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CATALOG OF ELECTIVE DISCIPLINES

For students in the direction of preparation 6B051 Biological and related sciences

Brief description of the elective disciplines of the educational program

EPG	EP	Form of education	The name of discipline	Code of subject	Discipline cycle	Component	Number of credits	Level of training	Caretra	Course	Academic period	Pre-requisites	Post-requisites	Brief content of the discipline	Key learning outcomes	Name of the alternative discipline
6B050 - «Biological and related sciences»	6B05102 - «Biotechnology»	Full-time (bachelor 4 years) trimester	Inorganic and organic chemistry	NOH 1251	BS	Elective subjects	5.0	Bachelor	Форман II	1	1	School Chemistry Program	Basics of Pharmacy and Pharmacology; Biochemistry, Food biotechnology; Fundamentals of pharmacology; Cell biotechnology; Medical Biotechnology; Pharmaceutical biotechnology; Pharmaceutical Chemistry	Knows the basic laws of chemistry, structure and properties of matter, regularities and features of chemical processes, thermodynamics, solutions, properties of elements; understands limit and unsaturated aliphatic hydrocarbons, aromatic hydrocarbons, halogen-Derived hydrocarbons; Industrial biotechnology; Medical Biotechnology; Molecular biology; Molecular genetics and genetic engineering; Pharmaceutical biotechnology; Physiology	Prepare and conduct a chemical experiment to study the properties and identify the most important classes of organic, inorganic compounds; determine the physico-chemical constants of substances; use the necessary instruments and laboratory equipment during research; process the results of the experiment.	Inorganic chemistry
6B050 - «Biological and related sciences»	6B05102 - «Biotechnology»	Full-time (bachelor 4 years) trimester	Inorganic chemistry	NH 1278	BS	Elective subjects	5.0	Bachelor	Форман II	1	1	School Chemistry Program	Basics of Pharmacy and Pharmacology; Biochemistry, Food biotechnology; Fundamentals of pharmacology; Cell biotechnology; Medical Biotechnology; Pharmaceutical biotechnology; Pharmaceutical Chemistry	Basic concepts of the laws of chemistry, fundamentals atomic and molecular theory, the structure of matter. Periodic law, chemical bond, patterns chemical process, the doctrine of solutions, exchange reactions in solutions of electrolytes, redox reactions	Solve formal and applied problems of matrix algebra and mathematical analysis, build mathematical models; apply probabilistic and statistical methods in solving applied problems; collect and process statistical data	Inorganic and organic chemistry
6B050 - «Biological and related sciences»	6B05102 - «Biotechnology»	Full-time (bachelor 4 years) trimester	Higher mathematics	VM 1216	BS	Elective subjects	5.0	Bachelor	Higher mathematics	1	2	School curriculum of mathematics, algebra	Basics of Biostatistics and Bioinformatics; Basics of biotechnology; processing of statistical data, information theory, number theory. Differential and integral calculus of function.	The discipline considers the basics of mathematical analysis. Fundamentals of probability theory and mathematical statistics. Formal and applied problems of matrix algebra, analytical geometry and mathematical analysis, collection and processing of statistical data, information theory, number theory. Differential and integral calculus of function.	Solve formal and applied problems of matrix algebra and mathematical analysis, build mathematical models; apply probabilistic and statistical methods in solving applied problems; collect and process statistical data	Biophysics

