



CONTENT

|  |  |  |
| --- | --- | --- |
|  | Concept of the EP |  |
|  | Pasport of the EP |  |
|  | Сompetences of the graduate of EP |  |
| 3.1 | Matrix of correlationof ep learning outcomes in general with modules formed by competencies |  |
| 4. | Matrix of the influence of modules and disciplines on the formation of learning outcomes and information on laborintensity |  |
| 5 | Summary table reflecting the volume assimilate of education program modules |  |
| 6. | Strategies and methods of training, monitoring and evaluation |  |
| 7 | Educational and resource support of the EP |  |
|  | Approval sheet |  |
|  | Appendix 1. Review from the employer |  |
|  | Appendix 2. Expert opinion |  |

**1. CONCEPT OF THE EDUCATIONAL PROGRAM**

|  |  |
| --- | --- |
| **UniversityMission** | Generation of new competencies, training of a leader who translates research and entrepreneurial thinking and culture |
| **UniversityValues** | 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. |
| **GraduateModel** | 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. |
| **The uniqueness of the educational program** | 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. |
| **Academic Integrity and Ethics Policy** | 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). |
| **Regulatory and legal framework for the development of EP** | 1. Law of the Republic of Kazakhstan "On Education";  2. Model rules for the activities 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;  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 October 31, 2018 No. 604;  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 |
| **Organization of the educational process** | Implementation of the principles of the Bologna Process  Student-centered learning  Availability  Inclusivity |
| **Quality assurance of the Educational program** | Internal quality assurance system  Involvement of stakeholders in the development of the Educational Program and its evaluation  Systematic monitoring  Actualization of the content (updating) |
| **Requirements for applicants** | 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 |

1. **PASSPORT OF THE EDUCATIONAL PROGRAM**

|  |  |
| --- | --- |
| **Purpose of the EP** | The purpose of the EP is 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. |
| **Tasks of the EP** | - formation of the main professional competencies of future specialists in the field of biotechnology;  -application of biotechnological methods and organization of research;  -conducting biotechnological research aimed at solving research problems;  -ability to control organizational and production activities, production modes in the laboratory of biotechnological enterprises;  -creating conditions for intellectual development in order to ensure the possibility of their employment under the educational program or continuing education at subsequent levels of study. |
| **Harmonization of EP** | -6th level of the National Qualifications Framework of the Republic of Kazakhstan;  -Dublin descriptors of the 6th level of qualification;  -1 cycle of a Framework for Qualification of the European Higher Education Area);  -6thLevel of European Qualification Framework for Life long Learning). |
| **Connection of the EP with the professional sphere** | **Professional standard:** "Breeding activity (breeding business) in animal husbandry". 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 26.12.2019 No. 263  **Professional standard:** "Yeast production". Appendix No. 44 to the order of the Deputy Chairman of the Management Board  The National Chamber of Entrepreneurs of the Republic of Kazakhstan "Atameken" dated 26.12.2019 No. 263.  **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 |
| **List of qualifications and positions** | Bachelors in EP 6B05120 "Biotechnology" can hold primary positions: specialist in biotechnology 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.  - specialist (laboratory assistant) in research institutes and universities:  -research engineer (general profile)  -chief microbiologist  -specialist in the field of biotechnology  -researcher at the research institute  -laboratory assistant in the production of the research institute  -employee of research and design biotechnological organizations  - specialist of enterprises of microbiological, pharmaceutical, food, environmental industry and agricultural and industrial complex |
| **Field of professional activity** | -biological and related sciences  -biotechnological industry  -research institutes of biological, ecological, pharmaceutical and agricultural profile  -manufacturing enterprises and laboratories of the food, microbiological, pharmaceutical industries;  - enterprises of the agricultural and industrial complex |
| **Objects of professional activity** | -research institutes and universities;  -manufacturing enterprises and laboratories of the food and processing, microbiological, pharmaceutical industries;  -laboratories for quality and safety control of agricultural products;  -environment al service sandorganizations |
| **Subjects of professional activity** | -microorganisms, animal and plant cell cultures, viruses, enzymes, biologically active substances;  -devices and equipment for the study of the properties of microorganisms used, cell cultures obtained in laboratory and industrial conditions;  -installations and equipment for biotechnological processes;  -means of quality control of raw materials, semi-finished products and finished products;  -means of assessing the state of the environment and protecting it from the influence of industrial production. |
| **Types of professional activity** | - to ensure the improvement of the technology of the biotechnological industry, the implementation of services, the introduction of science and technology, advanced basic technologies;  -organization of research and (or) developments beyond the scope of the main scientific (scientific and technical) specialization in new and (or) promising scientific biotechnological areas with broad professional and social interaction;  -methods and organization of research work;  -technological processes and production modes;  -introduction and improvement of the prospects of scientific and technical development of the enterprise;  -monitoring the condition of laboratory equipment and workplaces of laboratory staff;  -sterilization and treatment of nutrient media for propagation of pure culture;  -conduct information search for solving research problems. |
| **Learning outcomes** | **LO1** Observe academic honesty, ethical principles and laws of the Republic of Kazakhstan, demonstrate communication skills in Kazakh, English and English, engage in self-development, plan work, analyze.  **LO2** Demonstrate natural science, mathematical, social, socio-economic knowledge in professional activities, methods of mathematical data processing, distance learning, theoretical and experimental research, regulatory documents and elements of economic analysis.  **LO3** Use network computer technologies, databases, software packages, carry out information processing using applied software for business activities, comply with the basic requirements of information security.  **LO4** Understand the general patterns and mechanisms of life of plants, human and animal organisms, specific specific features of various systems of the body and their individual structural elements, establishing the relationship of basic biological processes with each other.  **LO5** Discuss biological requirements, environmental protection issues, their legal basis, as well as issues of assessing the stimulating factors used in practical training, use methods to ensure the reliability of safety equipment and life activities of maintenance personnel during the operation of biotechnology equipment.  **LO6** Analyze modern methods of researching biological systems in order to solve the issues of production of biotechnological products for various purposes and the development of new biotechnological processes, to recommend effective procedures for monitoring, regulation and control of technological processes, to conduct a simple educational and research experiment based on the technique of work in the laboratory, to perform calculations, to draw up results, formulate conclusions.  **LO7** Compare biological processes in the cells of various groups of organisms in order to optimize and regulate the production technology of final products, work in laboratory conditions with cultures of microorganisms, independently develop a problem statement taking into account the needs of society and requirements for biotechnological products, as well as scientifically substantiate solutions to fundamental and applied tasks of agricultural biotechnology.  **LO8** To clarify the problems of biosafety of products of modern biotechnological production, organize and conduct a biological experiment with specific objects, independently analyze the results, acquire practical skills in conducting physicochemical methods for analyzing compounds produced by microorganisms, plants and animals, sanitary and hygienic control of food products, evaluate methods in biotechnology of animals, accelerated increase in productivity, reproduction of farm animals.  **LO9** Formulate biotechnological principles for the synthesis of products based on cells of microorganisms, plants and animals, investigate and establish links between the characteristics of products and biotechnological processes, use methods of using highly productive industrial breeds of animals, improve the quality of manufactured products, develop regulations for the production of agricultural products.  **LO10** To own the elements of spiritual, aesthetic and cultural culture, to form judgments, taking into account social and ethical problems. Possess the skill of conceptual, logical and analytical thinking, realize the potential in solving the assigned tasks and their correct documentation.  **LO11** Express their ideas and underlying professional knowledge and questions in writing or orally. Know the history of the Republic of Kazakhstan and the universal laws of the development of the world and society, as well as about moral categories and values ​​based on the formation of a new political system. Be able to lead a healthy lifestyle. Know about the laws of human socialization and psychosomatics.  **LO12** Use research, entrepreneurial and uncertainty skills. Work effectively individually and as a team member, correctly defend your point of view, correct your actions and use various methods. |

