ALIKHAN BOKEIKHAN UNIVERSITY

MODULAR EDUCATIONAL PROGRAM
6B01509 «Chemistry-Biology»

Semey, 2023 y.

Developed by the Department of Applied Biology

Discussed and approved at the meeting of the Department of Applied Biology
(Protocol No. 6 of 03.02.2023)

Reviewed and recommended for approval at the meeting of the Academic Quality Council of the Faculty of Information Technology and Economics
(Protocol No. 3 of 25.05.2023)

Reviewed and approved at the meeting of the Educational and Methodological Council of the University (Protocol No. 5 of May 25, 2023)

CONTENT

1. EXPLANATORY NOTE

The modular educational program (MEP) is compiled on the basis of the following documents:

- The Law of the Republic of Kazakhstan "On Education" dated 27.07.2007 with additions and amendments dated 21.02.2019;
- The State Standard of Higher and Postgraduate Education approved by the Order of the Minister of Science and Higher Education of the Republic of Kazakhstan dated July 20, 2022 No. 2;
- Rules for the organization of the educational process on credit technology of education, approved by Order No. 152 of the Minister of Education and Science of the Republic of Kazakhstan dated April 20, 2011;
- Model Rules for the Activities of organizations of Higher and (or) Postgraduate Education, approved by Order No. 595 of the Minister of Education and Science of the Republic of Kazakhstan dated October 30, 2018;
- Professional standard "Teacher" approved by the order of the Acting Minister of Education of the Republic of Kazakhstan dated December 15, 2022 No. 500;
- Form 26 "Structure of the modular educational program";
- MEP Regulations

The MEP is designed as a set of sequential training modules for the entire period of study and is aimed at mastering the competencies necessary for awarding the Bachelor of Education degree under the educational program 6B01509 "Chemistry-Biology".

The modules of the block of general education disciplines (GE) include the disciplines of the mandatory component: (MK) – 51 credits and the university component (UC) – 5 credits.

The block of basic disciplines (BD) includes disciplines of the university component (UC) – 76 credits and elective components (EV) – 36 credits.

The block of profile disciplines (PD) includes disciplines of the university component (UC) – 28 credits and elective components (EV) - 36 credits.

Additional types of training (ATT) – 8 credits, which include the Final certification.

The criterion for the completion of the educational process is the development of 240 credits by a student.

The MEP consists of 21 modules.

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Social partners:

- biology teacher of KSU "Secondary school No. 17" – Shokhanov T.K.;
- biology teacher of KSU "Secondary school No. 3" – Mukasheva M.B.;
- chemistry teacher of KSU "Bulak secondary school" Kanatova U.K.

The purpose of the educational program.

Training of qualified teaching staff according to the educational program "Chemistry-Biology", who have professional competencies aimed at meeting the needs of the teaching staff of the region.

Expected results of the educational program (formed learning outcomes):

ON1 – demonstrate knowledge of the idea of a modern law state to instill entrepreneurial skills, leadership qualities, receptivity to innovation based on scientific research with integrity, as well as ensuring safety standards.

ON2 – to conduct psychological and pedagogical research in order to identify the specifics of human mental functioning, taking into account the peculiarities of age stages, developmental crises and risk factors, in order to assess and analyze the processes of higher nervous activity; apply methods and technologies of educational activities and inclusive education in accordance with the age characteristics of students based on knowledge about the peculiarities of the regulation of behavior and activity a person at various age levels; to select the means of training and education, methods and technologies of education that meet the modern requirements of traditional and inclusive education; to use the basic theories of motivation, leadership and power to solve managerial tasks; to apply risk management in educational organizations to make managerial decisions to reduce the degree of risk; to comply with modern requirements for personal and professional qualities of the teacher.

ON3 – use professional documentation in the state and foreign languages; use Kazakh, Russian and foreign languages in professional and research activities; present their position in a reasoned manner and conduct scientific discussions; perceive and analyze scientific articles in foreign journals and reports at international conferences.

ON4 – use regulatory legal documents in the field of safety and ecology fundamentals in their activities; predict the danger to living organisms of chemicals based on their structure and properties; conduct a chemical experiment in compliance with safety standards, including synthesis, analysis, study of the structure and properties of substances and materials; use basic methods to protect the life and health of students in the educational process and extracurricular activities, taking into account the danger of biological objects and chemicals.

ON5 – to plan, design and analyze the educational process in the organization of education; solve the tasks of education and spiritual and moral development of students in educational and extracurricular activities; manage the behavior of students, motivating their educational and cognitive activities and promote their personal growth; develop programs of extracurricular work in biology and chemistry: scientific circles, excursions, field expeditions to study flora and fauna of the region, studies of the chemical composition of soils, reservoirs, etc.

ON6 – analyze the curriculum of textbooks and methodological literature; develop teaching materials based on normative documents in the field of education; use modern pedagogical methods and technologies in planning and conducting classes in biology and chemistry in educational institutions, taking into account the individual characteristics of students; apply the knowledge gained in chemistry and biology to solve pedagogical problems; plan, organize and conduct research work; to use modern methods and means of knowledge control, as well as a system of criteria for evaluating educational achievements of training and monitoring the progress of students; methodically competently conduct school experiments, laboratory and practical classes; use modern information and communication technologies and technical means of training; analyze their professional qualities and best pedagogical practices.

ON7 - possess basic chemical laws, theories, patterns and chemical transformations for explanation and use in real chemical processes occurring in the educational process; use computational methods to solve various chemical tasks of an educational and scientific laboratory nature; possess methods of safe use of chemical materials taking into account their physical and chemical properties.

ON8 – to use the basic laws of chemical science and fundamental chemical concepts in solving specific professional tasks; to possess the skills of chemical experiment, synthetic and analytical methods for obtaining and researching chemicals and reactions; to calculate the main characteristics of typical processes of chemical technology and nanotechnology based on knowledge of modern chemical production; based on knowledge of safety standards to implement them in laboratory and technological conditions.
ON9 – apply biological knowledge to explain the processes and phenomena of vital activity (physiological processes) of the human body and other representatives of the animal kingdom, plants, indicating their taxonomic group, anatomical, morphological and ecological features (spread on Earth) in professional activities.
ON10 – to compare the structure, components, functions, development, properties of plant, animal cells, tissues, microorganisms, various viruses and extracellular structures with the use of measuring instruments, laboratory equipment, cytochemical, biochemical methods of studying microscopic objects for solving practical problems and application in experimental studies; to use knowledge on inheritance and modification of genetic information of plant cells, animals, microorganisms with the use of virus particles to understand the latest achievements in biotechnology of immune preparations and plant selection.
ON11 – to carry out qualitative reactions to various substances, separate classes of chemical compounds; to analyze the physico-chemical properties of substances of various nature; to identify functional groups of chemical compounds; to investigate the properties of natural compounds; to evaluate the course of chemical processes in systems; to determine the concentration of reacting substances and their reaction rate; to build phase diagrams; to determine the parameters of catalytic reactions, patterns of chemical and physico-chemical processes.
ON12 – predict chemical reaction products by formulas or names of starting substances; determine starting substances by formulas or names of reaction products; predict the effects of various factors on changing the direction of a chemical reaction; use chemical experiment skills, basic synthetic methods for obtaining and analyzing chemicals; evaluate the effectiveness of chemical processes; simulate the hardware design of chemical compounds; choose the method of obtaining a chemical product, select the necessary equipment, evaluate the technological system.
ON13 – to distinguish between cultivated and wild plants by species; to use agrotechnics for growing plants of open, closed ground; to accelerate the ripening of fruits and seeds of plants; to make earth mixtures for indoor plants; to follow the rules and techniques of plant care; to design landscaping of green spaces; to make an assortment of plants for the landscaping object taking into account their biology, decorative and climatic conditions of the area; to create landscaping projects using special designations; rationally distribute the functional zones of the landscaped area.

