experience to identify and formulate a scientific problem, its research and substantiation of	6								✓		✓

			<p>solutions.</p> <p>Content: Organization of scientific research in accordance with the modern methodology of science, compliance with the stages and logic of scientific research in accordance with the applied tasks of the master's project. Develops the ability to experiment and summarize the results of research work in the form of scientific publications, defend their position during the discussion and make professional decisions. Develops creativity, creativity and initiative.</p>												
	PD	EC	<p>Landscape Design and Greening</p>	<p>Purpose: formation of a system of theoretical knowledge and practical skills for creating landscape compositions and their use in interiors and open environmental situations, formation of microclimate, image improvement</p> <p>Contents: theoretical and practical foundations of landscape design. Landscaping based on the analysis of natural, social and economic factors. Rational methods, techniques and means of landscape design. Relief, artificial reservoirs and small forms as integral components of the architectural landscape. Scientific and methodological foundations of modern landscape</p>	5									✓	

			design. Principles and main stages of landscape planning. Classification of landscape plans and features of their structure.												
PD	EC	Urbanoflora	<p>Goal. Familiarity with the specifics of plant habitat conditions in the urban environment, the peculiarities of urban flora and vegetation.</p> <p>Content. Features of urban flora in connection with their rational use and protection. Light and temperature conditions in the city. Soil environment: compaction, specificity of microbiological processes. Conditions of mineral nutrition of plants in the city. Pollution of the environment and plants. Recreation and plants. The influence of the urban environment on the physiological processes of plants and their morphology. The specifics of the composition and structure of urbanophytocenoses. The role of urban flora in solving environmental problems. Phyto-indications of the state of the environment in the urban environment.</p>	5							✓				
PD	EC	Biological Monitoring of Environment	<p>Purpose: formation of knowledge about the system of observations of biological objects, which allows to identify changes in the state of the biosphere under the influence of human activity.</p>	6								✓			

			<p>Contents: Biological monitoring is a priority method of modern environmental monitoring. Principles of monitoring. General monitoring structure. Classification of types of monitoring. Monitoring of impact factors - physical, chemical, biological factors; monitoring of the state of the biosphere - geographical monitoring (atmosphere, ocean, land surface with rivers and lakes) and biological monitoring. Monitoring of the state of impact factors and the environment; forecasting and assessment of the forecast state. Environmental monitoring programs, their application in monitoring.</p>											
PD	EC	Environmental Problems of Plant and Animal world of Kazakhstan	<p>Purpose: formation of knowledge about environmental problems, diversity of flora and fauna of Kazakhstan and effective ways to solve them.</p> <p>Content: environmental problems of Kazakhstan. Qualified implementation of practical activities for environmental protection and sustainable development in the republic. Normative documents of domestic and foreign policy in the field of protection and use of the natural environment.</p>	6								✓		

			Biodiversity of plants and animals of Kazakhstan. Biospheric importance of biodiversity conservation. The impact of human activities on biodiversity. Endemic and rare plants, animals of Kazakhstan. Measures to protect them. Preservation of the gene pool of plants and animals of Kazakhstan.												
PD	EC	Biodiversity and Protection of the RK Animal World	Goal. familiarity with the biodiversity of the animal world: systematics, morphology, species composition, reproduction, geographical distribution. Content. Biological diversity and sustainable use of animal resources. Specially protected natural areas and biodiversity. Methods for assessing the state of animal resources and ways to restore them. Methods for assessing the state of animal resources and ways to restore them. Threats to the biodiversity of animal species. Regulatory and legal framework for the conservation of fauna biodiversity both at the regional level and at the level of the republic and the world community.	6						✓					
PD	EC	Plant and Animal Resources of the RK, Rational Use,	Goal. To give an idea of the methods of determining the state of plant and animal resources in the Republic of Kazakhstan, ways of their restoration and	6								✓			

			Protection	<p>rational measures for their effective use.</p> <p>Content. The state of plant and animal resources of Kazakhstan, the structure and levels of biodiversity, flora and fauna. Possibilities of protection and rational use of plant and animal resources of the Republic of Kazakhstan. Methods for assessing the state of plant and animal resources and ways to restore them. Sustainable use of animal and plant resources.</p> <p>Ecosystem change from human action. Specially protected natural areas and biodiversity.</p>											
Applied Aspects of Modern Biology	PD	EC	Actual Problems of Modern Biology	<p>Objective: the role of the use of artificial intelligence (AI) in the consideration of current problems of modern biology and promising areas of development of biological research. Contents: modern views on the origin of life. Genetic and molecular bases of gene regulation in animals and plants. Developmental biology, problems of behavioral biology. The main current problems of evolution and patterns of biological phenomena. Interdisciplinary approach to understanding the essence of biological patterns</p>	5					✓					