1. **COMPETENCES OF THE GRADUATE OF EP**

|  |  |
| --- | --- |
| **SOFTSKILLS**.Behavioral skills and personality qualities | |
| SS 1. Competence in managing one's own literacy | SS1.1. The abilityofself-learn, self-developandconstantly update their know ledge with in the chosen trajectory and in an interdis ciplinary environment.  SS1.2. The ability to expressthoughts, feelings, facts and opinions in the professional field.  SS1.3. The ability for mobility in the modern world and critical thinking. |
| SS 2. Language competence | SS2.1. The ability to build communication programs in the state, Russian and foreign languages.  SS2.2. The ability for inter personal social and professional communication in the condition so finter cultural communication. |
| SS 3. Mathematical Competence and Competence in the field of Science | SS3.1. The ability and will ingness 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. |
| SS 4. Digital competence, technological literacy | 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.  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. |
| SS 5. Personal, social and academic competencies | 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.  SS5.2. The aility to social and cultural development based on the manifestation of citizenship and morality.  SS5.3 The ability to build a personal educational trajectory throughout life for self-development, career growth and professional success.  SS5.4. The ability to successfully interact in a variety of socio-cultural contexts during study, work, home and leisure. |
| SS 6. Entrepreneurial competence | SS6.1. The ability to becreative and entrepreneurial in a variety of environments.  SS6.2. The ability to work in a mode of uncertainty and rapidly changing task conditions, make decisions, all ocatere sourcesand manage your time.  SS6.3. The ability to work with consumer requests. |
| SS 7. Cultural awareness and ability to express yourself | SS7.1. The ability to show world view, civil and moral positions.  SS7.2. The ability to be tolerant of the traditions and culture of other peoples of the world, to have high spiritual qualities. |
| **PROFESSIONAL COMPETENCES** (HARDSKILLS). | |
| The oretical know ledge and practical skills specific to this area | 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. |
| 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. |
| 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 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. |

* 1. **MATRIX OF CORRELATIONOF 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 |  |  |  |  | + |  | + | + |  |  |  |  |