In order to create special conditions for people with special educational needs to receive education, the graduate's competence model is supplemented with professional competencies that ensure the adaptive nature of the main educational program. To this end, courses for the formation of the ability of persons with special educational needs to successfully socialize in society and actively adapt to the labor market, taking into account the characteristics of the disease, are introduced into the catalog of courses of the additional educational program "Minor".

2. The graduate's competence model

The learning outcomes are determined on the basis of the Dublin descriptors of the first level (Bachelor's degree) and are expressed through competencies.

Competence is the possession of a certain competence, the availability of knowledge, skills and abilities necessary for effective activity in a certain professional field.

Competence is the ability to apply knowledge, skills, and successfully act on the basis of practical experience in solving professional tasks.

The competencies that a graduate should have after mastering the MOS are listed below.

1. Competence of general education (GE):

1) aimed at forming the ideological, civil and moral positions of the future specialist, competitive on the basis of knowledge of information and communication technologies, building communication programs in Kazakh, Russian and foreign languages, orientation to a healthy lifestyle, self-improvement and professional success;

2) form a system of general competencies that ensure the socio-cultural development of the personality of the future specialist on the basis of the formation of his ideological, civil and moral positions;

3) develop the ability to interpersonal social and professional communication in Kazakh, Russian and foreign languages;

4) contribute to the development of information literacy through the mastery and use of modern information and communication technologies in all spheres of their lives and activities;

5) form skills of self-development and education throughout life;

6) form a personality capable of mobility in the modern world, critical thinking and physical self-improvement;

7) to evaluate the surrounding reality on the basis of worldview positions formed by knowledge of the fundamentals of philosophy, which provide scientific understanding and study of the natural and social world by methods of scientific and philosophical cognition, to reveal the meaning of the content and specific features of the mythological, religious and scientific worldview;

8) to show a civic position based on a deep understanding and scientific analysis of the main stages, patterns, peculiarities of the historical development of Kazakhstan, to use methods and techniques of historical description to analyze the causes and consequences of events in the history of Kazakhstan;

9) assess situations in various spheres of interpersonal, social and professional communication, taking into account basic knowledge of sociology, political science, cultural studies, psychology, arguing their own assessment of everything happening in the social and industrial spheres, as well as synthesize knowledge of these sciences as a modern product of integrative processes;

10) to use scientific methods, methods of research of a specific science, as well as the entire socio-political cluster, to select a methodology, analyze and summarize the results of the study;

11) develop their own moral and civic position on the basis of social, business, cultural, legal and ethical norms of the Kazakh society;

12) to apply in practice knowledge in the field of social sciences and humanities, which has worldwide recognition, synthesize new knowledge and present it in the form of humanitarian socially significant products;

13) to engage in communication in oral and written forms in Kazakh, Russian and foreign languages, using language and speech means based on grammatical knowledge to solve the problems of interpersonal, intercultural and industrial (professional) communication, as well as to analyze information, actions and deeds of communication participants in accordance with the communication situation;

14) use various types of information and communication technologies in personal activities: Internet resources, cloud and mobile services for the search, storage, processing, protection and dissemination of information;

15) build a personal educational trajectory throughout life for self-development and career growth, focus on a healthy lifestyle to ensure full-fledged social and professional activities through methods and means of physical culture;

16) to know and understand the basic laws of the history of Kazakhstan, the basics of philosophical, socio-political, economic and legal knowledge, communication in oral and written forms in Kazakh, Russian and foreign languages;

17) apply the acquired knowledge for effective socialization and adaptation in changing socio-cultural conditions, possess the skills of quantitative and qualitative analysis of social phenomena, processes and problems.

2. Basic competencies (BC):

1) conduct psychological and pedagogical research in order to identify the specifics of human mental functioning, taking into account the peculiarities of age stages, developmental crises and risk factors, in order to assess and analyze the processes of higher nervous activity; conduct research on the educational environment and the level of assimilation of the content of the subject by students, and independently use the results of diagnostics of individual characteristics of students;

2) apply methods and technologies of educational activity and inclusive education in accordance with the age characteristics of students based on knowledge about the peculiarities of regulation of human behavior and activity at various age levels; select teaching and upbringing tools, methods and technologies of education that meet modern requirements of traditional and inclusive education, while observing pedagogical tact, rules teaching ethics and showing respect for the personality of students;

3) use professional documentation in the state and foreign languages; use Kazakh, Russian and foreign languages in professional and research activities; present their position in a reasoned manner and conduct scientific discussions; perceive and analyze scientific articles in foreign journals and reports at international conferences;

4) to plan, design and analyze the educational process in the organization of education, taking into account the national priorities of Kazakhstan and to form a tolerant attitude to a different culture, to a different way of life; to solve the tasks of education and spiritual and moral development of students in educational and extracurricular activities; to develop extracurricular work programs; to introduce students to the system of social values, adhering to democratic I enter into relationships with students, contribute to the development of a favorable educational environment

5) to provide methodological support for the educational process; to analyze the program of textbooks and methodological literature; to develop educational materials in accordance with the set goals of classes;

6) to carry out pedagogical communication and interaction in the pedagogical process; to design and carry out educational work in accordance with the laws, educational mechanisms of the pedagogical process; to involve representatives of professional communities in the educational process;

7) apply pedagogical technologies in the educational process; use modern techniques and means of knowledge control; develop their own approaches to the process of education and upbringing; use new learning technologies, including ICT.

