

MINISTRY OF SCIENCES AND HIGHER EDUCATION OF THE REPUBLIC OF  
KAZAKHSTAN

M.O. AUEZOV SOUTH KAZAKHSTAN UNIVERSITY



Chairman of the board - Rector

Doctor of historical sciences

Academician Kozhamzharova D.P.

« \_\_\_\_\_ » \_\_\_\_\_ 2023

**Educational program**

**6B05120 – «Biotechnology»**

Registration Number	6B05100021
Code and Classification of Education	6B05 – «Natural sciences, mathematics and statistics»
Code and Classification of Areas of Training	6B051 – «Biological and related sciences»
Group of educational programs (EP)	B050 – «Biological and related sciences»
Type of EP	Acting EP
ISCE level	6
NQF level	6
IQF level	6
Language learning	Kazakh, Russian, English
The complexity of EP	240 credits
Distinctive features of EP	-
Partner University (JEP) -	-
University partner (DDEP) -	-

**Developers:**

Full Name	Position	Signature
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Isayeva A.U.	Doctor of Biological Sciences, Professor, Director of Research Institute «Ecology and Biology»	
Azhibekov B.A.	Director General of South-Western Research Institute of Animal Husbandry and Plant Growing, Candidate of Agricultural Sciences	
Isaev G.I.	Candidate of Technical Sciences, Associate Professor «International Kazakh-Turkish University named after H.A. Yasawi»	
Ergeshov E.	Director of LLP «Em-Nur»	
Tleukeeva A.	PhD student of group DHT-20-3ка	
Aripbayeva A.	Student of group HT-20-5к1	

The EP was reviewed at the meeting of the Academic Committee for the field of Natural Sciences",

Minutes № 4a « 10 » 02 2023

Chairman of the Committee  Madiyarov N. K.

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

Minutes № 4\* « 22 » 02 2023

Chairman of the EMM  Abisheva R.D.

The EP was approved by the decision of the Academic Council of the University

Minutes № 13 « 23 » 02 2023

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## 1. CONCEPT OF THE EDUCATIONAL PROGRAM

<b>University Mission</b>	Generation of new competencies, training of a leader who translates research and entrepreneurial thinking and culture
<b>University Values</b>	Openness – open to change, innovation and cooperation. Creativity – generates ideas, develops them and turns them into values. Academic freedom – free to choose, develop and act. Partnership – creates trust and support in a relationship where everyone wins. Social responsibility – ready to fulfill obligations, make decisions and be responsible for their results.
<b>Graduate Model</b>	Deep subject knowledge, their application and continuous expansion in professional activity. Information and digital literacy and mobility in rapidly changing conditions. Research skills, creativity and emotional intelligence. Entrepreneurship, independence and responsibility for their activities and well-being. Global and national citizenship, tolerance to cultures and languages.
<b>The uniqueness of the educational program</b>	Educational Program 6B05120 - «Biotechnology» is accredited by the Independent International Agency ASIIN (Germany), 2019. According to the Educational program 6B05120 – «Biotechnology», dual training is provided.
<b>Academic Integrity and Ethics Policy</b>	The University has taken measures to maintain academic integrity and academic freedom, protection from any kind of intolerance and discrimination: - Rules of academic integrity (Minutes of the Academic Council No 3 dated 30.10.2018); - Anti-Corruption Standard (Order No 373 n/k dated 27.12.2019). - Code of Ethics (Protocol of the Academic Council No. 8 dated 31.01.2020).
<b>Regulatory and legal framework for the development of EP</b>	1. Law of the Republic of Kazakhstan "On Education"; 2. Standard rules of activity of educational organizations implementing educational programs of higher and (or) postgraduate education, approved by Order of the Ministry of Education and Science of the Republic of Kazakhstan dated October 30, 2018 No 595 with amendments and additions dated December 29, 2021 No 614 3. State obligatory standards of higher and postgraduate education, approved by order of the Ministry of Education and Science of the Republic of Kazakhstan dated July 20.2022 No. 2; 4. Rules for organizing the educational process on 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; 5. Qualification directory of 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. 6. Guidelines for the use of ECTS. 7. Guidelines for the development of educational programs for higher and postgraduate education, Appendix 1 to the order of the Director of the Center for the Bologna Process and Academic Mobility No 45 o / d dated June 30, 2021
<b>Organization of the</b>	Implementation of the principles of the Bologna Process

<b>educational process</b>	<p>Student-centered learning</p> <p>Availability</p> <p>Inclusivity</p>
<b>Quality assurance of the Educational program</b>	<p>Internal quality assurance system</p> <p>Involvement of stakeholders in the development of the Educational Program and its evaluation</p> <p>Systematic monitoring</p> <p>Actualization of the content (updating)</p>
<b>Requirements for applicants</b>	<p>It is established according to the Model Rules for admission to training in educational organizations, implementing educational programs of higher and postgraduate education, Order of the Ministry of Education and Science of the Republic of Kazakhstan No. 600 dated 31.10.2018</p>
<b>Conditions for the implementation of the EP for persons with disabilities and SEN</b>	<p>Tactile tiles with PVC, specially equipped toilets, a mnemonic diagram, and shower bars have been installed in educational buildings and student dormitories for students with SEN and PD. Created special places for parking lots. Crawler lift installed. There are desks for PLM, signs indicating the direction of movement, ramps. In the educational buildings (<i>main building, building No. 8</i>) there are 2 rooms with six working places adapted for users with disorders of the musculoskeletal system (MSS). For visually impaired users, the SARA<sup>TM</sup> 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 the Web site service EIC <a href="http://lib.ukgu.kz/">http://lib.ukgu.kz/</a> operating 24/7.</p> <p>An individual differentiated approach is provided for all types of classes and in the organization of the educational process.</p>