1. **MATRIX OF THE INFLUENCE OF MODULES AND DISCIPLINES ON THE FORMATION OF LEARNING OUTCOMES AND INFORMATION ON LABOR INTENSITY**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **№** | **Name of the module** | **Cycle** | **Component** | **Name of the discipline** | **Brief description of the discipline** | **Number of credits** | **Generated learning outcomes (codes)** | | | | | | | | | | | |
| **LО1** | **LО2** | **LО3** | **LО4** | **LО5** | **LО6** | **LО7** | **LО8** | **LО9** | **LО10** | **LО11** | **LО12** |
| 1 | Social Sciences Module | GED | OC | Modern history of Kazakhstan. | Formation of Kazakhstan state structure. Ethno-demographic processes and strengthening of interethnic harmony. The value of the program "People in the stream of history" to form new historical consciousness Mangilik El. After course, student demonstrates historical knowledge that meets the strategic objectives of strengthening the statehood of Kazakhstan and national security. | 5 |  |  |  |  |  |  |  |  |  | **ѵ** |  |  |
| 2 | GED | OC | Philosophy | Philosophy and world philosophical understanding. Asia Philosophy. Philosophy of the Middle Ages and Renaissance. Philosophy of the New Age and the Enlightenment. Modern philosophy. The philosophy of natural sciences as the basis for biotechnology development After course, student uses philosophical knowledge basic to form worldview position in biotechnological processes. | 5 |  | **ѵ** |  |  |  |  |  |  |  | **ѵ** |  |  |
| 3 | Socio-political knowledge module | GED | OC | Sociology and Political Science | Development and formation of political science. Power political theory and concept. The essence of political system and regime. State and features. Political institutions and parties. Politics relationship with public life other areas. Student learns sociological approach to society development and individual functioning about political systems and regimes, politics human dimension. | 4 |  | **ѵ** |  |  |  |  |  |  |  | **ѵ** | **ѵ** | **ѵ** |
| 4 | GED | OC | Sociology and Political Science | Sociology Fundamentals. Society social structure. Political Science Fundamentals. The political system of society. Basic social processes and political socialization in biotechnological industries. At the end of the course, the student learns about the sociological approach to the development and functioning of society and the individual; about political systems and regimes. | 4 |  | **ѵ** |  |  |  |  |  |  |  | **ѵ** | **ѵ** | **ѵ** |
| 5 | Socio – ethnic development module | GED | UC | Ecosystem and law | Ecosystem preservation as basis of law rule. Regulations and regulatory documents of environmental protection. Citizens ' rights to clean air, water and soil. Biotechnological methods for determining maximum permissible concentrations of nature pollutants. Student has knows regulatory documents, citizens ' rights and methods for determining pollution level in urban areas. | 5 | **ѵ** | **ѵ** |  |  | **ѵ** |  |  |  |  |  |  | **ѵ** |
| 6 | BD | EC | Abay Study | Kazakh literature of the XIX century. Abay - founder of Kazakh classical literature. Abay's philosophy. At the end of the course, the student learns the main works of Kazakh writers of the 19th century, can use quotes from great writers in business correspondence and popularize Kazakh literature in the world. | 3 |  | **ѵ** |  |  |  |  |  |  |  | **ѵ** |  |  |
| 7 | BD | EC | Actual problems and modernization of public consciousness | This discipline examines the formation of a creative personality, instilling in young people the spiritual revival of the Independent Great Steppe, which is aimed at restoring our spirituality, which was in crisis during the Soviet era, and at being among the best thirty developed countries of the world. |  | **ѵ** |  |  |  |  |  |  |  |  |  | **ѵ** | **ѵ** |
| 8 | BD | EC | Mukhtar Study | Kazakh literature of the XX century. M. Auezov - founder of - Kazakh classical literature. M. Auyezov's Philosophy in the world. Student learns he main works of Kazakh writers of the 20th century, can use quotes from great writers in business correspondence and popularize Kazakh literature in the world. |  |  |  |  |  |  |  |  |  |  | **ѵ** | **ѵ** |  |
| 9 | Communication and Physical Education module | GED | OC | Kazakh (Russian) language | Development communication and speech skills. Scientific speech and the language of my specialty. Use of business and scientific terminology. Biotechnological terms. Processing of scientific information in official languages. Student can process scientific information in Russian for further use in the educational and scientific processes in biotechnology. | 10 | **ѵ** |  |  |  |  |  |  |  |  |  | **ѵ** |  |
| 10 | GED | OC | Foreign language | Foreign language and science. Basic rules and laws of the language. Use of business and scientific terminology. Biotechnological terms. Processing of scientific information in foreign languages. After course, the student can process scientific information in a foreign language for further use in educational and scientific processes in biotechnology. | 10 | **ѵ** |  |  |  |  |  |  |  |  |  | **ѵ** |  |
| 11 | GED | OC | Physical education | Physical education as basis improving the student health. Physical culture and mental activity. Physical exercises and a healthy lifestyle in the biotechnological production. At the end of the course, the student has knowledge of physical fitness and a healthy lifestyle to support life while working in educational and industrial processes. | 8 |  |  |  |  |  |  |  |  |  | **ѵ** |  | **ѵ** |
| 12 | BD | UC | Professional Kazakh (Russian) language/ | Language and specialty. Basic terms of natural and related sciences. Terms and basic texts of biotechnology. An essay on a professional topic. According to the results of the course, the student is fluent in the professional state language for further research work in the field of biotechnology. | 3 | **ѵ** | **ѵ** |  |  |  |  |  |  |  |  |  |  |
| 13 | BD | UC | Professional-oriented foreign language | Foreign language and specialty. Basic terms of natural and related sciences. Terms and basic texts of biotechnology. Essay on a professional topic. According to the results of the course, the student is fluent in a professional foreign language for further research work in the field of biotechnology with foreign scientists. | 3 | **ѵ** | **ѵ** |  |  |  |  |  |  |  |  |  |  |
| 14 | GED | OC | Information and communication technologies | Introduction to computer systems. Types of software, goals, and characteristics. Information technologies - basis of - research. Methods of searching scientific information. Preparation of programs for biotechnological processes. Student uses information resources to e-learning. Search for scientific information, conduct statistical analysis of data, prepare basis of program for biotechnological processes. | 5 |  |  | **ѵ** |  |  | **ѵ** |  |  |  | **ѵ** |  |  |