3. Professional competencies (PC):

1) predict the danger to living organisms of chemicals based on their structure and properties; conduct a chemical experiment in compliance with safety standards, including synthesis, analysis, study of the structure and properties of substances and materials; use basic methods to protect the

life and health of students in the educational process and extracurricular activities, taking into account the danger of biological objects and chemical substances; use regulatory and legal documents in the field of safety and environmental fundamentals in their activities;

2) develop programs of extracurricular work in biology and chemistry: scientific circles, excursions, field expeditions to study the flora and fauna of the region, research of the chemical composition of soils, reservoirs, etc.;

3) analyze the program of textbooks and methodological literature; use modern pedagogical methods and technologies in planning and conducting classes in biology and chemistry in educational institutions; apply the knowledge gained in chemistry and biology to solve pedagogical problems; use modern techniques and means of knowledge control; plan training sessions taking into account the principles of integration and continuity of training at all levels secondary education; conduct training sessions using didactic knowledge in integration with knowledge in the field of chemistry and biology;

4) plan, organize and conduct research work; methodically competently conduct a school experiment, laboratory and practical classes; use modern information and communication technologies and technical training tools;

5) to use the basic laws of chemical science and fundamental chemical concepts in solving specific professional tasks; to possess the skills of chemical experiment, synthetic and analytical methods for obtaining and studying chemicals and reactions; to calculate the main characteristics of typical processes of chemical technology and nanotechnology based on knowledge of modern chemical production; based on knowledge of safety standards to implement them in the laboratory and technological conditions;

6) possess basic chemical laws, theories, patterns and chemical transformations for explanation and use in real chemical processes occurring in the educational process; use computational methods to solve various chemical tasks of an educational and scientific laboratory nature; possess methods of safe use of chemical materials taking into account their physical and chemical properties;

7) apply biological knowledge to explain the processes and phenomena of vital activity (physiological processes) of the human body and other representatives of the animal kingdom, plants, indicating their taxonomic group, anatomical, morphological and ecological features (spread on Earth) in professional activities;

8) to predict the products of chemical reactions by formulas or names of starting substances; to determine the starting substances by formulas or names of reaction products; to predict the results of the effects of various factors on the change in the direction of the chemical reaction; to use the skills of chemical experiment, basic synthetic methods of obtaining and analyzing chemicals; to evaluate the effectiveness of the organization of chemical processes; to simulate the hardware design of obtaining chemical compounds; choose the method of obtaining a chemical product, select the necessary equipment, evaluate the technological system;

9) distinguish between cultivated and wild plants by species; use agricultural techniques for growing plants of open, closed ground; accelerate the ripening of fruits and seeds of plants; make earth mixtures for indoor plants; follow the rules and techniques of plant care; design landscaping of green spaces; make an assortment of plants for the landscaping object taking into account their biology, decorative and climatic conditions of the area; create landscaping projects using special designations; rationally distribute the functional zones of the landscaped area.

10) compare the structure, components, functions, development, properties of plant, animal cells, tissues, microorganisms, various viruses and extracellular structures using measuring instruments, laboratory equipment, cytochemical, biochemical methods of studying microscopic objects to solve practical problems and applications in experimental research; to use knowledge on inheritance and modification of genetic information of plant cells, animals, microorganisms with the use of viral particles to understand the latest achievements of biotechnology of immune drugs and plant breeding.

Table 1. The sequence of mastering disciplines in the process of forming special competencies

	Competencies	The list of compulsory, elective disciplines and the sequence of their study		Expected results
		List of disciplines	The sequence of their study	
1	**Professional**	General and inorganic chemistry	3rd semester	To know: fundamentals of chemical thermodynamics, kinetic fundamentals of the description of chemical reactions, methods and mechanisms of their acceleration, the doctrine of chemical equilibrium, fundamentals of the theory of solutions, elements of electrochemistry; theoretical foundations of inorganic chemistry; patterns of change in the properties of simple substances and compounds within groups and series of the periodic system; methods and methods of synthesis of inorganic substances; characteristics of chemical bonds and its types; nomenclature of simple substances and inorganic compounds; characteristics of complex compounds; safety rules for working with chemicals; be able to: use knowledge, skills and abilities in the field of theory and practice of general and inorganic chemistry to master the theoretical foundations and methods of research in the field of inorganic materials, on the basis of thermodynamic and kinetic concepts to predict the possibilities of chemical processes, to propose optimal conditions for reversible reactions; to predict the possibilities of exchange reactions in electrolyte solutions; to justify the processes at electrolysis; compare the thermodynamic, redox activity of substances; conduct experiments on the synthesis and research of inorganic compounds; possess: basic chemical laws, theories, patterns and chemical transformations for explanation and use in real chemical processes occurring in the educational process; use computational methods to solve various chemical tasks of an educational and scientific laboratory nature; possess methods of safe use of chemical materials taking into account their physical properties and chemical properties.
		Cytology and histology	3rd semester	Be able to: use microscopes to examine cytological and histological preparations, independently work with drawings and images of cells and tissues; demonstrate knowledge and ability to compare structures, structure, components, functions, development, properties of various cells, tissues; apply theoretical knowledge and skills of using laboratory equipment to solve practical problems and in experimental studies; must master: the technique of preparation of cyto- and histological preparations; material on cell types and main types of tissues; know the following types of laboratory research: basic principles of cell theory; methods of cell and tissue research; structure and functions of cells and cell organoids; differentiation and mechanisms of cellular distribution; methods of studying the structure, classification of tissues in the body/

		Immunology		Know: key concepts in immunology: antigen, antibody, receptors, cytokines, immunocompetent cells, immune response, immune pathology, mechanisms of autoimmune reactions; must be able to: understand the purpose and objectives, see the practical orientation of immunology, which is crucial for the diagnosis, prevention, treatment of infectious, allergic, immunodeficiency, autoimmune, tumor diseases; must possess: theoretical knowledge about mechanisms of formation of innate and acquired immunity in the human body.
		General and molecular genetics	3rd semester	To know: the subject and tasks of general and molecular genetics, the history of its development; the material foundations of heredity and variability, the structure and types of nucleic acids, reproduction of organisms, patterns of inheritance of traits, the basics of genetic analysis, chromosomal theory of heredity, types and causes of variability of organisms, the fine structure of the gene, the main molecular cellular mechanisms, the current state of the problems of genetics; be able to: conduct a bibliographic search for literary sources; solve genetic problems for crossing; conduct experiments on the study of heredity and variability; demonstrate knowledge and ability to compare structures, structure, components, functions, development, properties, inheritance and changes in the characteristics of various cells, tissues; have skills: building a second DNA chain, mRNA; determining the amino acid composition of proteins from DNA or mRNA; building a Pennet lattice to solve problems; using the hybridological method of studying the patterns of inheritance of traits; compiling pedigrees; making a forecast of the development of a hereditary disease in a carrier of a pathological gene or a forecast of the birth of a child with a hereditary pathology/
		Genetic foundations of plant breeding		To know: the features of the plant genome, the main methods of genomic analysis, the functioning of mitochondrial and plastid genomes, mutational and modification variability in autopolyploids, polyploid series, distant hybridization, allopolyploidy and the emergence of cultivated plants, methods for analyzing chromosome homeology, Methods for obtaining aneuploids, similar and homologous mutations, chlorophyll mutations, features of chromosomal and genetically engineered plant breeding, opportunities and achievements of genetic engineering; be able to: navigate the modern scientific literature on genetics and plant breeding, analyze the types of inheritance of breeding traits, types of genetic variability arising under the influence of mutagenic factors; possess: skills of working with literature, including periodical scientific literature; skills and methods of research of biological objects; skills of describing plant karyotypes.
		Microbiology and virology	3rd semester	To know: the basic properties, structure, systematics, ecology of microorganisms; their classification, role in nature and human life; the kingdom of viruses, their use in the production of antiviral vaccines; biological features of microorganisms causing food spoilage; be able to: use literature in the field of microbiology and virology; demonstrate knowledge and ability to compare structures, structure, constituent components, functions, development, properties, inheritance and change of traits and use of various prokaryotic and eukaryotic cells; apply theoretical knowledge and skills of using measuring instruments, laboratory equipment,