## 2. PASSPORT OF THE EDUCATIONAL PROGRAM

<b>Purpose of the EP</b>	To provide comprehensive and high - quality training of qualified, competitive specialists in the field of biotechnology of pharmaceutical industries on the basis of broad fundamental training, including the development of students' personal qualities and the formation of general cultural universal and professional competencies.
<b>Tasks of the EP</b>	<ul style="list-style-type: none"> <li>- formation of socially responsible behavior in society, understanding the importance of professional ethical standards and following these standards;</li> <li>- providing basic bachelor's degree training that allows them to continue their lifelong learning, successfully adapt to changing conditions throughout their professional career;</li> <li>- providing conditions for the acquisition of a high general intellectual level of development, mastering competent and developed speech, culture of thinking and skills of scientific organization of work in the field of pharmaceutical production technology and biotechnology;</li> <li>- creating conditions for intellectual, physical, spiritual, and aesthetic development to ensure that they can be employed in the OP or continue their studies at subsequent levels of study.</li> </ul>
<b>Harmonization of EP</b>	<ul style="list-style-type: none"> <li>- 6th level of the National Qualification Framework of the Republic of Kazakhstan;</li> <li>- Dublin Descriptors of the 6th qualification level;</li> <li>- 1st cycle of the European Higher Education Space Qualification Framework (A Framework for Qualification of the European Higher Education Area);</li> <li>- Level 6 of the European qualification framework for Lifelong Learning (The European Qualification Framework for Life long Learning).</li> </ul>
<b>Connection of the EP with the professional sphere</b>	<p>Professional standard: «Breeding activities in Animal Husbandry (breeding)». Appendix No 25 to the order of the deputy chairman of the Board of the National Chamber of entrepreneurs of the Republic of Kazakhstan «Atameken» dated 26.10.2022, No 190.</p> <p>Professional standard «Yeast production». Appendix No 44 to the order of the deputy chairman of the Board of the National Chamber of entrepreneurs of the Republic of Kazakhstan «Atameken» dated 26.12.2019, No 263.</p> <p>Professional standard: «Cheese production». Appendix No. 30 to the order of the deputy chairman of the Board of the National Chamber of entrepreneurs of the Republic of Kazakhstan «Atameken» dated 26.12.2019 No 263.</p>
<b>Name of the degree awarded</b>	After the successful completion of this EP, The Graduate is awarded a bachelor's degree in natural sciences under the EP 6B05120 – «Biotechnology».
<b>List of qualifications and positions</b>	<p>Bachelors under EP 6B05120 - «Biotechnology» can hold the main positions of specialists and other employees in the field of Biotechnology, approved by order of the minister of Labor and social protection of the Republic of Kazakhstan dated December 30, 2020 No 553:</p> <ul style="list-style-type: none"> <li>- specialist (laboratory assistant) in research institutes and universities</li> <li>- research engineer (general profile)</li> <li>- chief microbiologist</li> <li>- biotechnology specialist</li> <li>- researcher of the research institute</li> <li>- laboratory assistant in the production of the research institute</li> <li>- employee of biotechnological research and design organizations</li> <li>- specialist of microbiological, pharmaceutical, food, ecological industry and agro-industrial complex enterprises</li> </ul>
<b>Field of professional</b>	- biological and related sciences

<b>activity</b>	<ul style="list-style-type: none"> <li>- biotechnological industry</li> <li>- Research Institutes of Biological, Environmental, pharmaceutical and agricultural profile</li> <li>- industrial enterprises and laboratories of the Food, Microbiology, Pharmaceutical Industries;</li> <li>- enterprises of the agricultural and industrial complex</li> </ul>
<b>Objects of professional activity</b>	<ul style="list-style-type: none"> <li>- microorganisms, cell cultures of animals and plants, viruses, enzymes, biologically active substances;</li> <li>- devices and equipment for the study of the properties of used microorganisms, cell cultures obtained in laboratory and industrial conditions;</li> <li>- installations and equipment for biotechnological processes;</li> <li>- food biotechnologies;</li> <li>- means of quality control of raw materials, semi-finished products and finished products;</li> <li>- means of assessing the state of the environment and protecting it from the influence of industrial production.</li> </ul>
<b>Subjects of professional activity</b>	<p>The subjects of professional activity of the bachelor in EP 6B05120 «Biotechnology» are: research institutes and universities of biotechnological, biological, ecological, pharmaceutical and agricultural profile; production enterprises and laboratories of the food and processing, microbiological, pharmaceutical industries; agricultural enterprises; botanical gardens and zoological parks; plant protection stations; breeding stations; environmental services and organizations; laboratories for quality and safety control of agricultural and food products.</p>
<b>Types of professional activity</b>	<p>Bachelors in EP 6B05120 «Biotechnology» can perform the following types of professional activities:</p> <ul style="list-style-type: none"> <li>- implementation of the production of biotechnological products, quality control of biotechnological products, creation of the necessary conditions for the cultivation and biological realization of biotechnological objects;</li> <li>- organization of individual stages of biotechnological production in the field of agricultural biotechnology;</li> <li>- production and technological activities: analysis of the main ingredients of food products; determination of the components of raw materials and finished products; development and implementation of new technological processes;</li> <li>- selection: study of the source material for the selection of microorganisms, plants and animals; study of environmental factors on the genotype of microorganisms, plants and animals in order to achieve their maximum productivity; study of the features of the selection of microorganisms, plants, animals, domestication of species; study of the world gene pool of plants and animals for selection; intensification and improvement of the efficiency of the selection process through the introduction of biotechnological methods.</li> <li>- experimental research: experimental study of the properties and life processes of biological objects; research of biotechnological processes; design of biotechnological devices and equipment; modification of genotypes of biological objects with economically valuable characteristics.</li> </ul>
<b>Learning outcomes</b>	<p><b>LO1</b> Comply with academic integrity, ethical principles and laws of the Republic of Kazakhstan, showing communication skills in Kazakh, Russian and English.</p> <p><b>LO2</b> Demonstrate natural science, mathematical, social, socio-cultural, professional development based on the formation of worldview, civil, spiritual and social responsibility, methods of scientific, theoretical and experimental research.</p> <p><b>LO3</b> Use network computer technologies, databases, software packages based</p>