| 15 | BD | EC | Content and language integrated learning | The discipline studies the professional and personal qualities of a biotechnologist, covering the general patterns and mechanisms of life of plants and animals. It covers a sufficient level of study of the subject and the development of skills to express in writing and orally their ideas related to issues in the field of biotechnological products based on cells of microorganisms, plants and animals, issues of environmental protection through a foreign language. | 5 |  |  |  | **ѵ** | **ѵ** |  |  |  |  |  | **ѵ** |  |
| 16 | BD | EC | English in professional sphere | English in the professional field forms and develops the communicative competence of a future specialist - a participant in professional communication in a foreign language in the field of science, technology, production and education. The acquisition of communicative competence lies in the ability to use English to meet professional needs, realize personal business contacts and further professional self-education and self-improvement. |  | **ѵ** |  | **ѵ** |  |  |  |  |  |  |  | **ѵ** | **ѵ** |
| 17 | General Mathematical and Natural Sciences | BD | UC | Higher Mathematics | Linear and vector algebra. Mathematical analysis. Indefinite and definite integrals. Functions of several variables. Ordinary differential equations. Numerical characteristics of systems of two random variables. Correlation coefficient. Student can make a mathematical analysis of the biotechnological process, calculate the probability theory of various circumstances in the production. | 4 |  | **ѵ** |  |  |  | **ѵ** |  |  |  | **ѵ** |  |  |
| 18 | BD | UC | Physics | Mechanics, Molecular physics. Thermodynamics. Electrostatics. Optics. Physical factors in biotechnological processes. At the end of the course, the student learns the basic laws of general physics and their applicability in biotechnological industries and the creation of biotechnological equipment. | 4 |  | v |  |  |  | **ѵ** |  | **ѵ** |  |  |  |  |
| 19 | BD | UC | Chemistry | Chemical elements and reactions. Electrochemical processes. Analysis of substances chemical composition. Chemical kinetics. Catalysis. Solutions. Redox reactions. Complex connections. Qualitative chemical analysis. Student can conduct chemical analyses, determine the composition of substances and prepare the theoretical part of experiments in the preparation of scientific research in the field of biotechnology. | 5 |  | **ѵ** |  |  |  |  |  | **ѵ** | **ѵ** |  |  |  |
| 20 | BD | EC | Biochemistry | Introduction to Biochemistry. Metabolism basic provisions Energy of biochemical processes. Physical and chemical properties of natural compounds. Student learns the biochemistry of proteins, nucleic acids, carbohydrates, lipids, minerals and vitamins and hormones; the essence of chemical transformations occurring in organisms, the mechanisms of their regulation. | 5 |  | **ѵ** |  | **ѵ** |  | **ѵ** |  | **ѵ** | **ѵ** |  |  |  |
| 21 | BD | EC | Inorganic chemistry | This discipline covers the basic concepts and laws of chemistry, the theoretical foundations of the structure of matter, the regularities of the course of chemical processes, familiarization with biogenic elements and their role in human life. The discipline informs about the practical application of chemical knowledge in the field of biotechnology, covers the regularities of the course of chemical processes, forms the ability to solve practical problems and conduct the simplest chemical experiments in this specialty. |  |  |  |  |  |  |  | **ѵ** |  | **ѵ** |  |  |  |
| 22 | Biotechnology of the agro-industrial complex | BD | EC | Objects of biotechnology | Objects of biotechnology. Technological techniques and features of cultivation of microorganisms, cells and tissues of plants and animals. Subcellular structures. Immobilized biological objects. Student can analyze useful properties of biotechnology objects; use principles of improving the properties of biotechnology objects; cultivation methods and features of various organisms. | 4 |  |  |  | **ѵ** |  | **ѵ** | **ѵ** |  | **ѵ** |  |  | **ѵ** |
| 23 | BD | EC | General Technology of Branch | Biotechnological processes in connection with mass transfer. Hardware design of the processes of isolation and purification of some products of microbial synthesis. The main areas of application of membrane technology: water treatment, medicine, bioenergetics. Student can work on basic biotechnological devices and perform basic analyses of biotechnological objects. |  |  |  |  | **ѵ** |  | **ѵ** | **ѵ** |  | **ѵ** |  |  | **ѵ** |
| 24 | BD | EC | Microbiology and virology | Microorganisms and classification. Morphology, composition and reproduction of microorganisms. Metabolism of microorganisms. Ecology of microorganisms. Genetics of microorganisms. The role of microorganisms in nature and possibility of using microbes in production. Student learns basic properties and classification of microorganisms and viruses, is able to isolate pure culture, work with microorganisms. | 5 |  |  |  |  | **ѵ** | **ѵ** | **ѵ** | **ѵ** | **ѵ** |  |  |  |
| 25 | BD | EC | Sanitation and hygiene of biotechnological industries | Fundamentals of microbiology, sanitation and hygiene in biotechnology. Modern methods of production sanitary control. Sanitary and hygienic indicators. Student learns modern methods of sanitation and hygiene in biotechnological production of products; methods of quality control of sanitation facilities, finished products; basic regulatory documents in the field of food production sanitation. |  |  |  |  |  | **ѵ** | **ѵ** | **ѵ** | **ѵ** | **ѵ** |  |  |  |
| 26 | BD | EC | Basics of biotechnology | Features of biotechnological processes, stages and principles of their implementation. Continuous, semi-continuous, and periodic cultivation processes. Basic methods for creating and maintaining aseptic cultivation conditions. Student learns methods and principles of biotechnology; the current state of biotechnology; modern requirements for biotechnological products; prospects for biotechnology development | 5 |  |  |  | **ѵ** | **ѵ** | **ѵ** | **ѵ** |  | **ѵ** |  |  | **ѵ** |
| 27 | BD | EC | The or etical basics of biotechnological production | Biological objects as specific component of biotechnological production, raw materials base of biotechnological production, technologies of laboratory, industrial, semi-industrial cultivation, periodic and continuous cultivation, production of biomass, waste products, primary and secondary metabolites, methods of isolation and purification of final products, production of concentrates, highly purified pharmaceuticals, finished products forms. |  |  |  |  | **ѵ** | **ѵ** | **ѵ** | **ѵ** |  | **ѵ** |  |  | **ѵ** |
| 28 | Methodological foundations of teaching | BD | EC | Methodology of teaching biology and biotechnology | Theoretical and methodological approaches to teaching biology and biotechnology. Regularities of the processes of knowledge transfer in biology and biotechnology to students. Quality control of training, its place in educational process. Student receives knowledge about the basic methodological principles, forms and techniques of effective teaching of biology and biotechnology. | 4 | **ѵ** | **ѵ** |  |  |  |  |  |  |  | **ѵ** | **ѵ** |  |