B050 - «Biological and related sciences»	«Biotechnology»	Full-time (bachelor 4 years) trimester	Biophysics	BF 1211	BS	Elective subjects	5.0	Bachelor	«Quantum II »	1	2		School program of physics	Basics of Biostatistics and Bioinformatics, Cell biotechnology, Industrial biotechnology, Medical biotechnology, Objects of biotechnology, Pharmaceutical chemistry, Research work with the basics of patient	Biophysics considers the physical and chemical phenomena occurring in living organisms, which underlie elementary life processes, as well as the action of physical factors on the body. The main task of biophysics is to study the processes associated with the transformation of the chemical energy of the components of living matter into other types of energy - mechanical and osmotic work, electrical and radiation energy.	Forming the competencies of biophysical phenomena in animal organisms.	Higher mathematics
B050 - «Biological and related sciences»	«Biotechnology»	Full-time (bachelor 4 years) trimester	Analytical and physical and colloid chemistry	APH 1258	BS	Elective subjects	5.0	Bachelor	«Quantum II »	1	3		School Chemistry Program	Basics of biotechnology; Basics of Pharmacy and Pharmacognosy; Biochemistry, Fundamentals of pharmacology, Medical Biotechnology, Pharmaceutical biotechnology, Pharmaceutical chemistry	The course forms students' ideas about the theoretical foundations of analytical chemistry, its relationship with other applied sciences and practical relevance. Introduces recent achievements in the field of analytical chemistry, with modern methods of detection, separation and determination of chemicals. Discipline provides the students with a comprehensive picture of the analysis methods used for rapid and holistic assessment of the content of chemicals in environmental objects.	Prepare and conduct a chemical experiment to study the properties and identify the most important classes of organic, inorganic compounds; determine the physico- chemical constants of substances; use the necessary instruments and laboratory equipment during research; process the results of the experiment	Organic chemistry
B050 - «Biological and related sciences»	«Biotechnology»	Full-time (bachelor 4 years) trimester	Organic chemistry	OH 1280	BS	Elective subjects	5.0	Bachelor	«Quantum II »	1	3		School Chemistry Program	Basics of Pharmacy and Pharmacognosy, Biochemistry, Biotechnology of plants, Environmental biotechnology, Food biotechnology, Fundamentals of pharmacology, Industrial biotechnology, Molecular genetics and genetic engineering, Objects of biotechnology, Pharmaceutical biotechnology, Pharmaceutical chemistry, Veterinary Biotechnology	The discipline promotes knowledge of the subject of economic theory and methods of research, the basis of public production and forms of public economy, the mechanism of functioning of the market system, production costs and income of the firm, national economy; Give an assessment of economic growth and instability of the market economy, inflation and unemployment as manifestations of economic instability. Demonstrate knowledge and skills in the financial and monetary credit system in the national economy and economic security. To master the basics of constitutional, administrative, civil, labor, family, criminal law.	Analyze in a logical and quantitative way the conditions for the development of production and evaluate the competitiveness of created products on the principles of entrepreneurship, study innovative corruption culture, formulate interventions	Basics of anti-corruption culture, Ecology and life safety, Introduction to labour safety and safety of the life activity

B050 - «Biological and related sciences»	6B05102 - «Biotechnology»	Full-time (Bachelor 4 years) trimester	Introduction to leadership in education	VLO 2126	Elective subjects	5.0	Bachelor	Трофецко манаоце ођопаоам	2	1	History of Kazakhstan, Political science and sociology, School curriculum of the history of Kazakhstan, social science, jurisprudence	The discipline analyzes and studies the model of effective communication of the leader, methods of management in critical situations, methods of work in the management team and the principle of distribution of roles in the team, methods of effective control and motivation of training. It provides an opportunity to study the theory of leadership qualities and at the same time the concept of leadership behavior (three leadership styles (K. Lervin), research at the University of Ohio, management system (R. Likert), management grid (Blake and Mouton), concept of reward and punishment, substitute leadership (S. Kerr and J. Germeier))	To organize highly efficient operation of machines, apparatus, machinery and technological equipment in production, to show leadership qualities	Basics of anti-corruption culture, Basics of economics and Law, Ecology and life safety, The labour safety and safety of the life activity	
B050 - «Biological and related sciences»	6B05102 - «Biotechnology»	Full-time (Bachelor 4 years) trimester	Basics of anti-corruption culture	OAK 2127	Elective subjects	5.0	Bachelor	Economy	2	1	Fundamentals of Economics and Law, Philosophy, Cultural Studies and Political Science	Business activities, Innovative entrepreneurship	The discipline examines the theoretical and methodological foundations of the concept of "Corruption" and examines the improvement of socio-economic relations of the Kazakh society as a condition for combating corruption, psychological features of the nature of corrupt behavior, formation of anti-corruption culture, features of formation of anti-corruption culture of youth, ethnic features of formation of anti-corruption culture, moral and ethical responsibility for corruption in various spheres. Discipline allows you to learn about legal responsibility for corruption offenses	Analyze in a logical and quantitative way the conditions for the development of production and evaluate the competitiveness of created products on the principles of entrepreneurship and anti-corruption culture, formulate interventions	Basics of economics and law, Ecology and life safety, Introduction to leadership in education, The labour safety and safety of the life activity
B050 - «Biological and related sciences»	6B05102 - «Biotechnology»	Full-time (Bachelor 4 years) trimester	The labour safety and safety of the life activity	OTOBZa 4301	Elective subjects	5.0	Bachelor	Mechanization of technological processes	2	1	School program of physics, labor protection	Annual Biotechnology, Biotechnology of plants, Biotechnology of microorganisms, Environmental biotechnology, Food biotechnology, Cell biotechnology, Industrial biotechnology, Immunology, Medical biotechnology, Microbiology and Virology, Objects of biotechnology, Practical Pharmaceutical biotechnology, Practical training, Pregraduation practice, The microbiological control of food production, Veterinary Biotechnology	Formation of students knowledge, practical skills and abilities to create safe and healthy working conditions, to prevent the causes and conditions the emergence of a dangerous situations, to protect the population and production staff of national economy objects from the consequences of possible emergencies. The specific features of labor protection for women and youth, supervision and control of the implementation of health and safety legislation and liability for violations of the requirements of occupational safety.	Make calculations in heat engineering, thermodynamics and electrical engineering, choose the correct operation of electrical and thermal equipment, analyze hazards and harmful production factors, study the environment and life safety requirements	Basics of anti-corruption culture, Basics of economics and law, Ecology and life safety, Introduction to leadership in education