	<p>on business application software, observing the basic requirements of information security.</p> <p><b>LO4</b> Use biotechnological studies of the synthesis of products based on cells, plants and animals.</p> <p><b>LO5</b> Conduct laboratory analyzes and experiments using physicochemical and technological approaches to assess the compliance of biological objects, raw materials, mixed substances and finished products with the specifics of biotechnological production</p> <p><b>LO6</b> Conduct pilot, industrial and field tests in order to develop technologies for using biological objects to obtain new biotechnological products</p> <p><b>LO7</b> Use adequate research methods in the field of biotechnology necessary for the production of enzymes, viruses, microorganisms, animal and plant cell cultures, their biosynthesis and biotransformation</p> <p><b>LO8</b> Ensure environmental and biological safety, supporting the protection of the environment</p> <p><b>LO9</b> Participate in solving scientific and practical problems in the field of biomedicine and bionanotechnology using biotechnological methods for obtaining drugs, functional foods, biologically active substances</p> <p><b>LO10</b> Conduct standard and certification tests of finished products and technological processes in their professional areas</p> <p><b>LO11</b> Express in writing or orally their ideas and fundamental professional knowledge in various fields and fields of human activity</p> <p><b>LO12</b> Use research, entrepreneurial and uncertainty skills, working individually and in a team</p>
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### 3. COMPETENCES OF THE GRADUATE OF EP

<b>SOFT SKILLS.</b> Behavioral skills and personality qualities	
SS 1. Competence in managing one's own literacy	<p>SS1.1. The ability of self - learn, self – develop and constantly update their knowledge within the chosen trajectory and in an interdisciplinary environment.</p> <p>SS1.2. The ability to express thoughts, feelings, facts and opinions in the professional field.</p> <p>SS1.3. The ability for mobility in the modern world and critical thinking.</p>
SS 2. Language competence	<p>SS2.1. The ability to build communication programs in the state, Russian and foreign languages.</p> <p>SS2.2. The ability for interpersonal social and professional communication in the conditions of intercultural communication.</p>
SS 3. Mathematical Competence and Competence in the field of Science	<p>SS3.1. 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.</p>
SS 4. Digital competence, technological literacy	<p>SS4.1. 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.</p> <p>SS4.2. The ability to use various types of information and communication technologies: Internet resources, cloud and mobile services for searching, storing, protecting and disseminating information.</p>
SS 5. Personal, social and academic competencies	<p>SS5.1. 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.</p> <p>SS5.2. The ability to social and cultural development based on the manifestation of citizenship and morality.</p> <p>SS5.3. The ability to build a personal educational trajectory throughout life for self-development, career growth and professional success.</p> <p>SS5.4. The ability to successfully interact in a variety of socio-cultural contexts during study, work, home and leisure.</p>
SS 6. Entrepreneurial competence	<p>SS6.1. The ability to be creative and entrepreneurial in a variety of environments.</p> <p>SS6.2. The ability to work in a mode of uncertainty and rapidly changing task conditions, make decisions, allocate resources and manage your time.</p> <p>SS6.3. The ability to work with consumer requests.</p>
SS 7. Cultural awareness and ability to express yourself	<p>SS7.1. The ability to show world view, civil and moral positions.</p> <p>SS7.2. The ability to be tolerant of the traditions and culture of other peoples of the world, to have high spiritual qualities.</p>
<b>PROFESSIONAL COMPETENCES (HARD SKILLS).</b>	
Theoretical knowledge and practical skills specific to this area	<p>PC-1 - The ability to carry out activities under the guidance of a certain degree of independence, to show individual responsibility for the performance of various tasks.</p>
	<p>PC-2 - The ability to define professional - level tasks and plan activities based on the set goal. The ability to independently solve standard and non-standard tasks, taking into account the choice of solutions based on knowledge and practical experience.</p>
	<p>PC-3 - The ability to apply innovative technologies and new biological objects in biotechnology. The ability to independently develop and put forward various, including alternative versions of technologies using</p>

	theoretical and practical knowledge.
	PC-4 – The ability to apply monitoring methods, analyze situations in the field of agricultural biotechnology, demonstrate creativity and initiative in management processes, including training others to improve teamwork, The ability to identify dangerous and harmful factors and ensure the safety of biotechnological production.

### 3.1 MATRIX OF CORRELATION OF EP LEARNING OUTCOMES IN GENERAL WITH MODULES FORMED BY COMPETENCIES

	R1	R2	R3	R4	R5	R6	R7	R8	R9	R10	R11	R12
SS 1	+									+	+	
SS 2		+	+							+	+	
SS 3	+	+									+	+
SS 4	+				+						+	+
SS 5	+											
SS 6	+											
SS 7										+		
PC1				+	+	+	+	+	+			+
PC2			+		+	+	+	+	+		+	
PC3		+	+		+	+	+	+	+			+
PC4					+		+	+				





					institutions.													
4		GED	OC	Cultural studies and Psychology	<p>Purpose: the formation of scientific knowledge of history, modern trends, current problems and methods for the development of culture and psychology, the skills of a systematic analysis of psychological phenomena.</p> <p>Contents: Morphology, language, semiotics, anatomy of culture. Culture of nomads, proto-Turks, Turks. Medieval culture of Central Asia. Kazakh culture at the turn of the XVIII - XIX centuries, XX century. Cultural policy of Kazakhstan. State Program "Cultural Heritage". National consciousness, motivation. Emotions, intellect. The will of man, the psychology of self-regulation. Individual typological features. Values, interests, norms are the spiritual basis. The meaning of life, professional self-determination, health. Communication of the individual and groups. Socio-psychological conflict. Models of behavior in conflict.</p>	4	v	v										
5	Socio-ethnic Development	GED	HsC	Ecosystem and Law	<p>Purpose: Formation of integrated knowledge in the field of economics, law, anti-corruption culture, ecology and life safety, entrepreneurship, scientific research methods.</p> <p>Content: Fundamentals of safe human-nature interaction, ecosystem and biosphere productivity. The entrepreneurial activity of society in conditions of limited resources, increasing the competitiveness of business and the national economy. Regulation of relations in the field of ecology and human life safety. Knowledge and compliance of</p>	5		v			v							





















22	Biotechnology of industrial Complex	BD	EC	Microbiology and Virology	<p>Purpose - explanation of the conceptual foundations of general microbiology and virology.</p> <p>Contents: Taxonomic categories. View. Strain. Clone. Methods and the most promising features used in the classification of prokaryotes. Morphophysiological features. Ecology of microorganisms. Morphology and structure of viruses. Virion form. Chemical composition and structure of the virion. Simple and complex viruses. Viruses with spiral and isometric capsids. Features of biological oxidation. Accumulation of energy by a bacterial cell. The ratio of microorganisms to oxygen. Microbiological - experimental assessment of the sanitary condition of dairy products and milk. Microbiology of sausages, canned food and semi-finished products and isolation of a pure culture of microorganisms.</p>	5				v	v							v
23			BD	EC	Sanitation and Hygiene of Biotechnological Industries	<p>The goal is to form knowledge about the methods of hygienic and sanitary control of biotechnological production and the role of nutrition in the life of the human body.</p> <p>Contents: Hygienic and sanitary condition and methods of its control at food industry enterprises. Importance of sanitation and hygiene; environmental and personal hygiene requirements. The importance of sanitary protection of food stocks and ways to ensure food safety. Determination of the sanitary and hygienic state of food production. Organization of sanitary and hygienic protection of production facilities and the environment.</p>				v	v							