| 29 | BD | EC | Criteria-based assessment technology | Criteria-based assessment is important factor in improving the productivity of information received and effectiveness of student work, the quality of products in all areas of mental activity. Using general theoretical applications in various branches of education that serve as the fundamental basis of the science of teacher education. |  | **ѵ** | **ѵ** |  |  |  |  |  |  |  | **ѵ** | **ѵ** |  |
| 30 | PD | UC | Pedagogical practice | The educational tasks of teaching biology and biotechnology in a modern school and the ways of their implementation are considered. It allows increasing effectiveness of teaching biology and biotechnology. The realization areas of creative potential of teacher-biologist are identified. The main paradigms of education in the domestic school are considered. | 4 | **ѵ** | **ѵ** |  |  |  |  |  |  |  | **ѵ** | **ѵ** |  |
| 31 | Fundamentals of the specialty | BD | EC | Introduction to specialty | Introduction to Biotechnology. The main directions of biotechnology. Achievements of biotechnology in molecular biology, medicine, veterinary medicine, food industry, energy industry, metallurgy, etc. Biotechnological monitoring of the environment. Student gets a general understanding of the discipline, the main objects and methods of research. | 4 |  |  |  | **ѵ** | **ѵ** | **ѵ** | **ѵ** | **ѵ** | **ѵ** |  |  |  |
| 32 | BD | EC | Fundamentals of Academic Writing | Academic writing. Types of scientific activity. Business scientific correspondence. Structure of scientific texts. Analysis of theoretical and practical research results. Upon completion of the course, the student can prepare scientific texts on their discipline, conduct scientific correspondence with foreign scientists and scientific publications. |  | **ѵ** | **ѵ** |  |  |  |  |  |  |  | **ѵ** | **ѵ** | **ѵ** |
| 33 | BD | EC | Educational practice | The practice is to acquire practical skills in the conditions of existing production. During training practice, attention is paid to issues of life safety, labor protection and industrial sanitation. As a result, students will gain skills in development of new biological products, methods for obtaining them, and practical implementation options. | 2 |  | **ѵ** |  |  | **ѵ** | **ѵ** |  | **ѵ** |  |  |  |  |
| 34 | BD | EC | Processes and apparatus of biotechnological production | This discipline examines the features of the course of mass transfer, thermal, hydrodynamic and mechanical processes in combination with the biological processes of growth, metabolism and the death of microorganisms. Regularities of such processes as defoaming, sterilization of liquid and air, grinding and packaging. The main features of the hardware design of microbiological industries. | 4 |  |  |  | **ѵ** |  | **ѵ** | **ѵ** |  |  |  |  |  |
| 35 | BD | EC | Equipment for biotechnological production | This discipline examines the design and principles of operation of large-tonnage equipment for biotechnological industries. A course containing technological operations used in biotechnological industries. |  |  | **ѵ** | **ѵ** | **ѵ** |  | **ѵ** | **ѵ** | **ѵ** |  |  |  | **ѵ** |
| 36 | PD | UC | Industrial practice I | Acquisition of practical knowledge and skills in production activities, experience in using the acquired knowledge and skills in solving specific technical problems. Students will learn the basics of planning and managing existing biotechnological processes; operate biotechnological equipment; and are able to work in a team. | 3 |  | **ѵ** |  |  |  | **ѵ** | **ѵ** |  |  |  |  |  |
| 37 | Fundamentals of applied sciences | BD | EC | Medical and veterinary biotechnology | The main directions of medical and veterinary biotechnology. New pharmaceutical and veterinary drugs for the treatment of previously difficult-to-treat human and animal diseases. Student knows strategic medical-biological and veterinary-biological approaches to create diagnostic and medicinal products using medical, veterinary biotechnology; basics of industrial production of the main modern dosage forms. | 5 |  |  |  | **ѵ** | **ѵ** | **ѵ** |  | **ѵ** | **ѵ** |  |  |  |
| 38 | BD | EC | Pharmaceutical Biotechnology | Pharmaceutical biotechnology provides for the study of biotechnological processes when obtaining a number of medicinal and prophylactic drugs, methods of conducting experimental research, the study of standard and certification tests of raw materials, finished products and technological processes, introduces the methods of their application, the implementation of a quality management system for biotechnological products in accordance with the requirements of quality standards and GMP. |  |  |  |  |  |  | **ѵ** |  | **ѵ** | **ѵ** |  |  |  |
| 39 | BD | EC | General Molecular Genetics | Molecular genetic methods of analysis and research studies the structural features and properties of macromolecules in a living cell, the structural and functional organization of the genetic apparatus of a cell, the implementation of genetic information, genetic methods for solving fundamental problems in the field of medical, food, agricultural, environmental biotechnology, analyzes the contribution of Kazakhstani scientists in the development of genetics, determines the importance of the impact of biotechnology on improving welfare in the country. | 6 |  |  |  |  |  | **ѵ** | **ѵ** |  | **ѵ** |  |  |  |
| 40 | BD | EC | Molecular Biology and Cytology | Cell molecular biology. Structural and functional organization of DNA, RNA, biological membranes. Transmitting an external signal to the cell. Intracellular mediators. Student learns modern theoretical knowledge and scientific achievements about structure, properties and functions of cells and their molecular structures, the basics of genetic information at the level of biomolecules. |  |  |  |  |  |  | **ѵ** | **ѵ** | **ѵ** | **ѵ** |  |  |  |
| 41 | BD | EC | Animal Biotechnology | Development and current state, main objects and methods of animal biotechnology. Student should be able to give a description of cattle breeds and their competitiveness in the gene pool of the market; expand the global gene pool, and organize its involvement for the qualitative development of livestock production in Kazakhstan. | 5 |  | **ѵ** |  | **ѵ** | **ѵ** | **ѵ** |  | **ѵ** | **ѵ** |  |  |  |
| 42 | BD | EC | Transgenic animals, plants and methods of their production | Principles of recombinant organisms design. Expression and isolation of target proteins. GMO in human economic activity. Transgenic plants and animals. Student learns basic principles of obtaining recombinant DNA, the stages of genetic engineering work; the scientific and legal bases for ensuring biosafety in the use of transgenic plants and animals. |  |  | **ѵ** |  | **ѵ** | **ѵ** | **ѵ** | **ѵ** | **ѵ** |  |  |  |  |
| 43 | BD | EC | Environmental biotechnology | Microorganisms’ role in circulation of substances. Domestic, industrial and agricultural wastewater, its structure and quality assessment criteria. The use of microorganisms in wastewater treatment plants, biosorption of metals. During the study, the student is able to carry out an environmental assessment of the state of air, water and land objects. | 4 |  |  |  |  | **ѵ** |  |  | **ѵ** | **ѵ** |  |  |  |