				cytochemical, biochemical methods of studying various environmental objects to solve practical problems and in experimental studies; possess: methods that allow identifying non-permanent elements of microorganisms; isolation of pure cultures of microorganisms and study of their biochemical properties by methods of microbiological studies used to assess environmental objects
		Soil microbiology		Know: morphology, systematics, physiology and ecology of microorganisms, the role of microorganisms in the transformations of various compounds and chemical elements in the soil; be able to: determine the biological activity of the soil and propose ways to regulate it, use bioindication, biotests; demonstrate knowledge and ability to compare structures, structure, components, functions, development, properties, inheritance and change of signs and use of various prokaryotic and eukaryotic cells; apply theoretical knowledge and skills of using measuring instruments, laboratory equipment, cytochemical, biochemical methods of studying various environmental objects to solve practical problems and in experimental research; possess a culture of thinking, capable of generalization, analysis, perception of information, setting goals and choosing ways to achieve it; ready to cooperate with colleagues, work in a team.
		Chemistry of elements	4th semester	To know: basic chemical systems and processes; reactivity of substances; methods of chemical identification of substances; the latest discoveries in the field of chemistry of elements; chemical elements in the human body: macro- and microelements and their compounds; prevention of diseases associated with deficiency, excess and imbalance of trace elements, taking into account age and gender groups and human health; be able to: characterize chemical elements in accordance with their position in the periodic table of chemical elements of D.I. Mendeleev; to make reaction equations, to carry out calculations according to chemical formulas and reaction equations; to focus on periodic changes in the properties of elements located in the main and additional subgroups of the periodic system, properties of compounds, their areas of application; to possess the skills of describing chemical elements in accordance with their decomposition in the table of D.I. Mendeleev.
		Anatomy and morphology of plants	4th semester	To know: similarities and differences of plants, their cells with other living organisms; the structure of plant cells, tissues; vegetative and generative organs of plants and their anatomy; morphofunctional features, types and types of reproduction of plants; flower and its structure, formulas, flower diagrams, arrangement of flowers on the plant; the structure of the seed and fruit; be able to use with a microscope, prepare preparations for microscopy, recognize elements of the structure of plant organisms and correctly formalize the results of observations; to analyze the proposed plant objects based on knowledge of the anatomical, morphological and physiological characteristics of the plant organism, the principles of their systematic classification, as well as the dependence of their structure and functions on the conditions of existence; to possess the basic botanical terms underlying the anatomy and morphology of plants; skills in preparing micro-preparations and microscopy.

		Zoology of invertebrates and vertebrates	4th semester	To know: the basics of systematics, morphology of the main groups of invertebrates and vertebrates; to know about the origin and evolution of chordates; about the role of animals in ecosystems and the biosphere as a whole; features of single- and multicellular parasitic animals, measures to combat them for the safety of life; to know the structure and features of local fauna and ecology of mass and rare animal species; be able to: demonstrate basic concepts of invertebrate and vertebrate zoology, apply them in practice, critically analyze the information received and present research results; apply biological knowledge to explain the processes and phenomena of life activity of representatives of the animal kingdom, indicating their taxonomic group, anatomical, morphological and ecological features in different periods of evolution; possess: skills of research work, discussion; methods of laboratory zoological research on morphology.
		Cell biotechnology	4th semester	Know about: the subject, tasks, history of development, objects, methods of cellular biotechnology, promising directions and trends of its development in the modern world, cellular biotechnology of microbiological systems, genetic engineering, achievements of cellular biotechnology, environmental aspects of biotechnology; be able to: critically analyze scientific experiments; demonstrate knowledge and ability to compare cells, tissues and extracellular structures; apply theoretical knowledge and skills of using laboratory equipment, cito- and biochemical methods of studying various environmental objects to solve practical problems and in experimental research; possess skills of working with specialized laboratory equipment to solve practical problems/
		Introduction to biotechnology		Know about: the scientific foundations of biotechnology; the main directions of production of useful substances; the basics of engineering enzymology; methods and capabilities of genetic and cellular engineering; the basics of technological bioenergy and biological processing of raw materials; the use of biotechnology as an alternative in agriculture; the basics of environmental biotechnology; be able to: navigate in modern directions and methods of biotechnology; use knowledge about biotechnology in study of special disciplines; apply the acquired knowledge in the rational use of natural resources and environmental protection; use the obtained data when writing abstracts; possess applied aspects of biology.
		Analytical chemistry	5th semester	To know: the subject of analytical chemistry; qualitative analysis; requirements for analytical reactions in qualitative analysis; external signs of analytical reactions, specificity, selectivity, sensitivity; principles of analytical classification of cations and anions; chemical methods of quantitative analysis and their use; chemical equilibrium in heterogeneous systems; theoretical foundations of gravimetry; chemical equilibrium in homogeneous systems; complex compounds and organic reagents in chemical analysis; safety rules for working with chemicals; be able to: describe the mechanism of chemical reactions of quantitative and qualitative analysis; justify the choice of analysis methods, reagents and chemical equipment for a specific task; prepare solutions of a given concentration; conduct quantitative and qualitative analysis in compliance with safety regulations; monitor and evaluate the flow of chemical processes; perform calculations of analysis results; must possess methods of safe use of chemical