24		BD	EC	Laboratory Work	The goal is to form knowledge about modern methodological laboratory practices and the stages of work on biotechnology in the conditions of an educational laboratory. Contents: Laboratory glassware for general use; preparation of laboratory glassware; methods of drying and physico - chemical cleaning of laboratory glassware; Laboratory equipment for use; absorption media and bacteriological paints; technologies for the manufacture of bacteriological absorbent media; chemical reagents; the procedure and technology for preparing mixtures; application and disinfection of disinfectants; laboratory facilities; diseases of laboratory objects. laparotomy method.	5				v							v	v	
25		BD	EC	Technique of cool	The goal is to prepare for production and technical activities in the field of the use of refrigeration equipment in catering establishments, methods of its application and combination with the main technological equipment. Contents: Cooling in the food industry and the development of technology. Fundamentals of artificial cooling. Thermodynamic basic laws. Carnot cycle. Classification of cooling equipment. Vapor compression, absorption cooling and jet cooler equipment. Heat in cooling technology, exchange types. Similarity theory. The use of cooling technology in the biotechnological food industry.					v							v	v	
26		BD	EC	Basics of	Purpose - to acquaint with the technological					v	v								v



				<p>Biotechnology</p> <p>foundations of bioproduction, methods for obtaining a raw substance, the stages of cultivating biological objects and their isolation, purification and stabilization of the final product.</p> <p>Contents: The current state and prospects for the development of biotechnology. Stages of the biotechnological process and the basis for the implementation of the biotechnological process. Technical and economic efficiency of the raw material, manufacturability of the final product, aseptic conditions and scalability of microorganisms of the production strain. Typical approaches and features of the cultivation of microorganisms, animal and plant cells. Methods for ensuring aseptic conditions. Fermentation (purification of biological objects).</p>	4													
27		BD	EC	<p>Fundamentals of Academic Writing</p> <p>Purpose - the formation professional and communicative competencies associated with analytical textual activity in students of the skills of linguistic and pragmatic thinking, the ability to analyze the expressive units of the language.</p> <p>Contents: An introduction to academic writing. Academic writing as a procedural design of the process of scientific communication. The concept of academic text. Functions of academic texts: descriptive, persuasive, constructive. Types of academic texts. Sociocultural features of</p>					v	v								v

					writing academic texts in the English and Russian traditions. Specifics of writing texts in social and humanitarian disciplines. Requirements for academic texts and language.													
28		BD	HsC	Educational Practice	The practice is designed to consolidate and deepen the theoretical knowledge gained at the university and to acquire practical skills in the conditions of the current production. During the training practice, attention is paid to the issues of familiarization with the content of the educational program; the profile of enterprises engaged in advanced technologies and new biotechnologies in the form of excursions by an advanced academic group, with the content of research work carried out in scientific institutions, at the department, with provisions on labor protection and labor protection in the fields. As a result, students acquire skills in the development of new bioproducts, methods for its production, options for practical implementation.	1								v				v
29	Module of Integrated Biosciences	BD	EC	Plant Biotechnology	Purpose - to form knowledge about the biology of the plant cell and the main directions of its current state in biotechnology. Contents: Biotechnology of plant cells. Cultivation of individual cells. Totipotency. Plant cell as an object of biotechnology. Callus. The main directions of plant cell engineering. suspension cultures. Morphogenesis in callus tissues. Clonal micropropagation, types, activation of existing meristems, induction of new buds or embryos. Obtaining somatic hybrids by	5				v		v						v







					organizations and production and support services (departments); familiarization with the services of the central and small laboratories; formation of professional practical skills and characteristics necessary for future professional activity.														
36		BD	EC	Animal Biotechnology	<p>Purpose - to obtain theoretical knowledge on general issues of animal biotechnology, practical skills in embryo transplantation and embryo engineering research in animal husbandry.</p> <p>Contents: The main objects of animal biotechnology. Maintenance and reproduction of animals in laboratory conditions. The use of cell cultures as model systems for the purposes of scientific and practical animal biotechnology. Methods and structures used in animal biotechnology. bioethical questions. Biotechnology research control and patented biotechnological invention. Solutions of theoretical, applied problems of animal biotechnology.</p>	5					v			v					v
37		BD	EC	Transgenic Animals, Plants and Methods of their Production	<p>Purpose - to form knowledge about the basic principles of obtaining recombinant DNA at the stage of genetic engineering work, as well as the scientific and legal foundations for ensuring biosafety when using transgenic plants and animals.</p> <p>Contents: principles of construction of recombinant organisms. Expression and cleavage of target proteins. Transgenic plants-sweat and animals. Commercialization and biosafety of transgenic plants. Genetically modified products of transgenic plants and animals. The use of plant biotechnology in</p>							v		v					v

					agriculture, breeding and crop production. Use of animal biotechnology in agriculture, breeding and breeding													
38		BD	EC	Technology of production of biologically active additives	<p>Purpose - to master the current state of knowledge about the technology of production of biologically active additives and biologically active substances.</p> <p>Contents: Stages of production development, classification and structure of antibiotics. Biotechnological methods for obtaining antibiotics. Removal and purification of antibiotics. Obtaining antibiotics using biosynthesis. Obtaining antibiotics using genetic engineering. Preparation of antibiotics using immobilization enzymes. Growing conditions for antibiotics. Selection and purification of antibiotics. Conditions for the production of antibiotics. receiving penicillin. receiving streptomycin. receiving gentamicin. Antibiotic control.</p>	7				v				v			v	
39		BD	EC	Economic and environmental aspects of Food Additives use	<p>Purpose - to instill skills in solving complex problems related to the development and implementation of modern technologies for obtaining food products with increased safety.</p> <p>Content: In accordance with modern achievements in the economic and environmental aspects of the use of food additives and the main microferans (food and biologically active additives), their classification, composition, nutrition. Toxicology and fulfillment of biological requirements. Substances that determine the taste and aroma of foods. Sweet substances (sugar substitutes and sweeteners).</p>					v				v			v	