| 44 | BD | EC | Biodegradation and stability of polyutants, xenobiotics | Anthropogenic impact on environment. Self-healing of nature, accumulation and transformation of polyutants, xenobiotics. Use of plants, protozoa as accumulators of polyutants. Methods of wastewater treatmnt. Degradation and restoration of polluted land. Student can assess degree of environmental impact of pollutants, risks, disposal, prevention measures for occurrence of dangerous pollutants foci. |  |  |  |  |  | **ѵ** | **ѵ** | **ѵ** |  | **ѵ** |  |  |  |
| 45 | PD | UC | Industrial practice II | The practice is conducted to gain professional skills and experience in professional activities. Based on the results of the practice, students will learn the basics of planning and managing existing biotechnological processes; operate biotechnological equipment; and are able to work in a team. | 4 |  | **ѵ** |  |  |  | **ѵ** | **ѵ** |  |  |  |  |  |
| 46 | Fundamentals of scientific research | BD | EC | Planning and setting up of scientific research works | Classification of scientific research. Research objectives and state of the problem. Definition of research objects and methods. Setting research goals and objectives. Processing of research results. Student can formulate the goals and objectives of research, make plans and process experimental biotechnological research. | 5 |  | **ѵ** |  |  |  | **ѵ** | **ѵ** |  | **ѵ** |  |  |  |
| 47 | BD | EC | Fundamentals of scientific research and patenting | Methodology of scientific research and design of scientific results, preparatory stage of research work, the methodology of experimental research, design of research results in form of scientific papers, basics of patent science and theory of solving inventive problems, basics of scientific ethics, research institutions, preparation of students' research work. |  | **ѵ** | **ѵ** |  |  |  | **ѵ** | **ѵ** |  | **ѵ** |  |  |  |
| 48 | PD | EC | Modeling and scaling in biotechnology | Modeling and scaling of biotechnology processes and schemes. Physical and mathematical modeling of biotechnology processes. Hydro-mechanical and thermal processes. Mass transfer processes. Hardware design of biochemical processes. Student learns basic scheme of biotechnological production, basics of modeling and methods of engineering calculation of main processes and devices of biotechnological production. | 5 |  | **ѵ** | **ѵ** |  |  | **ѵ** | **ѵ** |  |  |  |  | **ѵ** |
| 49 | PD | EC | Bioinformatics | Introduction to Bioinformatics. Structural and comparative genomics. Proteomics. Computer simulation of biological molecules interaction Methods for comparing spatial structures of biological macromolecules, modeling interactions between macromolecular complexes. Molecular graphics. Student can use main technical means of searching for scientific and biological information, work with biological information in global computer networks. |  |  | **ѵ** | **ѵ** |  |  | **ѵ** | **ѵ** |  |  |  |  | **ѵ** |
| 50 | General physiology | PD | EC | Plant physiology | Plant cell physiology. Water regime of plants. Mechanisms of absorption and transport of mineral elements. Specifics of respiration in plants. Main ways of carbohydrate dissimilation. Student learns principles of functional organization of plant objects and physiological and biochemical foundations of molecular mechanisms of plant life, basic concepts of plant physiology. | 4 |  |  |  | **ѵ** |  |  |  | **ѵ** | **ѵ** |  |  |  |
| 51 | PD | EC | Basics of microclonal plant reproduction | Callus formation. Preparation and cultivation of plant cells and tissues. The advantage of plants. microclonal reproduction Prospects for application of microclonal plant reproduction in agricultural biotechnology. Student learns the theoretical and practical basics of microclonal reproduction of plants for use in further scientific research. |  |  |  |  | **ѵ** |  |  |  | **ѵ** | **ѵ** |  |  |  |
| 52 | PD | EC | Human and animal physiology | Physiology of human and animal body. Physiology of central nervous system. Physiology of blood system. Physiology of respiratory system. Physiology of digestive system, excretory system. Reproductive function. Comparative animal and human physiology. Student learns morphofunctional organization of animals and humans, main mechanisms of regulating functions of body biological systems. | 5 |  |  |  | **ѵ** |  |  |  | **ѵ** | **ѵ** |  |  |  |
| 53 | PD | EC | Modeling of physiological processes | Modeling of natural processes, population dynamics. Description of interaction of two species models. Study of the stability of stationary states. Modeling of physiological processes. Upon completion of the course, students have the skills to apply mathematical modeling methods to analyze specific natural processes for further application in biotechnological research. |  |  |  |  | **ѵ** |  |  |  | **ѵ** | **ѵ** |  |  |  |
| 54 | Biotechnology objects and products | PD | EC | Molecular genetic methods of analysis and research | Organization, information molecules of the genome. Methods of genome research. Enzymes used in molecular genetic research. Modern methods of molecular genetic research. When studying the course, the student can use the services of searching for scientific information in the field of molecular biology, modern methods of molecular genetic research. | 5 |  |  | **ѵ** | **ѵ** |  |  |  | **ѵ** | **ѵ** |  |  |  |
| 55 | PD | EC | Plant and animal genetics | Cytological bases, molecular foundations of heredity. Variability of genetic material. Fundamentals of population genetics. Problems of classical and modern genetics and prospects for its development. Student learns the main characteristics of a living organism, the most important biological processes occurring at all levels of the organization of living matter. |  |  |  |  | **ѵ** |  |  | **ѵ** |  | **ѵ** |  |  |  |
| 56 | BD | EC | Industrial biotechnology | Modern methods, main directions and prospects of biotechnology development. Biotechnology and agriculture. Features and processes based on use of live or inactivated biomass of microorganisms and products from synthesis. Students should know the specifics of industrial biotechnological processes, the scientific principles of their implementation; modern hardware design of biotechnological production. | 5 |  |  |  |  | **ѵ** | **ѵ** | **ѵ** | **ѵ** | **ѵ** |  |  | **ѵ** |
| 57 | BD | EC | Biological processing of industrial and agricultural waste | Biotechnological processing of industrial waste. Efficient resource-saving technologies. Problems of biological processing of wastewater from chemical enterprises. Assessment of impact of industrial and economic activities on environment state. Student learns basic processes and equipment in field of waste processing and disposal; able to prepare production reports in waste management. |  |  |  |  |  | **ѵ** | **ѵ** | **ѵ** | **ѵ** | **ѵ** |  |  | **ѵ** |
| 58 |  | BD | EC | Agricultural biotechnology | Food security, high-quality, environmentally friendly food, products for veterinary medicine, crop production. Modern postgenomic and biotechnological methods. Biotechnology of drugs for agriculture. Student uses methods of developing and implementing biotechnological approaches to solving problem of increasing fertility of agricultural soils, applying theoretical knowledge gained in practice of the agro-industrial complex. | 5 |  |  |  |  |  |  | **ѵ** | **ѵ** | **ѵ** |  |  | **ѵ** |