			in nature. The role of artificial intelligence (AI) in addressing the current problems of modern biology. Areas of application of artificial intelligence in biology, research methods, diagnostics and therapy, as well as the possibility of in-depth explanation of biological processes in general. Among them are genome research and sequencing; Proteomics and protein structure prediction; synthetic biology and genetic engineering; Ecology and biological diversity; environmental modeling; environmental monitoring:												
PD	EC	Modern Methods of Biological Researches	Purpose: to consider the main research methods of biological systems and their components and to form practical skills. Mastering modern methods of effective use of artificial intelligence in biological research. Content: planning and organization of scientific research. Means and methods of biological scientific research. Methods of anatomical and morphological, microscopic, cytological,	5						✓					

			cytogenetic, comparative, molecular study of biological objects, methods of flora and fauna research. Using artificial intelligence (AI) in biological research to efficiently and quickly carry out scientific processes; machine learning and data analysis; genomics and transcriptomics; proteomics and protein structure prediction; quantitative diagnostics and medical image processing; synthetic biology and genetic engineering; automated laboratory experiments, etc..												
	PD	EC	Cell Membrane	<p>Purpose: formation of knowledge about modern models of cell membrane structure and mechanisms of functional activity.</p> <p>Contents: modern models of the structure of membranes and membrane systems of cells of living organisms. Classification, evolution, functions of membranes. Biochemical features, patterns of metabolic processes in membranes. A layered model of the membrane. Liquid-mosaic structure. The function of cell membranes. Barrier, selective, passive and active metabolism. Matrix,</p>	6							✓			

			mechanical, receptor, energy functions of membranes. Surface receptors. Energy transfer systems in the membrane. Biopotentials. Enzymatic function, recognition function. Immune function. Intercellular relationships. Transmembrane glycoproteins. Histocompatibility Changing the state of the membranes.											
	PD	EC	Cell Biology	<p>Purpose: To provide the theoretical and practical foundations of scientific methods for analyzing the morpho-functional features of the cell as a structural unit of all living things.</p> <p>Contents: cell theory, Modern trends and prospects for the development of cell biology. Molecular biology of the cell, structural and functional organization and mechanisms of regulation of genome expression. Mechanisms of autoregulation and adaptation of cells. Proliferation and differentiation, integration of cells in various organisms, intercellular interactions. Features of the structure and physiology of stem cells, their role in the vital activity of the body. Light and electron microscopy. Cell culture, cytogenetic methods, isolation and investigation of intracellular</p>	6						✓			

			structures, PCR, ELISA, sequencing methods.												
PD	EC	Chronobiology	<p>Purpose: formation of knowledge about cyclic processes in biological systems of different levels of organization</p> <p>Contents: basic concepts of biological rhythms.</p> <p>Methods of chronobiology. The problem of biological time. Time series. Time series analysis. A person's sense of time in the historical aspect. Rhythmic structure of the habitat. The cyclical nature of the movement of celestial bodies. Diagram of the Solar system. Cosmic rhythms in the biosphere. Dynamics of the ozonosphere and variations of the surface ultraviolet radiation. The comparability of biological rhythms with the rhythms of the habitat. Adaptive role of circadian rhythms. Seasonal rhythms. Biological circadian clock. Regulators of circadian biological rhythms. Time sensors. Desynchronization.</p>	5							✓				
PD	EC	Basics of plant introduction and acclimatization	<p>Purpose: formation of the ability to use methods and techniques of introduction and acclimatization of plants in practical activities</p> <p>Content: Introduction and acclimatization. Naturalization of plants. Genetic bases of plant</p>	5									✓		

			introduction and acclimatization. Methods of preliminary selection of introducers. A method of comparative study of paleoareals and modern areas of introduced species. The phlorogenetic method of selecting Sobolevskaya introducents. The method of accounting for the experience of acclimatization of Aurorin. The method of studying introducents in the nature of Kucherov. Phenology. Phenophase and the stages of its manifestation. Phenological observations and their mathematical and graphical processing. Organization of introduction observations and assessment of the success of the introduction.											
PD	EC	Biogeocenology	<p>Purpose: formation of a complex of knowledge about the patterns of diverse relationships and interactions that determine the life and productivity of biogeocenoses.</p> <p>Contents: Analysis of the geocological features of plants and animals. Similarities of borders of large floristic and faunal zones in Kazakhstan. Problems of biogeocenology. Stages of development of modern biogeocenological research. Classification of biocenoses. Center of origin of cultivated</p>	5							✓			

			plants. Division of flora and fauna into zones, floristic and faunal regions or kingdoms. International programs on biological diversity.												
	PD	EC	Biometrics	Objective: to develop the ability to plan and process the results of quantitative experiments and observations by methods of mathematical statistics. Contents: Basic concepts of biometrics. Grouping of primary data. The main characteristics of varying objects. Application of mathematical and statistical methods in biology. The laws of distribution. Sampling method and estimation of general parameters. Analysis of variance. Correlation analysis. Regression analysis. Criteria for the reliability of estimates. Statistical hypotheses and their verification. Issues of research planning.	5								✓		
Module of scientific-research work and Final Certification			Research work of a master student, including passing an internship and completing a master's thesis	Independent scientific search and solution of specific scientific problems on the topic of the selected research. Analysis and use of modern theoretical, methodological, technological achievements of biological science. Familiarization with innovative technologies as part of the internship. The use of modern research methods. Conducting an assessment of the reliability of the	24										✓

			results obtained and critically comparing them with similar results of domestic and foreign works. Analysis of the results, conclusions and suggestions.												
		Execution and Defense of Master`s Thesis	Objective: assessment of the achieved learning outcomes and mastered competencies upon completion of the study of the educational program Content: preparation of the dissertation in accordance with the requirements for master's theses. Accounting for academic integrity requirements (plagiarism). Public defense with demonstration of formed knowledge, skills and competencies.	8											✓