40	Fundamentals of Applied Sciences	BD	EC	Management in Integrated Plant Protection	Purpose - to form knowledge about the population of especially dangerous pests and harmful organisms in modern plant protection in the context of the management of the integration of all available methods. Contents: management methods in integrated plant protection. Ensuring high economic efficiency. Maximum use of natural regulatory factors. Prevention of the risk of environmental pollution by pesticides. Obtaining environmentally friendly plant products. Plant protection as a system of evidence-based measures General technology of crop cultivation.	6									v	v	v		
41		BD	EC	Organization of Phytosanitary Technologies use	Purpose - the formation of theoretical and practical skills and abilities to apply the integrated protection of field crops from pests, diseases and weeds. Content: agrotechnical and organizational - economic methods of pest and disease control. Breeding and seed production. The value of resistant varieties in epiphytotic and invasive. The role of seed production in obtaining healthy seeds and planting material. Biological method in the system of complex plant protection. Genetic method. Application area. Development prospects. Physico - mechanical method. State, role in complex plant protection. Chemical method in the system of complex plant protection.										v	v	v		
42		PD	EC	Environmental Biotechnology	Purpose - to master the basics of environmental biotechnology with scientific knowledge for the development of environmental engineering in production. Contents: Development of ecological biotechnology. During the biodegradation of	7										v			v



					organic substances in the environment the role of microorganisms. Agriculture, industrial waste and stagnation biological water treatment by aerobic and anaerobic methods. Technological bioenergy. Non-traditional energy sources. Production of carbohydrates, biogas and ethanol. Modification of photosynthesis processes. Radionuclides and contaminated heavy metals by biotechnological methods cleaning. The future of environmental biotechnology.															
43		PD	EC	Biodegradation and stability of pollutants, xenobiotics	<p>Purpose - to form knowledge about the anthropogenic impact on the environment, the self-organization of nature, the accumulation and change of pollutants, xenobiotics.</p> <p>Contents: Degradation and restoration of pollutants and contaminated lands. The degree of impact of pollutants on the environment. Formation of hazardous pollutants, their disposal and preventive measures. Bioavailability of xenobiotics. Stages of interaction of xenobiotics with a microbial cell. Biochemical pathways of microbiological transformation of xenobiotics. Genetic determinants of xenobiotic degradation in microorganisms of different taxonomic groups. Principles of selection and genetic engineering design of microorganisms-destructors of xenobiotics.</p>									v				v	v	
44		PD	EC	Techniques for experimentation and processing of results,	<p>Purpose - to form basic knowledge about the technique of the experiment and the processing of the data obtained, as well as about the methods and means of protecting intellectual property.</p>	6								v					v	v

				patenting	Contents: The history of the emergence of patent law. General provisions on the protection of the results of intellectual activity. Development of a methodology and scheme for conducting practice. The structure of scientific research. Types of scientific research. Selection and Justification of the research topic. The order of the study and the plan of the experiment. Statistical, graphical and mathematical analysis. Metrology, standardization, concept of certification. Theory of errors and processing of experimental results. Biotechnological genetic methods used in experiments.														
45		PD	EC	Fundamentals of Scientific Research and Patenting	<p>Purpose - to form knowledge about the peculiarities of the methodology for conducting scientific research, the legal protection of industrial property objects and the organization of research work.</p> <p>Contents: The concept of intellectual property, copyright and industrial property law (patent law). The subject of patent law. The place of patent law in the general system of law. The main directions and choice of scientific research in biotechnology. Requirements for experiments. Characterization and presentation of the results of observations. Experimental studies and their features. Methodical methods of setting up experiments. Basic principles of research methodology. Analysis of the research results. Generalization and familiarization with the methods of preparing proposals for industries.</p>						v							v	v

46		PD	EC	Agricultural Biotechnology	<p>Purpose - to form knowledge about modern post-genomic and biotechnological methods for the molecular cultivation of new varieties of agricultural plants and animals.</p> <p>Discipline content: Properties of enzymes of microorganisms used for biotechnological processing of agricultural products. The role of microorganism enzymes in the biotransformation of substances in nature. Enzymatic activity of microorganisms that destroy cellulose and destroy pectin. Biotransformation by micro-organisms of compounds of carbon, nitrogen, phosphorus, iron, sulfur in natural conditions. The possibility of using these processes in the biotechnological processing of agricultural waste. Interspecific embryo transfers and obtaining chimeric animals.</p>	7						v	v				v		
47		PD	EC	Assessment of Quality and Safety of Agricultural Products	<p>Purpose - to develop skills in the methodology of sampling and sample preparation for various raw materials and finished products and to analyze the main criteria for assessing food security.</p> <p>Contents: Assortment and consumer properties of agricultural products, goods. Factors that form and preserve the quality of agricultural products. Troubleshooting. Identification of dangerous, low-quality and counterfeit products. Methods for determining, assessing the quality and safety of goods to minimize and prevent product losses. Improving the quality and safety of food products through the use of customer-oriented design methodology. Modern approaches to food safety management.</p>						v	v				v			

48		PD	EC	Food Biotechnology	<p>Purpose - to form knowledge about the basics of modern biotechnological research in the field of food production.</p> <p>Contents: Methods of modern biotechnology. Practical achievements and problems of biotechnology in the Republic of Kazakhstan and the world, modern style. Modern issues of biotechnological science in the agro-industrial complex in the food and production sector. Tools and processes in biotechnological production. Genetic cell engineering. Biotechnology of alcoholic, semi-alcoholic and non-alcoholic drinks. Acquisition of new food products for a rational and balanced diet. Automated biotechnological systems for controlled cultivation of microorganisms</p>	7					v				v			v
48		PD	EC	Biological and Food Safety	<p>Purpose - to form knowledge about the methods for monitoring the hygienic characteristics of raw materials and the main components of products, food raw materials and food safety indicators.</p> <p>Contents: Basic principles of the formation and management of food quality. Food safety and the main parameters of its assessment. European HACCP Hazard Analysis System for Critical Control Points. Hygienic requirements for food products. Microbiological indicators of food safety. Requirements for the safety of meat and meat products. The role of milk and dairy products in food poisoning.</p>						v				v			v
49		PD	EC	Biotechnology of Microorganisms	<p>The goal is to form modern ideas about the principles and features of microbiological processes used in biotechnology.</p> <p>Contents: Development of biotechnology of</p>	4					v			v				v