BO50 - «Biological and related sciences»	GB05102 - «Biotechnology»	Full-time (Bachelor 4 years) trimester	Ecology and life safety	EB20 2120	GER subjects	5.0	Bachelor	Ecology	2	1	Disciplines of the school curriculum	Environmental biotechnology, Microbiology and Virology, Objects of biotechnology, The microbiological control of food production	The discipline studies the laws of interaction between organisms and their habitats, the laws of development, the preservation of human health and life in the technosphere, protection from the dangers of man-made and natural origin and the creation of comfortable living conditions.	Theoretical and methodological foundations of the concept of "corruption" Improving the socio-economic relations of Kazakhstan society as a condition for countering corruption Psychological features of the nature of corrupt behavior Formation of anti-corruption culture Features of the formation of anti-corruption culture of youth Ethnic features of the formation of anti-corruption culture Moral and ethical responsibility for corruption in various fields Legal liability for corruption offenses	Basics of anti-corruption culture, Basics of economics and law, Introduction to leadership in education, The labour safety and safety of the life activity
BO50 - «Biological and related sciences»	GB05102 - «Biotechnology»	Full-time (Bachelor 4 years) trimester	Fundamentals of pharmacology	OF 2222	BS subjects	6.0	Bachelor	Microbiology and biotechnology	2	3	Ecology, chemistry, analytical and physical colloidal chemistry, organic chemistry,	Cell biotechnology, Internship, Medical biotechnology, Pharmaceutical chemistry, Pregraduation practice	General pharmacology; General recipe. Means affecting afferent innervation, efferent innervation, central nervous system, metabolic processes and homeostasis.	Know the basics of pharmacology; the concept of a medicinal product, medicinal substance, medicinal product, dosage form, general patients of pharmacokinetics and pharmacodynamics of drugs;	Basics of Pharmacy and Pharmacology
BO50 - «Biological and related sciences»	GB05102 - «Biotechnology»	Full-time (Bachelor 4 years) trimester	Basics of Pharmacy and Pharmacology	OF 2294	BS subjects	6.0	Bachelor	Microbiology and biotechnology	2	3	Биологиялық пәнаралық органикалық химия, анализикалық және физикалық коллоидтық химия, органикалық химия, физиологиялық молекулалық биология, биохимия	Cell biotechnology, Internship, Medical biotechnology, Pharmaceutical chemistry, Pregraduation practice	Basics of pharmacy and pharmacology; Nomenclature of medicinal plants and medicinal plant materials. The tasks of pharmacology at the present stage of its development. A chemical composition of medicinal plants and a classification of medicinal plant materials. Medicinal plants and raw materials containing polysaccharides, vitamins, fatty oils, terpenoids, alcohols, glycosides, monoterpene bitterness, flavonoids.	Interpret the basic concepts of pharmacology; demonstrate the methods of pharmacognosic analysis; the principles of harvesting medicinal plant materials; conduct qualitative and microchemical reactions to the main biologically active substances;	Fundamentals of pharmacology
BO50 - «Biological and related sciences»	GB05102 - «Biotechnology»	Full-time (Bachelor 4 years) trimester	Basics of Biostatistics and Bioinformatics	BBN 2214	BS subjects	6.0	Bachelor	Microbiology and biotechnology	2	3	Information communication technologies	Animal Biotechnology, Biotechnology of plants, Business activities, Cell biotechnology, General Immunology, Industrial biotechnology, Innovative entrepreneurship, Internship, Medical biotechnology, Pharmaceutical biotechnology, Pregraduation practice, The microbiological control of food production, Veterinary Biotechnology.	Biological information, statistical processing of measurement results in biological research. Sequencing technology; Microsoft Excel. Excel package features. The main categories of statistical analysis in Microsoft Excel, Microsoft Access databases. Processing of the results of serological studies. Deciphering the genetic code electronic resources NCBI. The possibilities of using the program BLAST. Acquaintance with the Galaxy web platform	Apply probabilistic and statistical methods in solving applied problems; collect and process statistical data. Be proficient in working with software used in the analysis of biological data, engage in research and biotechnological practice using the methods of biostatistics and bioinformatics; process and analyze the results of their own research when performing term papers and theses	Research work with the basics of patient
BO50 - «Biological and related sciences»	GB05102 - «Biotechnology»	Full-time (Bachelor 4 years) trimester	Research work with the basics of patient		BS subjects	6.0	Bachelor	Microbiology and biotechnology	2	3	Fundamentals of Economics and Law, Fundamentals of Biotechnology	Animal Biotechnology; Environmental biotechnology; Food biotechnology, Cell biotechnology, Industrial biotechnology, Internship, Pregraduation practice, Veterinary Biotechnology	Methodological foundations of scientific knowledge: Forms and types, theoretical foundations, basic research methods used in the field of biological sciences. Experiment. Stages of research and their sequence. The choice of research topic, analysis and synthesis of research results. Methods of collecting and studying patent information.	Know the methodological foundations of scientific research and naming used in the field of biological sciences.	Basics of Biostatistics and Bioinformatics