| 59 | BD | EC | Assessment of the quality and safety of agricultural products | Sanitary and hygienic assessment of agricultural crops quality. Assessment of products quality, animal feed. Student should know: the method of sampling and the specifics of sample preparation for various types of raw materials and finished products; the main criteria for assessing food safety. |  |  |  |  |  |  |  | **ѵ** | **ѵ** | **ѵ** |  |  | **ѵ** |
| 60 | Bio Sciences Integration Module | PD | EC | Food biotechnology | Technological processes for food production using microorganisms, development and introduction of new modern technologies, BAS, vitamins, amino acid enzymes and protein products.Microbiological control of products. Student should know the general laws of circulation, which are accompanied by the action of various microorganisms in the process of their vital activity. | 5 |  |  |  |  | **ѵ** | **ѵ** | **ѵ** | **ѵ** | **ѵ** |  |  | **ѵ** |
| 61 | PD | EC | Biological and food safety | Food security: Classification of potentially hazardous food substances and main ways of its contamination. Fundamentals of radiation safety of food raw materials and food products. Student learns the main indicators of the safety of finished food products; the parameters of implementation of technological control of the safety of finished products. |  |  |  |  |  | **ѵ** | **ѵ** | **ѵ** |  |  |  |  |  |
| 62 | PD | EC | Plant biotechnology | Prospects of plant biotechnology and biosafety issues. In vitro cultivation methods. Callus and cell cultures. Biotechnologies for accelerating the selection process. Student receives knowledge about the physiology of cultured cells, plant tissues in vitro; the principles of using cultured cells to obtain important metabolites, development of methods of clonal micropropagation. | 6 |  |  |  | **ѵ** |  |  |  | **ѵ** | **ѵ** |  |  |  |
| 63 | PD | EC | Bioprotectors and stimulators of plants | Mechanisms of regulation of physiological processes of plants. Hormonal regulation. Regulation of plant growth and development. The process of photosynthesis and adaptation. Plant protection products. At the end of the course, the student has knowledge of plant bioprotectors, the composition and functions of plant stimulants. |  |  |  |  | **ѵ** |  |  |  | **ѵ** | **ѵ** |  |  |  |
| 64 | PD | EC | Biotechnology of microorganisms | Microbiological processes used in biotechnology; requirements for raw materials and producing microorganisms, methods of microorganisms’ cultivation, isolation and purification of target products, specific industrial productions. Industrial production of antibiotics, enzymes, amino acids, polysaccharides, organic acids and neutral products, bacterial plant protection products and fertilizers, protein of single-celled organisms. | 6 |  |  |  |  | **ѵ** | **ѵ** | **ѵ** | **ѵ** | **ѵ** |  |  | **ѵ** |
| 65 | PD | EC | Industrial microorganisms | Industrial biotechnology. Stages of industrial cultivation. Preparation of seed material. Obtaining pure crops. Genetically modified microorganisms. Metabolites of microorganisms. Upon completion of the course, the student has theoretical and practical skills in the isolation and cultivation of industrial microorganisms for use in biotechnology. |  |  |  |  |  | **ѵ** | **ѵ** | **ѵ** | **ѵ** | **ѵ** |  |  | **ѵ** |
| 66 | BD | EC | Cell biotechnology | Cellular biotechnology studies the foundations of methods for the cultivation and vital activity of cells of animal and plant organisms in vitro. Methods for constructing cells of a new type based on their hybridization, reconstruction and cultivation, the possibility of cloning tissues or whole organisms from individual cells. Forms bitechnological principles for the synthesis of products based on cells of microorganisms, plants and animals. | 5 |  |  |  | **ѵ** |  | **ѵ** | **ѵ** |  | **ѵ** |  |  |  |
| 67 | BD | EC | Cultivation technology of plant cell and tissue culture | Technique of growing culture of plant objects in vitro. Callus cultures. Dedifferentiation and callus formation. Suspension culture of plant cells. Methods of isolation and cultivation of protoplasts. Fusion of protoplasts. Hybridization of somatic cells. Students should know in vitro cultivation of plant cells and tissues for use in biotechnological processes. |  |  | **ѵ** |  | **ѵ** | **ѵ** | **ѵ** | **ѵ** | **ѵ** |  |  |  |  |
| 68 | PD | EC | Biophysics | Laws of biophysics and biophysical properties of biomolecule systems. Biophysics of membranes, proteins, and complex molecular systems. Student has an understanding of the basic phenomena, concepts, laws and methods of biophysics, the skills of the simplest practical calculations, as well as experimental work in the laboratory. | 5 |  | **ѵ** |  | **ѵ** |  |  |  | **ѵ** |  |  |  |  |
| 69 | PD | EC | Bionanotechnology | Bionanotechnology is a field of science at the intersection of biology and nanotechnology, which covers a wide range of technological approaches, including: the use of nanotechnological devices and nanomaterials in biotechnology; the use of biological molecules for nanotechnological purposes; nanobiophysics of biomolecules; folding proteins; creation of biotechnological products, the properties of which are determined by dimensional characteristics; the use of biotechnological approaches based on the principle of controlled self-organization of nanostructures. |  |  |  |  | **ѵ** |  | **ѵ** |  |  |  |  |  |  |
| 70 | Module of acquired new professional competencies | BD | EC | Subjects on-the additional educational program | Studying additional educational program - Minor (Minor). A set of disciplines and (or) modules and other types of educational work, determined by students for study in order to form additional competencies that allow graduates to be more in demand on the labor market of the region and the country as a whole. | 12 |  |  |  | **ѵ** |  | **ѵ** |  |  |  |  |  |  |
| 71 | Final certification module | PD | UC | Predegree or industrial practice | Pre-graduate practice and subsequent diploma design or research work is intended for independent professional activity. The purpose of pre-graduate practice is to acquire the student's production skills for independent work, to collect data for the completion of the final qualification work or source data for research work. | 8 |  | **ѵ** |  | **ѵ** |  | **ѵ** | **ѵ** | **ѵ** | **ѵ** |  |  | **ѵ** |
| 72 |  |  | Writing and defending a thesis, a graduate work of preparing and passing a comprehensive exam | It provides implementation of analytical review, setting goals, study objectives, experimental part, results analysis Level of learning outcomes formation of EP is determined: possession of basic knowledge in field of natural science disciplines, skills in handling modern technology, ability to use information technologies in professional activity; critical thinking, solving tasks. | 12 | **ѵ** | **ѵ** | **ѵ** |  |  |  |  |  |  | **ѵ** | **ѵ** |  |