5. Summary table reflecting the volume of disbursed loans by EP modules

Course of training	Semester	Amount of the mastered modules	Amount of the studied disciplines		Amount of KZ credits					Total in hours	Total credits KZ	Amount	
			University component	Optional component	Theoretical training	Physical education	Training practice	Production practice	Final attestation			Exam	Differentiated credit
1	1	3	5	2	29		-	1	-	900	30	6	2
	2	3	1	4	23	4	-	3	-	900	30	4	2
2	3	3		5	26		6	3	-	900	35	5	2
	4	1	-	-	-	-	-	17	8	900	25	-	1
total			6	11	78	4	6	24	8	3600	120	15	7

6. Strategies, teaching methods and artificial intelligence, monitoring and assessment

Learning strategies	<p>Student-centered learning: The student is the center of teaching/learning and an active participant in the learning and decision-making process.</p> <p>Practice-oriented training: orientation to the development of practical skills.</p>
Teaching methods	<p>Conducting lectures, seminars, various types of practices with:</p> <ul style="list-style-type: none"> • the use of innovative technologies; • problem-based learning; • case study; • work in a group and creative groups; • discussions and dialogues, intellectual games, olympiads, quizzes; • reflection methods, projects, benchmarking; • Bloom's taxonomies; • presentations; • * rational and creative use of information sources; • * multimedia training programs; • * electronic textbooks; • * digital resources.

	<ul style="list-style-type: none"> * machine learning methods <p>Organization of independent work of students, individual consultations.</p>
Monitoring and evaluation of the achievability of learning outcomes	<p>Current control on each topic of the discipline, control of knowledge in classroom and extracurricular classes (according to syllabus). Assessment forms:</p> <ul style="list-style-type: none"> • survey in the classroom; • testing on the topics of the discipline; • control works; • protection of independent work; • discussions; • trainings; • colloquiums; • abstract, etc . <p>Boundary control at least twice during one academic period within the framework of one academic discipline.</p> <p>Intermediate certification is carried out in accordance with the working curriculum, academic calendar.</p> <p>Forms of conducting:</p> <ul style="list-style-type: none"> • exam in the form of testing; • oral examination; • written exam; • combined exam; • project protection; • protection of practice reports. <p>Final state certification.</p>

7. Educational and resource support for EP

Information Resource Center	<p>The structure of the Educational Information Center includes 6 subscriptions, 16 reading rooms, 2 electronic resource centers (ERC). The basis of the network infrastructure of the Educational and Information Center is 180 computers with Internet access, 110 workstations, 6 interactive whiteboards, 2 video doubles, 1 video conferencing system, 3 A-4 format scanners, JIC software - AIBS "IRBIS-64" under MS Windows (basic set of 6 modules), stand-alone server for uninterrupted operation in the IRBIS system.</p> <p>The library fund is reflected in the electronic catalog available to users on the site http://lib.ukgu.kz on-line 24 hours 7 days a week.</p> <p>Thematic databases of their own generation: "Almamater", "Proceedings of SKSU scientists", "Electronic archive" have been created. Online access from any device 24/7 via the external link http://articles.ukgu.kz/ru/ppp.</p> <p>Catalogs are processed electronically. EC consists of 9 databases: "Books", "Articles", "Periodicals", "Proceedings of the teaching staff of SKSU", "Rare Books", "Electronic Fund", "SKGU in Print", "Readers" and "SKU".</p> <p>The EIC provides its users with 3 options for accessing its own electronic information resources: from the "Electronic Catalog" terminals in the catalog hall and in the EIC subdivisions; through the information network of the university for faculties and departments; remotely on the library website http://lib.ukgu.kz/.</p> <p>Open access to international and republican resources: "SpringerLink", "Polpred", "Web of Science", "EBSCO", "Epigraph", to electronic versions of scientific journals in the public domain, "Zan", "RMEB", "Adebiet", Digital library "Aknurpress", "Smart-kitar", "Kitar.kz", etc.</p> <p>For people with special needs and disabilities, the library website has been adapted to the work of visually impaired users</p>
Material and technical base	<p>The department has the following classrooms with a total area of 342 m²: The office of the head of the department, the Office of teachers –</p>

	Educational and laboratory classrooms botany, plant physiology, teaching methods biology, human anatomy, zoology and the office of undergraduates (building No. 7, Baitursynova str.). Greenhouse with a total area of 3 hundred 60 m ² Tauke khan No. 5
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APPROVAL SHEET
According to the Educational program 7M05110 - Biology

Director of DAA _____ Naukenova A.S.

Director of DASc _____ Nazarbek U.B.