BO50 - «Biological and related sciences»	«Biotechnology»	Full-time (bachelor 4 years) trimester	Medical Biotechnology	MB 32100	BS	Elective subjects	7.0	Bachelor	Микробиология и биотехнология	3	1	<p>Fundamentals of Biotechnology, Biochemistry, Inorganic and Organic Chemistry, Physiology, Analytical and Physical Colloid Chemistry, General Pharmacology</p> <p>Fundamentals of Pharmacy and Pharmacognosy</p>	<p>Biotechnology of microorganisms, Environmental biotechnology, General Immunology, Industrial biotechnology, Inertship, Pharmaceutical production, The microbiological control of food production</p>	<p>Medical biotechnology: The value of biotechnology in solving problems of medicine and health. The use of human cells in biotechnology; Fibroblasts, stem cells. IVF - problems and prospects. Technology of production, fertilization of cells, replanting and storage of embryos in vitro. Requirements for sperm and egg donors. Banks of gametes and human embryos. Technology of producing antigens and hyperimmune sera for medicine. Production of diagnostics of common diseases based on hybridoma technology and monoclonal antibodies.</p>	<p>Master the basics of biotechnology, the features of the technology for the manufacture of medical preparations, the methods of their control; master the methods of genetic engineering used in the creation of diagnostics and vaccines of a new generation; to master the skills of obtaining phyto- and biological preparations, operations of hybrid technique, isolation and purification of DNA.</p>	Pharmaceutical chemistry
BO50 - «Biological and related sciences»	«Biotechnology»	Full-time (bachelor 4 years) trimester	Pharmaceutical chemistry	PH 32101	BS	Elective subjects	7.0	Bachelor	Физика и химия	3	1	<p>Inorganic and organic chemistry, analytical and physical- colloid chemistry, organic chemistry, physiology, molecular biology, biochemistry, general pharmacology, basics of pharmacy and pharmacognosy</p> <p>Animal Biotechnology; Environmental biotechnology; Food biotechnology; Industrial biotechnology; Inertship, Pharmaceutical biotechnology, Preraduation practice, Veterinary Biotechnology</p>	<p>Animal Biotechnology; Environmental biotechnology; Food biotechnology; Industrial biotechnology; Inertship, Pharmaceutical biotechnology, Preraduation practice, Veterinary Biotechnology</p>	<p>Introduction to drug chemistry funds. Content pharmaceutical chemistry. Main regulations and documents regulating pharmaceutical analysis. Drug analysis methods funds. Communication farm-chemistry with other sciences Sources of obtaining PV. LV classification. Standardization of drugs</p>	<p>To be able to use the chemical properties of substances, including medicinal ones, to select methods for qualitative and quantitative analysis, to draw up reaction equations in</p>	Medical Biotechnology
BO50 - «Biological and related sciences»	«Biotechnology»	Full-time (bachelor 4 years) trimester	Biotechnology of microorganisms	BM 32102	BS	Elective subjects	6.0	Bachelor	Микробиология и биотехнология	3	2	<p>Animal Biotechnology, Basics of biotechnology, Biotechnology of plants, Food biotechnology, Cell biotechnology</p> <p>Microbiology (Immunology and Virology), Molecular genetics and genetic engineering</p>	<p>Environmental biotechnology; General Immunology, Industrial biotechnology, Inertship, Pharmaceutical biotechnology; Preraduation practice, The microbiological control of food production, Veterinary Biotechnology</p>	<p>Basics of microbiological biotechnology and principles of the biotechnological process. Stains-producers of target products and requirements for their storage- Principles and methods of producing producer strains and super-producers. Study of the growth of microorganisms and the effect of pH and temperature of cultivation. Characteristics of producers and technology of the production of microbial protein, organic acids and neutral products, BAS microbiological synthesis: vitamins, hormones and enzymes, antibiotics and probiotic preparations, classical and modern vaccines. Biotechnological production based on the production of microbial biomass</p>	<p>Justify the choice of microorganisms, plants or animals as objects for scientific research and practical work with the aim of application in various fields of biotechnology; Use knowledge about microorganisms</p>	Objects of biotechnology