				materials with taking into account their physical and chemical properties.
		Human and animal anatomy and physiology	5th semester	To know: the structure of animal cells, tissues, organs, organ systems; the relationship of organ functions with their structure; physiology and regulation of the main organ systems in humans and animals; to be able to: conduct somatometry, physiometry; apply biological knowledge to explain the processes and phenomena of the vital activity of one's own body and other animals; to possess: morphological and physiological skills assessment of the human body in anthropological research/
		Physiology of higher nervous activity		To know the mechanisms of the brain, the mechanisms of psychological processes; to possess a sufficient arsenal of the subject; to be able to apply biological knowledge to explain the processes and phenomena of the vital activity of one's own body and other representatives of the animal kingdom, indicating their taxonomic group, anatomical, morphological and environmental features.
		Professional kazakh (russian) language	5th semester	Know:- professional vocabulary and terminology;- the specifics of oral communication in the professional field;- linguistic features of oral and written communication;- features of business communication and business etiquette. Be able to:- use the Russian language in interpersonal communication and professional activities;- to carry out business communication and conduct business conversations on professional topics;- to make out and transfer the necessary information in writing;- explain your point of view and critically evaluate the provisions put forward;- create your own statements, essays, etc.;- apply business etiquette in speech. Own:- skills of expressing one's thoughts and opinions in interpersonal and business communication in Russian;- professional terms and concepts;- analysis of professional text; - information competence: the ability to work with a book, textbook, reference literature, dictionaries, find the necessary information.
		Methodology of teaching biology	5th semester	To know: the content of biological education in a general education school; the development of a system of knowledge, skills and abilities in the application of modern methods, methodological techniques and technologies; features of teaching biology according to the updated program; modern technologies and forms of education used in biology lessons; methods and techniques for the formation of independence and creativity in pedagogical activity; methodological foundations of criteria assessment achievements of students in biology; descriptors and their compilation; be able to: diagnose and plan the educational process; to organize the educational process in biology in secondary school; to competently use visual teaching aids, educational and laboratory equipment in lessons, excursions; to possess: the theoretical foundations of the methodology and technology of teaching biology to secondary school students; the algorithm of pedagogical activity focused on the results of educational work.

		Room and garden floriculture	5th semester	To know: the main groups of indoor and garden plants, the peculiarities of their organization, diversity, ecological, aesthetic and practical role; principles of plant placement; rules of plant care; the main diseases of indoor plants; to be able to: make a plant passport, design projects for flower beds and flower beds, flower beds; prepare soil mixtures; transplant and transfer plants; make fertilize and feed plants; propagate plants by seeds and vegetatively; describe your own observations or experiments, distinguish in them the purpose, conditions and results obtained; possess the skills of drawing up the simplest recommendations for the maintenance and care of indoor and other cultivated plants; plant propagation; certification of indoor and garden plants, as well as the organization of an educational and experimental site; thus, possess the applied aspects of biology/
		Decorative gardening with the basics of landscape design		Know: a zoned assortment of decorative woody plants for landscaping territories of various functional purposes and interiors; agrotechnical techniques used at different stages of green construction; be able to: recognize the main types of woody, shrubby, floral and herbaceous crops used in decorative gardening by morphological characteristics of plants, fruits, seeds; - use drawing and artistic tools and materials; create a landscape project, develop design and estimate documentation, select plants for landscaping objects; own: methods of production of planting material and maintenance of ornamental plantings; ability to build, design and read drawings, to constructively draw natural forms and landscape elements, to compose landscape compositions; possess applied aspects of biology.
		Modern methods of teaching biology	6th semester	To know: modern methods and technologies of multicultural, differentiated and developmental education in the biology course; to be able to: use a variety of forms, techniques, methods and means of teaching biology within the framework of the updated education system of basic general education and secondary general education; to use standard, applied, modern pedagogical methods and technologies in accordance with the set goals and objectives when planning and conducting classes in high school and college; possess: forms and methods of teaching biology, including those beyond the scope of training sessions: project activities, laboratory experiments, field practice, desk processing, etc.; possess knowledge of regulatory and legal documents in the field of education, instructional documentation, skills and abilities to develop current educational and organizational documentation for the implementation of educational concepts of educational institutions programs/
		Methods of organization of extracurricular work in biology		To know: the content and organization of extracurricular work in biology; forms, types of extracurricular work; ways, means of improving the effectiveness of extracurricular work; extracurricular, extracurricular work; research work in biology; methods of organizing, conducting circles, electives, elective courses; methods of organizing, conducting various forms and types of extracurricular work; be able to: develop educational plans for the organization of extracurricular work in biology; to select the components of the educational environment for the implementation of innovative educational tasks through the implementation of extracurricular, extracurricular and extracurricular work in biology; to possess: skills in the application of forms, methods of organizing extracurricular work as an

				integral component of professional improvement of the teacher; to possess knowledge of regulatory and legal documents in the field of education, skills in the development of current educational and organizational documentation for the implementation of educational concepts using extracurricular a job in biology.
		Methodology of teaching chemistry	6th semester	To know: the content and construction of the secondary school chemistry course, methods of teaching chemistry, forms of control and assessment of students' knowledge, methodological foundations of the criterion assessment of students' achievements in chemistry; conceptual and theoretical foundations of the methodology of teaching chemistry, its place in the system of pedagogical sciences and values, the history of the development of chemistry methodology and its current state; features of teaching chemistry in updated program; technological foundations of chemical education; descriptors and their compilation; be able to: determine the optimal methods of teaching chemistry, conduct oral and written forms of control of students' knowledge based on a criterion assessment of achievements; possess: methods, approaches and technologies of teaching chemistry to secondary school students; methods of pedagogical analysis of the results of observations and experiments; algorithm of pedagogical activity focused on the results of educational work.
		Professionally-oriented foreign language	6th semester	Know:- lexical material on the topics of this discipline;- regulatory requirements for registration (official letter, essay, etc.);- improve pronunciation skills;- develop productive and receptive lexical and grammatical skills;-to improve the skills of dialogic speech of a general nature associated with situations of everyday and professional communication;- develop listening skills (with a full understanding of what they heard);- develop and improve writing skills;- improve the skills of introductory, studying, viewing and search reading. be able to:-automate the technical skills of reading to oneself;– develop the ability to transfer scientific information and literature of a socio-political nature;– develop the skills of monologue (prepared) speech - the deployment of the thesis;– master reversed reading aloud of the prepared message;- teach referencing skills. Own:- complexity in solving practical, educational, educational and developmental goals (at the same time, practical goals act as leading ones);- communicative orientation of the learning process.
		Organic chemistry	6th semester	To know: the subject of organic chemistry, classification and nomenclature of organic compounds; theory of the chemical structure of A.M.Butlerov, characteristics of covalent bonds; isomerism; electronic structure of the carbon atom and chemical bonds; characteristics of hydrocarbons: alkanes, alkenes, alkynes, alkadienes, aromatic hydrocarbons; oxygen-containing compounds: alcohols, phenols, aldehydes, ketones, carboxylic acids; sulfur- and nitrogen-containing compounds: amines, thiospirts. natural organic compounds: carbohydrates, fats, proteins; be able to: depict structurally isomers of the main classes of organic compounds; give names for different types of nomenclature and determine the structure of a substance by name; be able to paint a reaction taking into account the mechanism