					microorganisms. Equipment and criteria for evaluating biotechnological processes. Biotechnological production of microbial metabolites. Biotechnological production of enzyme preparations. Biotechnological production of microbial biomass. Biotechnology of microorganisms and biosafety. Modern methods of biotechnology of microorganisms. Modern industrial use of biological agents														
50		PD	EC	Industrial Microorganisms	<p>Purpose - to master the theoretical and practical skills of isolating and cultivating industrial microorganisms for use in biotechnology.</p> <p>Contents: Introduction to the discipline "Industrial microorganisms". Obtaining biologically active substances and individual components of a microbial cell. Use of fermentation and other metabolic processes. Use of fermentation and other metabolic processes. Preparation of the medium for culturing the inoculum and the antibiotic producer. Alkaloids. Microbial chemistry process. properties of methanating bacteria. Industrial microbiological processes. Obtaining metabolic products of microorganisms. Obtaining enzymes of microbial origin.</p>				v			v							v
51		BD	EC	Cell Biotechnology	<p>Purpose - to form a complex of basic knowledge on cell and genetic engineering, the main methods and techniques for isolating food and feed preparations.</p> <p>Contents: Plant and animal cell as an object of biotechnology. Cultivation of eukaryotic cells in vitro. Technology for obtaining and growing animal cell lines. primary culture.</p>	5			v			v							v



54	Digital Biotechnology	PD	EC	Bioinformatics	<p>Purpose - to develop practical skills necessary for solving problems using statistical methods in bioengineering to apply methods for processing, visualizing and analyzing qualitative and quantitative data in the R language.</p> <p>Contents: Introduction to bioinformatics and information biology. Methods of interpretation of biological data. Methods of data and text information analysis in biology. Methods for analysis of gene expression. Algorithms of molecular evolution. Computer modeling of the interaction of biological molecules. Modern programming language R - in the international academic environment.</p>	7					v			v			v
55		PD	EC	Modelling and Scaling in Biotechnology	<p>Purpose - to master the concept of biotechnological production, the basics of modeling its main processes and devices, as well as the methodology of engineering calculations.</p> <p>Topic content: Modeling and scaling of biotechnological processes and schemes. Kinetic regularities of the main processes. Physical and mathematical modeling of biotechnological processes. Hydromechanical and thermal processes. mass transfer processes. Equipment for biochemical processes. Modeling the kinetics of microorganism growth in continuous bioreactors. Scaling of biotechnological processes. Conclusion of the "formula" of the biomass of microorganisms. Stoichiometry in biotechnology processes. Calculation of heat released in a biochemical process</p>						v		v				v

56		BD	EC	Biophysics	<p>Purpose: formation of ideas about the main phenomena, concepts, laws and methods of biophysics, skills of the simplest practical calculations, as well as experimental work in the laboratory.</p> <p>Contents: basic principles of biophysics of cells and whole organisms, basic physical laws underlying biological laws and phenomena, first and second laws of thermodynamics, Hess's law, Prigogine and E. Bauer, mechanisms of bioelectrical and photobiological processes, fundamentals of radiobiology and mechanisms of radiation damage, mechanisms of biological rhythms, basic biophysical research methods</p>	5					v		v						v
57		BD	EC	Medical biophysics	<p>Purpose - to master knowledge about physical processes and phenomena in biological systems in health and disease.</p> <p>Contents: Introduction to medical biophysics. The study of the physical and physico-chemical foundations of normal and pathological processes, the development of new methods of treating diseases; determination of physical and physico-chemical indicators that can be used for objective diagnosis of the functional state of the body and methods for studying the development of pathological processes and mechanisms of physical factors (ionizing rays, light, ultrasound, etc.) on the body. Achievements of medical biophysics.</p>						v		v						v
58		BD	EC	Molecular Biology	<p>Purpose - to form knowledge about the structural features and properties of macromolecules in the composition of a living cell, the structural and functional organization of the genetic apparatus of the</p>	5					v		v						v



					<p>cell, and the implementation of genetic information.</p> <p>Course content: Introduction to molecular biology. The main stages of development and achievements of molecular biology. The structure of nucleic acids. Objects of research in molecular biology.</p> <p>Molecular biology of the gene.</p> <p>Classification of genes. DNA-binding loci. Implementation of inheritance information. General principles and directions. DNA replication. Unidirectional replication. Bilateral replication. Comparison of DNA polymerase. Comparison of DNA polymerase in prokaryotes and eukaryotes. DNA replication in prokaryotes and eukaryotes. replication termination.</p>													
59		BD	EC	Analytical methods in biochemistry	<p>Purpose - to master the methods for determining the chemical composition of macromolecules and their structure, the study of the composition of substances using analytical methods is carried out through chemical analysis.</p> <p>Contents: Quantitative, semi-quantitative and qualitative types of assessment of biochemical analysis. For qualitative assessment or semi-quantitative determination of various substances in biological fluids (proteins, carbohydrates, ketone bodies, bile pigments, etc.). Methods for studying the chemical components of biological fluids, cells and tissues, as well as the processes of transformation of substances and energy present in the human body under normal and pathological conditions.</p>						v		v					v