B050 - «Biological and related sciences»	6B05102 - «Biotechnology»	Full-time (bachelor 4 years) 4th trimester	Objects of biotechnology	BN 2206	BS	Elective subjects	6.0	Bachelor V	Microbiology and biotechnology	3	3	2	Inorganic and organic chemistry, analytical and physical-chemical chemistry, organic chemistry, physiology, molecular biology, biotechnology, biochemistry, biophysics, microbiology, immunology, pharmaceutical biotechnology, praproduction practice, The microbiological control of food production, Veterinary Biotechnology	Features of the structural and functional organization of organisms - biological objects that produce the main practically significant cellular metabolites. Acquaintance with the biology of in vitro cultured plant and animal cells, methods of their cultivation and application for solving theoretical and practical problems. Principles of selection of biological objects for their use in the technical methods of obtaining modified biological objects in order to give them new properties or the ability to produce new substances.	Distinguish the nature and diversity of various objects of biotechnology, use biotechnology objects in production activities	Biotechnology of microorganisms	
B050 - «Biological and related sciences»	6B05102 - «Biotechnology»	Full-time (bachelor 4 years) 4th trimester	Professionally-oriented Foreign Language	POTs 3255	BS	Elective subjects	3.0	Bachelor V	Microbiology and biotechnology	3	3	3	«Foreign language» in the undergraduate level (B1-B2)	English for special purposes, Professional English	To form the professional foreign language speech of future specialists to increase the level of professional competence. Proficiency in a professional foreign language for the implementation of written and oral information exchanges, further development of speech activity (reading, writing, listening and speaking - monologue and dialogic speech). Rules of speech behavior in accordance with situations of professional communication, depending on the style and nature of communication in the social, household and academic spheres.	Use communication in oral and written forms in the state, Russian and foreign languages to solve professional problems of interpersonal and intercultural interaction	Academic writing
B050 - «Biological and related sciences»	6B05102 - «Biotechnology»	Full-time (bachelor 4 years) 4th trimester	General Immunology	OI 3257	BS	Elective subjects	6.0	Bachelor V	Microbiology and biotechnology	3	3	3	Biotechnology, Cell biotechnology, Microbiology and Virology, Molecular genetics and genetic engineering, Physiology	Internship, Pharmaceutical biotechnology, Praproduction practice	The concept of natural resistance and species immunity, acquired immunity. Modern ideas about antigens, protective mechanisms of the macroorganism, regulation of the immune response and applied immunology. The functioning of the immune system is normal, the laws and principles of functioning. Knowledge of immunological methods for determining T- and B-lymphocytes, as well as methods for isolating and studying immunoglobulins	Master the skills of obtaining feed and food protein, immunobiological preparations, organic acids, alcohols, biologically active compounds. Know the main stages and processes of food production. Be able to work with cultures of microorganisms, control the growth of producers, prepare the main types of food products obtained using microorganisms. Own methods of selection and selection of natural microorganisms for the manufacture of starter cultures.	The microbiological control of food production
B050 - «Biological and related sciences»	6B05102 - «Biotechnology»	Full-time (bachelor 4 years) 4th trimester	The microbiological control of food production	MKPP 2291	BS	Elective subjects	6.0	Bachelor V	Microbiology and biotechnology	3	3	3	Basics of biotechnology, Biochemistry, Microbiology and Virology, Molecular biology, Pharmaceutical genetics and genetic engineering	Environmental biotechnology, Industrial biotechnology, Internship, Pharmaceutical biotechnology, Praproduction practice	Microbiological bases of food products. Specific microflora of food. Foodborne diseases: microorganisms, diseases and methods of control. Some legal aspects in food safety. Control of microorganisms leading to food spoilage. Detection and identification of bacteria in food.		General Immunology