				and determine reaction products by analyzing the conditions of its conduct; possess basic chemical laws, theories, patterns and chemical transformations to explain and use in real chemical processes occurring in the educational process; possess the skills of using computational methods to solve various chemical tasks of an educational and scientific-laboratory nature; possess methods of safe use of chemical materials, taking into account their physical and chemical properties.
		Plant taxonomy	6th semester	To know: the diversity of the plant world, spatial distribution, structure, evolution, systematic groups of plants; taxonomic categories used in modern taxonomy; lower and higher plants as the main educators of modern vegetation cover; the volume of systematic groups, geographical distribution of plants, the role of plants in ecological systems; the practical significance of the properties of plants of various groups; be able to: distribute plants by groups; to use in practice the economic properties of plant representatives; to analyze the proposed plant objects based on knowledge of anatomical, morphological and physiological characteristics of the plant organism, the principles of their systematic classification, as well as the dependence of their structure and functions on the conditions of existence; to be able to make dichotomous keys; to possess the skills: to identify plants belonging to systematically complex groups; microscopy, dissection, sketches, work with herbarium; distribution of plants by groups/
		Flora of Kazakhstan		To know: the terminology of the discipline, the peculiarities of the flora of the Republic of Kazakhstan and East Kazakhstan region, modern approaches to the analysis of flora, the principles of geobotanical and floristic zoning, the main systematic and ecological groups of plants, the peculiarities of the protection of the flora of the Republic of Kazakhstan and the region in the reserve, national park, nature reserves; to be able to: apply knowledge in floristic research, make notes of flora and their analysis, learn rare and protected plant species of the Republic of Kazakhstan, in collections, in drawings, in nature; to analyze the proposed plant objects based on knowledge of the anatomical, morphological and physiological characteristics of the plant organism, the principles of their systematic classification, as well as the dependence of their structure and functions on the conditions of existence; to possess: methods of floristic research, techniques for describing plant communities, methods for determining the range of the species, knowledge and skills for professional handling of botanical objects.
		Physical and colloidal chemistry	6th semester	To know: the emergence of physical and colloidal chemistry as independent disciplines; the basics of the doctrine of the structure of matter; the basics of chemical thermodynamics; chemical kinetics and chemical equilibria; solutions; phase equilibria and state diagrams; electrochemical processes and surface phenomena; dispersed systems; obtaining and purification of dispersed systems by various methods; to be able to: determine the thermodynamic characteristics of chemical reactions and equilibrium concentrations of substances; determine the direction of the process under given initial conditions; to determine the compositions of coexisting phases in binary heterogeneous systems; to make kinetic equations for simple reactions; to perform calculations using the basic relations of thermodynamics of surface phenomena and calculations of the main characteristics of

				dispersed systems; to calculate the energy parameters of adsorption; to obtain and purify colloidal solutions; to generalize and process experimental information in the form of laboratory reports; to possess: skills of calculating thermal effects and equilibrium constants of chemical reactions; methods for calculating chemical equilibrium, measuring adsorption and specific surface area, viscosity; possess basic chemical laws, theories, patterns and chemical transformations for use in real chemical processes encountered in the educational process; use computational methods to solve various chemical tasks;/
		Polymer chemistry		To know: modern ideas about the structure and properties of high-molecular compounds used in the production of gunpowder, solid rocket fuel and polymer composite materials; theoretical foundations of the synthesis of polymers and their chemical transformations; basic physico-chemical processes occurring in the manufacture of polymer composite materials; standard methods for determining the properties of gunpowder, solid rocket fuels, polymer materials; be able to: to conduct research on the properties of polymer materials, gunpowders, solid rocket fuels according to standard methods; possess: experience in choosing methods for conducting complex tests of polymers, polymer composite materials and products based on them; possess basic chemical laws, theories, patterns and chemical transformations for explanation and use in real chemical processes occurring in the educational process; use computational methods to solve various chemical tasks of an educational and scientific-laboratory nature; possess methods of safe use of chemical materials, taking into account their physical and chemical properties.
		Biochemistry	7th semester	To know: the main stages of development and the most important achievements of biochemistry; physico-chemical properties and biological functions of water; structure, classification and biological functions of proteins, nucleic acids, carbohydrates, lipids; the functional role of proteins, nucleic acids, carbohydrates, lipids, vitamins, enzymes and hormones in the processes of vital activity; specificity and mechanisms of action of hormones; metabolism as a unified system of biochemical processes; mechanism of regulation of enzyme activity; metabolism of proteins, nucleic acids, carbohydrates, lipids; be able to: use the acquired knowledge to master other biological disciplines; conduct qualitative and quantitative analysis of biological material; apply theoretical knowledge in solving technological problems; possess: modern laboratory biochemical methods of studying biological molecules to solve practical issues; possess basic chemical laws, theories, patterns and chemical transformations to explain and use in real chemical processes, occurring in the educational process; use computational methods to solve various chemical tasks of an educational and scientific-laboratory nature; possess methods of safe use of chemical materials, taking into account their physical and chemical properties.
		Plant physiology	7th semester	To know: the subject, tasks and history of plant physiology; totipotency of plant cells; carbon nutrition of plants; water metabolism of plants; evaporation of water by plants, fundamentals of plant resistance to drought; mineral nutrition, physiological basis of fertilizer application; plant respiration; components of the respiratory chain; mechanism of oxidative phosphorylation;

				plant growth and development, phytohormones; physiological basis protection and stability of plants; be able to: conduct a bibliographic search for literary sources; clearly carry out the plan of experiments with plant objects; to work with living plants, compare and find differences between control and experimental plants; to conduct experiments on the removal of physiological indicators of plants; to formalize the results obtained using graphic images and compare indicators; to generalize and draw conclusions; to analyze the proposed plant objects; to have the skills: conducting experiments to study the basic physiological processes; determining osmotic pressure, intensity transpiration, photosynthesis, respiration; isolation of chlorophyll and determination of its quantity and physico-chemical properties; determination of the influence of various mineral elements on the growth and development of plants/
		Physiology of steppe plants		To know: features of the structure of vegetative and generative organs of the main groups of steppe plants - succulents, halophytes, petrophytes; bioecological features of their physiological processes (respiration, photosynthesis, water metabolism, mineral nutrition, growth and development) and adaptation mechanisms due to lack of water, high salinity and stony soils; the main representatives of succulents, halophytes and petrofitov; be able to: conduct a bibliographic search for literary sources; clearly carry out the plan of experiments with plant objects; to work with living plants of the steppe zone, to compare and find characteristic features of steppe plants; to conduct phenological observations; to analyze the proposed plant objects based on knowledge of anatomical, morphological and physiological characteristics of the plant organism growing in the steppe; to have skills: conducting experiments to study the basic physiological processes in the vegetative and generative organs of steppe plants.
		Innovative technologies for teaching chemistry	7th semester	To know: innovative technologies in the modernization of chemistry teaching in educational institutions; the use of information and communication, design and research technologies, technologies for the development of critical thinking, network technologies in teaching chemistry at school; the methodology of using eLearning in teaching chemistry; to know the possibilities of the Internet in the educational activities of chemistry teachers and for teaching chemistry; to be able to: selection and use of educational technologies and teaching methods in accordance with the objectives of their professional pedagogical activity; to make a choice of educational resources on information portals; to use computer tools for organizing pedagogical activities; to design a training session within the framework of variable formats of organizing the educational process; to possess: to possess modern educational technologies and technologies for conducting training sessions; modern computer tools; techniques for implementing interactive interaction in an open information educational space/
		Methods of organizing extracurricular work in chemistry		To know: the content and organization of extracurricular work in chemistry; forms, types of extracurricular work; ways, means of improving the effectiveness of extracurricular work; extracurricular, extracurricular work; research work in chemistry; methods of organizing, conducting circles, electives, elective courses; methods of organizing, conducting various forms and types of extracurricular work; safety when working with chemicals; be able to:

				develop educational plans for the organization of extracurricular work in chemistry; to select the components of the educational environment for the implementation of innovative educational tasks through the implementation of extracurricular, extracurricular and extracurricular work in chemistry; to possess: the skills of using forms, methods of organizing extracurricular work as an integral component of professional improvement of the teacher; to possess safety techniques when working with chemicals; possess knowledge of regulatory and legal documents in the field of education, skills in developing current educational and organizational documentation for the implementation of educational concepts using extracurricular work in chemistry.
		Methodology for calculating tasks in chemistry	7th semester	Possess methodological techniques for solving problems of varying degrees of complexity in the main sections of chemistry; possess methodological techniques for solving Olympiad problems; be able to solve complex creative problems of a theoretical and applied nature; be able to solve problems using a computer and a personal computer; possess a technique for using multimedia tools to teach students how to solve chemical problems; be able to create conditions and design solutions to problems and exercises of increased complexity; use standard, applied, modern pedagogical methods and technologies in accordance with the set goals and objectives when planning and conducting classes in high school and college/
		Methodology of conducting a school chemical experiment		To know: the scheme of construction and methodology of conducting a chemical experiment at school; the technique and methodology of chemical experiment in the study of the main sections of chemistry; to be able to: organize and conduct basic demonstration experiments and laboratory work; to use standard, applied, modern pedagogical methods and technologies in accordance with the goals and objectives when planning and conducting classes in secondary school and college; possess: methodological techniques for conducting a school chemical experiment; possess knowledge of regulatory and legal documents in the field of education, educational and instructional documentation, skills and abilities to develop current educational and organizational documentation for the implementation of educational concepts of training programs for conducting chemical experiments.
		Applied chemistry	7th semester	To know: the main technological processes of production of the most important chemical products in industrial and laboratory conditions, the main devices and devices of chemical technology, safety requirements, industrial sanitation and environmental standards of chemical products production; to be able to: solve typical problems in applied chemistry; to make structural formulas of polymers and ways of their synthesis; to possess: skills of synthesis, isolation and purification of chemicals in laboratory conditions, skills of determination of physical and mechanical properties/
		Chemical synthesis		To know: basic methods of synthesis of simple substances and inorganic compounds in gas, liquid and solid phases, basic methods of separation, concentration and purification of inorganic substances; be able to: make up the material balance of the synthesis process of the substance, determine

				the practical yield of the product; possess: chemical experiment skills, basic synthetic and analytical methods for obtaining and researching chemicals and reactions
		Chemical technology	7th semester	To know: the basic principles of the organization of chemical production, its structure; methods for evaluating the effectiveness of the chemical-technological process and the entire production as a whole; general patterns of chemical transformations in industrial production conditions; structure, organization and technological design of the main chemical industries of modern chemical enterprises of East Kazakhstan Region and the Republic of Kazakhstan. be able to: demonstrate knowledge about the laws of chemical transformations in industrial production conditions, as well as about the structure, organization and technological design of the main chemical industries; calculate the main characteristics of the chemical process, choose a rational scheme for the production of a given product; evaluate the technological efficiency of production; generalize and process experimental information; possess: methods for analyzing the efficiency of chemical production; skills for calculating and determining the technological indicators of the process/
		Organization of pupils' research activities in chemistry		To know: the specifics of the organization of research and project activities of students in chemistry; the specifics of project management within the framework of tutor support; organization and conduct of chemical experiments and observations in laboratory conditions; methods of experimental field research; application of modern techniques in the organization of laboratory experiments; safety when working with chemicals; be able to: apply the necessary methods of scientific research when developing scientific papers; use special methods when performing scientific research; to develop methodological recommendations for the organization of research activities based on the results of the study of scientific literature; to have the skills of: choosing the topic of scientific work; design of research and educational research; organization and conduct of activities aimed at the development of research activities of students.
		Environmental and green chemistry	8th semester	To know: the current state and trends in the development of ecological chemistry; patterns of interaction of living organisms and their aggregates with the environment; ecological significance of soil chemical properties; the effect on living organisms of the movement and chemical composition of air masses; types of bioindicator plants used in environmental diagnostics; principles of "green chemistry" and its latest developments; be able to: conduct screening analysis of habitat quality; reasonably choose a method and methodology for the analysis of environmental objects and biological objects; to carry out a screening bioindication survey of the ecological state of biogeocenoses; to process the results of analytical measurements; to apply the principles of ecological and "green chemistry" when performing chemical experiments; to possess: the laws of the action of environmental factors to predict optimal ecological niches of plants; methods of sampling and conservation of biological material and environmental objects; methods of registering analytical parameters during bioindication and chemical research/

		Coordination chemistry		Know: general ideas about coordination chemistry, including coordination chemistry of rare earth elements and actinides, as well as general patterns in changing the chemical properties of the corresponding CS; be able to: isolate the main thing; make suggestions when setting up or rationalizing the corresponding experiment; use computational methods to solve various chemical tasks of an educational and scientific laboratory nature; possess: terminology and the technique of conducting the simplest estimates and calculations, for example, using circular thermochemical cycles or the theory of the ligand field; possess basic chemical laws, theories, patterns and chemical transformations for explanation and use in real chemical processes encountered in the educational process; possess methods of safe use of chemical materials taking into account their physical and chemical properties.
		Modern chemistry and chemical safety	8th semester	To know: about the relationship between chemistry and sustainable development, as well as the theoretical foundations of traditional and new sections of chemistry and how to use them in solving specific chemical problems, chemical safety of production; methods for assessing technogenic risk; ensuring the safety of operation of chemical facilities to increase the protection of the population and the environment; environmental protection techniques in chemical production; be able to: perform actions (classification of substances, drawing up process diagrams, systematization of data, etc.) taking into account the basic concepts and general patterns formulated within the framework of basic chemical disciplines; possess: skills of using the theoretical foundations of basic chemical disciplines in solving specific chemical and materials science problems/
		Nanotechnology in chemistry		To know: definition and classification of nanoparticles, concepts of nanomaterials, their special physical and chemical properties; basic methods of synthesis and analysis of nanomaterials; existing and promising applications of nanotechnology and nanomaterials; harmful effects of nanomaterials on ecology, human health and safety, as well as ways to prevent them; to be able to: analyze and evaluate various methods of synthesis to propose methods for the analysis of nanomaterials depending on their nature; to propose possible applications of various nanomaterials; demonstrate knowledge about the laws of chemical transformations in industrial production conditions, as well as about the structure, organization and technological design of the main chemical industries; possess: skills of searching for sources of information about new achievements in nanochemistry and nanotechnology.