60		PD	EC	Bionanotechnology	<p>Purpose - the formation of theoretical and practical knowledge on the analysis of general and molecular genetic processes and phenomena in microorganisms, plants and animals, as well as their significance in the modern biotechnological process.</p> <p>Contents: Bionanotechnology as a field of science at the intersection of biology and nanotechnology. Use of a wide range of technological methods - nanotechnological devices and nanomaterials in biotechnology. The use of biological molecules for nanotechnological purposes. Nanobiophysics of biomolecules. Folding of proteins. Use of spatial symmetry in the formation of macromolecular structures. Examples of the implementation of molecular recognition in the formation of the structure of biological objects. Using the structural flexibility of biomolecules.</p>	7					v			v				v
61		PD	EC	Structural principles of bionanotechnology	<p>Purpose - the formation of knowledge about the implementation of the principles of self-assembly of biological objects.</p> <p>Contents: Structural principles of bionanotechnology. Structural features of non-covalent interactions in biomolecules and the role of the hydrophobic effect in the formation of their structure. The principle of formation of stable structures as a result of protein folding. Hierarchical principle of protein folding. The combination of positive and negative skills is the formation of stable globular structures of biomolecules. Biological nanostructures as matrices for the synthesis of nanomaterials. The principle of protecting biomolecules from nonspecific</p>						v			v				v

					aggregation. The principle of local strengthening of biostructures and the principles of controlled destruction of the structure of bionanomachines. Scaling up biotechnological processes															
62		PD	EC	Genetic Engineering	<p>Purpose - to form knowledge about methods for obtaining cells capable of producing the necessary substances on an industrial scale, capable of high growth and productivity.</p> <p>Contents: Research methods of genetic engineering. Fundamentals of genetic engineering. Methods of working with DNA. Vectors in genetic engineering. Embryocultural biotechnological research in animal husbandry. Laboratory animals as objects of research. Culture medium used to evaluate and select gametes and embryos. Embryoengineering research in animal husbandry. Theoretical foundations of animal embryo transplantation. Advances in the search for microorganisms that can increase the efficiency of each stage of biotechnology and provide the necessary products</p>	7						v				v			v	
63		PD	EC	Synthetic biology	<p>Purpose - the formation of a new scientific concept of the direction in biology, which deals with the design and creation of biological systems with desired properties and functions, including those that have no analogues in nature.</p> <p>Content: Design and build biological modules, biological systems and biological machines, or reconstruct existing biological systems for useful purposes. Future opportunities for algae biofuels, bacterial electricity, synthetic vaccines,</p>							v				v			v	





**5. SUMMARY TABLE REFLECTING THE VOLUME ASSIMILATE OF EDUCATION PROGRAM MODULES**

Course of study	Semester	Number of modules to be mastered	Number of subjects studied			Number of credits KZ					Total in hours	Total credits KZ	Quantity	
			OC	HsC	EC	Theoretical training	Physical culture	Educational practice	Production practice	Final attestation			exams	def. credit
1	1	4	5	2	-	28	2	-	-		900	30	6	1
	2	4	4	1	2	26	2	2	-		900	30	5	2
2	3	6	3	2	3	28	2	-			900	30	6	2
	4	5	1	1	4	25	2	-	3		900	30	5	2
3	5	6	-	-	6	30	-	-	-		900	30	6	-
	6	4	-	-	2	22	-	-	8		900	30	2	2
4	7	3	-	-	4	20	-	-	-		600	20	4	-
	8	2	-	-	4	20	-	-	-		600	20	4	-
	9					-	-	-	8	12	600	20	-	1
Total		34	13	6	25	199	8	2	19	12	7200	240	37	11

## 6. STRATEGIES AND METHODS OF TRAINING, MONITORING AND EVALUATION

<b>Learning Strategies</b>	<p><b>Student - centered learning:</b> the learner is the center of teaching/learning and an active participant in the learning and decision - making process.</p> <p><b>Practice-oriented learning:</b> focus on the development of practical skills.</p>
<b>Teaching methods</b>	<p>Conducting lectures, seminars, laboratory and practical classes with: application of innovative technologies:</p> <ul style="list-style-type: none"> <li>– problem learning;</li> <li>– round table;</li> <li>– group work and creative groups;</li> <li>– discussions and dialogues;</li> <li>– presentations;</li> <li>– rational and creative use of information sources:</li> <li>– multimedia educational programs;</li> <li>– electronic textbooks;</li> <li>– digital resources.</li> </ul> <p>Organization of independent work of students, individual consultations.</p>
<b>Monitoring and assessing the achievability of learning outcomes</b>	<p><b>Current control</b> on each topic of the discipline, control of knowledge in classroom and extracurricular activities (according to the syllabus). Assessment Forms: survey in the classroom; testing on the topics of the academic discipline; protection of independent works; discussions; trainings; colloquia; essay intelligence - map case-stages execution, etc.</p> <p><b>Midterm control</b> at least two times during one academic period within the same academic discipline.</p> <p><b>Intermediate certification</b> is carried out in accordance with the working curriculum, academic calendar. Conduct forms:</p> <ul style="list-style-type: none"> <li>– examination in the form of testing;</li> <li>– oral exam;</li> <li>– a written exam;</li> <li>– diff. offset;</li> <li>– defense of term papers (works) projects;</li> <li>– protection of practice reports.</li> </ul> <p><b>Final state certification.</b></p>

## 7. EDUCATIONAL AND RESOURCE SUPPORT OF THE EP

<p><b>Educational Information Center</b></p>	<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 <a href="http://lib.ukgu.kz">http://lib.ukgu.kz</a> 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 <a href="http://articles.ukgu.kz/ru/ppp">http://articles.ukgu.kz/ru/ppp</a>.</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 <a href="http://lib.ukgu.kz/">http://lib.ukgu.kz/</a>.</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>
<p><b>Material and technical base</b></p>	<p>Special laboratories of the department «Biotechnology»: «Biotechnology of animals», «Biotechnology of microorganisms», «Molecular biology», «Biotechnology of plants», «Agricultural biotechnology», «Plant physiology».</p> <p>Regional laboratory «Testing regional laboratory of engineering profile», Testing center «SAPA».</p> <p>Computer classes, classrooms with an interactive whiteboard, Wi-Fi, special physics and chemistry laboratories.</p> <p><b>Production bases:</b></p> <ul style="list-style-type: none"> <li>- LLP «South-West Research Institute of Animal Husbandry and Plant Growing», Shymkent, Tassay settlement</li> <li>- M. Auezov South Kazakhstan University Regional Testing regional laboratory of engineering profile «Structural and biochemical materials»</li> <li>- South-Kazakhstan regional branch of the Republican state enterprise on the right of economic management «Republican veterinary laboratory»</li> <li>- M. Auezov South Kazakhstan University, Research Center «Industrial Biotechnology»</li> <li>- LLP Company Food Master-Shymkent, Turkestan region, Tolebi district, Koksack village</li> <li>- LLP BorteMilka, Ordabasy, Badam village</li> <li>- LLP «Brewery», Shymkent</li> <li>- LLP «Em-Nur», Tassay settlement</li> <li>- LLP «VISIT», Shymkent</li> </ul>




**APPROVAL SHEET**

**on the Educational program 6B05120 – «Biotechnology»**

Director of DAA \_\_\_\_\_  \_\_\_\_\_ **Naukenova A.S.**

Director of DAsc \_\_\_\_\_  \_\_\_\_\_ **Nazarbek U.B.**

Director of DE&C \_\_\_\_\_  \_\_\_\_\_ **Bazhirov T.S.**

## РЕЦЕНЗИЯ

на образовательную программу «6В05120-Биотехнология», разработанной  
коллективом преподавателей кафедры «Биотехнология»  
ЮКУ им. М.Ауэзова

Основные задачи ТОО «Юго-Западный научно-исследовательский институт животноводства и растениеводства» - обеспечение новых возможностей по развитию животноводства и растениеводства путем создания и распространения племенного и семенного материала, а также перспективных технологий для юго-западного региона Казахстана.