B050 - «Biological and related sciences»	6B05102 - «Biotechnology»	Full-time (bachelor 4 years) trimester	Professional English	PAV a 4272	BS	Elective subjects	3.0	Bachelor	Microbiology and biotechnology	4	1	Foreign language, «Foreign language» in the bachelor's degree	Business activities, Industrial biotechnology, Innovative entrepreneurship, Pharmaceutical biotechnology, Pregraduation practice	Systematic deepening of the English study and the development of communicative competence in the framework of international standards of foreign language education based on the further development of skills and abilities of active language skills in professional activities.	Assess the competencies of monologue and dialogic utterance; independently write texts of different genres in English provided by the program; understand the main idea of academic texts; including specialty texts; critically analyze information; view and comment on texts; use reference materials; including resources from the Internet; make academic presentations on given topics.	English for special purposes
B050 - «Biological and related sciences»	6B05102 - «Biotechnology»	Full-time (bachelor 4 years) trimester	Business activities	PD 4220	BS	Elective subjects	5.0	Bachelor	Technology of production of products of stock-raising	4	2	Fundamentals of Economics and Law, Higher Mathematics	Industrial biotechnology, Pharmaceutical biotechnology, Pregraduation practice	Form students' knowledge of the fundamental concepts of innovative development, modern approaches to the implementation of entrepreneurial activity in the field of new technologies to ensure the competitiveness of an innovative enterprise on the market. Understand the economic essence of innovative entrepreneurship, business planning, venture financing and know the types of firms with venture capital. Possess skills in risk management, human resource management, innovative management and innovative processes, as a condition for economic growth.	Analyze in a logical and quantitative way the conditions for the development of production and evaluate the competitiveness of created products on the principles of engineering; study innovative entrepreneurship and anti-corruption culture; formulate interventions	Innovative entrepreneurship
B050 - «Biological and related sciences»	6B05102 - «Biotechnology»	Full-time (bachelor 4 years) trimester	Innovative entrepreneurship	IP 4292	BS	Elective subjects	5.0	Bachelor	Economy	4	2	Fundamentals of Economics and Law, Higher Mathematics	Industrial biotechnology, Pharmaceutical biotechnology, Pregraduation practice	Analyze in a logical and quantitative way the conditions for the development of production and evaluate the competitiveness of created products on the principles of engineering; study innovative entrepreneurship and anti-corruption culture; formulate interventions	Business activities	

The catalog of elective disciplines was approved by the faculty council Minutes 1A dated 28.08.2023

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