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

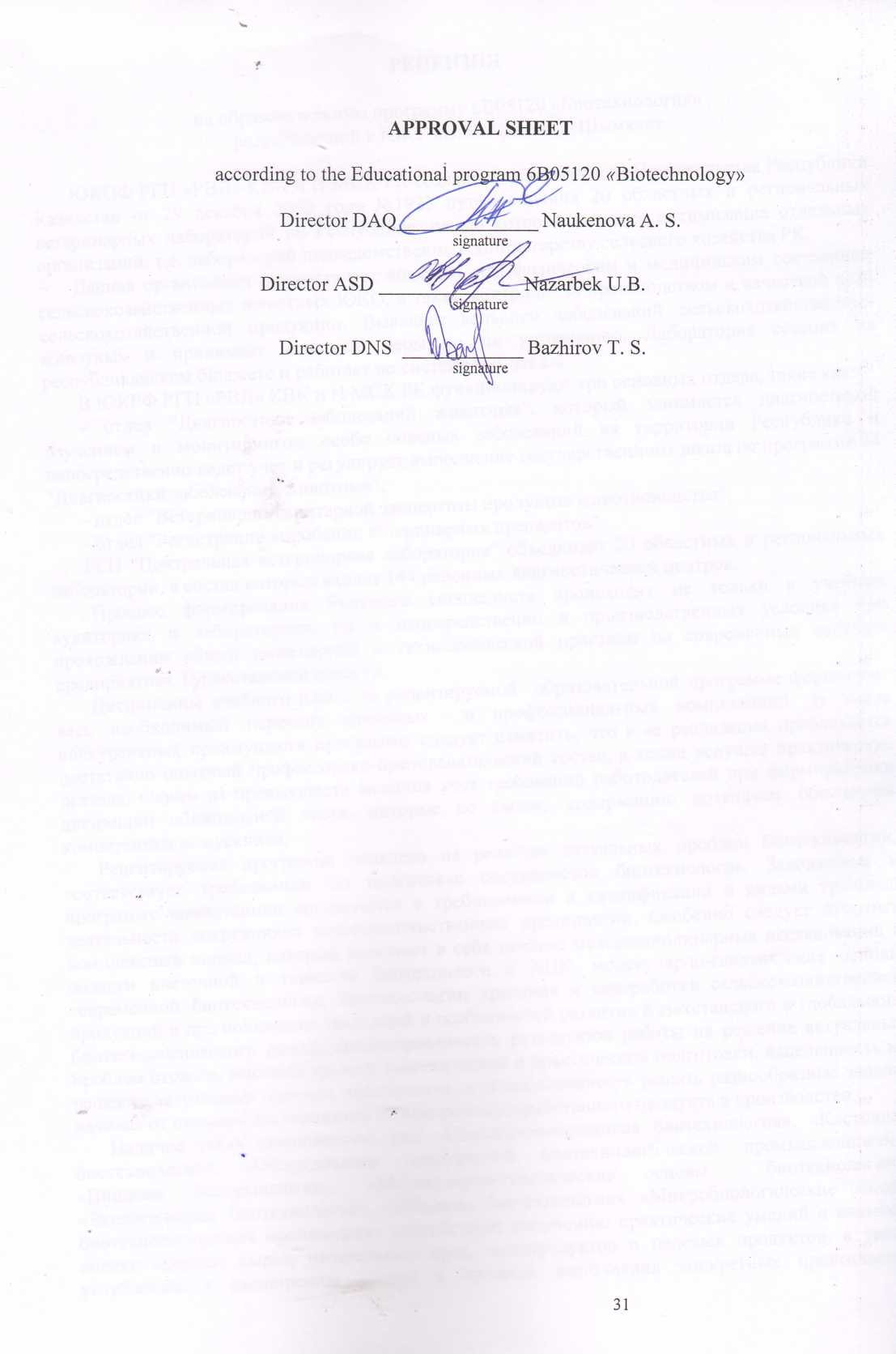
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Course of study | Semester | Number of modules to be mastered | Number of subjects studied | | | Number of credits KZ | | | | | Total in hours | Total credits KZ | Quantity | |
| OC | UC | 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 | 3 | 2 | 2 | 26 | 2 | 2 | - |  | 900 | 30 | 5 | 2 |
| 2 | 3 | 6 | 3 | 3 | 2 | 28 | 2 | - |  |  | 900 | 30 | 6 | 2 |
| 4 | 5 | 1 | 1 | 5 | 25 | 2 | - | 3 |  | 900 | 30 | 5 | 2 |
| 3 | 5 | 6 | - | - | 6 | 30 | - | - | - |  | 900 | 30 | 5 | 1 |
| 6 | 4 | - | 2 | 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 | 12 | 10 | 25 | 199 | 8 | 2 | 19 | 12 | 7200 | 240 | 37 | 11 |

1. **STRATEGIES AND METHODS OF TRAINING, MONITORING AND EVALUATION**

|  |  |
| --- | --- |
| **Learning Strategies** | **Student-centered learning:** the learner is the center of teaching/learning and an active participant in the learning and decision-making process.  **Practice-oriented learning:** focus on the development of practical skills. |
| **Teaching methods** | Conducting lectures, seminars, laboratory and practical classes with:  application of innovative technologies:  problem learning;  round table;  group work and creative groups;  discussions and dialogues;  presentations;  rational and creative use of information sources:  multimedia educational programs;  electronic textbooks;  digital resources.  Organization of independent work of students, individual consultations. |
| **Monitoring and assessing the achiev ability of learning outcomes** | **Current control** 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.  **Midterm control** at least two times during one academic period within the same academic discipline.  **Intermediate certification** is carried out in accordance with the working curriculum, academic calendar.  Conduct forms:  examination in the form of testing;  oral exam;  a written exam;  diff. offset;  defense of term papers (works) projects;  protection of practice reports.  **Final state certification.** |

1. **EDUCATIONAL AND RESOURCE SUPPORT OF THE EP**

|  |  |
| --- | --- |
| **Educational Information Center** | 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.  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.  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/pps>.  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".  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/>.  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-kіtаr", "Kitаr.кz", etc.  For people with special needs and disabilities, the library website has been adapted to the work of visually impaired users |
| **Material and technical base** | Special laboratories of the department "Biotechnology": "Biotechnology of animals", "Biotechnology of microorganisms", "Molecular biology", "Biotechnology of plants", "Agricultural biotechnology", "Plant physiology".  Regional laboratory "Testing regional laboratory of engineering profile", Testing center "SAPA".  Computer classes, classrooms with an interactive whiteboard, Wi-Fi, special physics and chemistry laboratories.  **Production bases:**  - LLP "South-West Research Institute of Animal Husbandry and Plant Growing", Shymkent, Tassay settlement  - M. Auezov South Kazakhstan University Regional Testing regional laboratory of engineering profile "Structural and biochemical materials"  - South-Kazakhstan regional branch of the Republican state enterprise on the right of economic management " Republican veterinary laboratory"  - M. Auezov South Kazakhstan University, Research Center "Industrial Biotechnology"  - LLP Company FoodMaster-Shymkent, Turkestan region, Tolebi district, Koksaek village  - LLP BorteMilka, Ordabasinsky, Badam village  - LLP "Brewery", Shymkent  - Em-Nur LLP, Tassay settlement  - LLP "VISIT", Shymkent |

****