Основные направления научно-исследовательского института: создание и распространение конкурентоспособных пород, типов и линий сельскохозяйственных животных и технологий их выращивания; создание и распространение новых сортов и гибридов сельскохозяйственных культур; производство и реализация племенного и семенного материала животных и растений; проведение системных исследований в области животноводства, аридного кормопроизводства и растениеводства; подготовка и переподготовка кадров и специалистов аграрного профиля; проведение совместных научных исследований с ведущими зарубежными научными центрами, адаптация перспективных зарубежных технологий.

Стратегическая цель образовательной программы «6В05120-Биотехнология» направлена на подготовку бакалавров, владеющих современными, высокоэффективными методами исследований в области биотехнологии и умеющих применять полученные знания и анализировать современное состояние развития отрасли.

Образовательная программа полностью отвечает требованиям по развитию и уровню подготовки студентов по междисциплинарному курсу профессионального модуля.

Объектами профессиональной деятельности выпускников по ОП «6В05120-Биотехнология» являются: научно-исследовательские институты и вузы; проектные биотехнологические организации; предприятия микробиологической, фармацевтической, пищевой и экологической промышленности и аграрно-промышленного комплекса.

Программа направлена на удовлетворение потребностей государства, региона, работодателей и обучающихся, согласованы с национальными приоритетами развития и стратегией развития вуза, направлены на практическое применение знаний, на самосовершенствование и получение образования в течение всего цикла обучения по специальности биотехнология.

Формирование профессиональной компетенции осуществляется благодаря содержанию, объему и логике построения индивидуальной траектории обучающихся студентов.

В качестве элективных курсов в учебном плане предусмотрен модули «Основы прикладных наук», «Цифровая биотехнология» которые направлены на применение инновационных технологий в учебном процессе и критического

мышления.

Процесс формирования учебных планов прозрачны, к ним привлекаются обучающиеся и работодатели-представители профильных НИИ и предприятия (РГП «Институт генетики и физиологии» КН МОН РК, НИИ «Экология и биология», ТОО «Юго-Западный НИИ животноводства и растениеводства», «Международный казахско-турецкий университет имени Х.А.Ясави», ТОО «Эм-Нур»), ППС активно развивает сотрудничество с профильными НИИ. Принимает участие в различных семинарах, ведут совместные научные исследования, консультируется по вопросам содержания образовательных программ, что в конечном итоге приводит к эффективному трудоустройству выпускников.

Образовательная программа может быть рекомендована для подготовки студентов по направлению «Биотехнология» с присвоением квалификации «бакалавра естествознания» по ОП 6B05120 - «Биотехнология».

И.о.Председателя Правления  
ТОО «Юго-Западный НИИ  
животноводства и растениеводства»



Б.А.Ажибеков

**Экспертное заключение**  
на образовательную программу  
«6B05120-Биотехнология»

Стратегическая цель образовательной программы «6B05120-биотехнология» направлена на подготовку бакалавров, владеющих временными, высокоэффективными методами исследований в области биотехнологии и умеющих применять полученные знания и анализировать временное состояние развития отрасли.

К разработке образовательной программы привлечены представители организаций работодателей биотехнологической отрасли.

Структура программы представлена в соответствии с требованиями к составлению программы: отражены паспорт образовательной программы; результаты обучения ОП, компетенции ОП, сводная таблица, отражающая объем освоенных кредитов в разрезе модулей образовательной программы, сведения о дисциплинах.

Цели образовательной программы бакалавриата соответствуют 6 уровню национальной рамки квалификаций Республики Казахстан, они также гармонизированы с Дублинскими дескрипторами, 1 циклом квалификационной Рамки Европейского Пространства Высшего образования, а также 6 уровнем Европейской квалификационной рамки для образования в течение всей жизни.

Образовательная программа направлена на подготовку специалистов в соответствии с существующими требованиями нормативных документов в части высшего образования и включает циклы базовых и профессиональных дисциплин способствующих приобретению навыков овладения специальной терминологии; использование современных методов исследования при выполнении исследовательской работы; изучение методов биотехнологических процессов, особенности инновационных технологий в части биотехнологии; работы с технической и справочной литературой, научно-технической документацией и на приобретение обучающимися необходимых знаний, умений, навыков и компетенций.

Для бакалавров читают лекции ведущие зарубежные профессора университета Загреб (Хорватия), Бухарский государственный университет имени Абу али Ибн Сина, Узбекистанский Национальный университет имени Ибрагима Улугбек, Джизакский государственный технологический институт, Самаркандский педагогический институт. Кроме того проводятся дисциплины обеспечивающие знания в области обеспечения совершенствования технологий биотехнологической отрасли, выполнение услуг, внедрение достижений науки и техники, прогрессивных базовых технологий.


Объектами профессиональной деятельности выпускников по ОП «6В05120-Биотехнология» являются: научно-исследовательские институты и вузы; проектные биотехнологические организации; предприятия микробиологической, фармацевтической, пищевой и биотехнологической промышленности и аграрно-промышленного комплекса.


Образовательная программа ориентирована на результаты обучения, соответствующие требованиям профессиональных стандартов, потребностям отраслевых рынков труда и организаций работодателей.

Из вышеизложенного, можно сделать вывод, что образовательная программа «6В05120-Биотехнология» отвечает предъявляемым требованиям и обеспечивает условия для формирования конкурентоспособности выпускников для максимально быстрого трудоустройства по специальности и профессионального роста.

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