Table 2. Sequence of mastering disciplines of social and professional interaction

	Providing disciplines	Competencies	Expected result
1	History of Kazakhstan	Competence of general education	Know:- demonstrate knowledge and understanding of the main stages of history development of Kazakhstan; Be able to:- to correlate the phenomena and events of the historical past with the general paradigm of the world-historical development of human society through critical analysis;- be able to objectively and multy-sided comprehend the immanent features of the modern Kazakh model of development; Own:- possess the skills of analytical and axiological analysis in the study of historical processes and phenomena of modern Kazakhstan; - systematize and critically evaluate historical phenomena and the processes of the history of Kazakhstan
1	Kazakh (Russian) language	Competence of general education	Know:- theoretical foundations of the course (language, its functions, forms of speech, text, its features, styles of speech, functional and semantic types of speech);- features of dialogic and monologue speech;- types of scientific information and the specifics of its implementation in a scientific text;- elements of structural-semantic analysis and semantic analysis of a scientific text, components of a speech situation, speaker's intentions. Be able to:- to carry out the correct choice and use of language and speech means for solving certain problems of communication and cognition based on knowledge of a sufficient amount of vocabulary, a system of grammatical knowledge, pragmatic means of expressing intentions;- compose everyday, socio-cultural, official and business texts in accordance with generally accepted norms, functional orientation, using lexico-grammatical and pragmatic material of a certain certification level that is adequate to the goal;- interpret the information of the text, explain in the scope of the certification requirements the style and genre specifics of the texts of the socio-cultural, socio-political, official business and professional spheres of communication;- participate in communication in various situations in different spheres of communication in order to realize their own intentions and needs (everyday, educational, social, cultural), declaring them ethically correct, meaningfully complete, lexico-grammatically and pragmatically adequate to the situation;- discuss ethical, cultural, socially significant issues in discussions, express their point of view, defend it with arguments, critically evaluate the opinion of interlocutors;- build speech behavior programs in situations of personal, social and professional communication in accordance with the norms of the language, culture, specifics of the sphere of communication, certification requirements;- request and communicate information in accordance with the situation of communication, evaluate the actions and deeds of participants, use information as a tool to influence the interlocutor in situations of knowledge and communication in accordance with certification requirements. Own:- the skills of producing oral and written speech in accordance with the communicative goal and the professional sphere of communication;- language skills in various situations of everyday, socio-cultural, professional communication;- skills of searching, processing information in Russian;- types of speech activity.
1	Foreign language	Competence of general education	Know:- lexical minimum and language material of topics and subtopics in a given discipline (social and social and cultural spheres of communication). Be able to:- understand by ear not only individual phrases and frequently used words, but also more voluminous statements on topics directly related to it;- understand the main content of short simple content on the radio, at the airport, at the station. - understand when reading the content of short, simple texts, advertisements, brochures, menus, bus and train schedules, short simple personal letters, e-mails; - communicate in simple typical situations that require the exchange of information within the framework of familiar topics and activities, be able to talk about family, living conditions, training sessions; - write a simple

			letter of a personal nature, a note, an autobiography. Own:- understanding of foreign language dialogic and monologue speech within the framework of general cultural and professional topics; - a foreign language at a level that allows to carry out the main types of speech activity;- different ways of oral and written communication;- skills of adequate response in situations of everyday, academic and professional communication;- skills of listening, reading, writing.
1	Information and communication technologies	Competence of general education	Know: What economic and political factors contributed to the development of information and communication technologies; features of various operating systems, architecture; Be able to: identify the main trends in the field of information and communication technologies; se information resources to search and store information; work with spreadsheets, perform data consolidation, build graphs; apply methods and means of information Be able to: design and create simple websites; to process vector and bitmap images; to create multimedia presentations; to use various platforms for communication; calculate and evaluate performance indicators of supercomputers; use various forms of e-learning to expand professional knowledge; use various cloud services. Own: database structure development; designing and creating presentations; receiving data from the server; creating video files; working with Smart applications; working with services on the e-government website
1	Sociology	Competence of general education	Know:- patterns and stages of the historical process, the main historical facts, dates, events and names of world and domestic historical figures; - the main events and processes of national history in the context of world history. Be able to: - critically perceive, analyze and evaluate historical information, factors and mechanisms of historical changes; - analyze civil and ideological positions in society, form and improve their views and beliefs, transfer philosophical worldview to the field of material and practical activities; - use various philosophical methods to analyze trends in the development of modern society, philosophical and legal analysis Own: - skills of a holistic approach to the analysis of society's problems; - methods of philosophical, historical and cultural studies, techniques and methods of analyzing the problems of society; - causal relationships in the development of Kazakhstan society; - the place of a person in the historical process and the political organization of society;- skills of respectful and careful attitude to the historical heritage
1	Political science	Competence of general education	Know:- the main stages of the development of political knowledge in the history of civilization;- schools and directions of modern political science;- political life of society;- the political system and its institutions;- the essence of political processes in the country and the world. Be able to: - analyze the features of political systems and the functioning of political institutions; - critically evaluate the theoretical approaches of political science; - identify the interrelationships and patterns of the political process; - compare political systems, institutions and actors in the cross-country and subnational context, based on the knowledge gained and the methods mastered. Own:- the skills (gain experience) of working with primary sources on the topics of the course; analysis of regulatory legal acts and other documents; search, processing and analysis of information; solving problems related to the assessment of the political course; working in groups, project activities, business games; public speaking; academic writing; -the skills to express their thoughts and opinions in interpersonal and business communication in a foreign language;- the skills to extract the necessary information from the original text in a foreign language.
1	Cultural studies	Competence of	Know: - basic theories of culture, basic concepts of cultural studies; the main directions of the methodology of modern cultural analysis;- the history of the formation of world culture and civilization, theoretical features of basic cultural concepts, various

		general education	interpretations of culture and civilization in world and domestic literature;- actual problems of the development of modern culture;- the idea of culture as a socio-historical phenomenon;- patterns of the development of world cultures, as well as the typology of the classification of cultures;-basic knowledge about the history of the most important cultures of mankind; - about the ways of acquiring, storing and transmitting the basic values of culture - about the diversity and self-worth of various cultures;- forms and types of culture, patterns of their functioning and development, the main cultural and historical regions - the history of Kazakh culture, its place in the system of world culture and civilization Be able to:- identify the features of this culture, the dominant values in it;- explain the specifics of intercultural communication; - conduct independent professional activity in a dynamically changing multicultural society; - navigate the cultural environment of modern society;- explain the phenomenon of culture, its role in human life;- navigate cultural issues, independently understand the issues of the influence of cultural factors on the behavior of individuals; Own: - practical skills in the preservation and enhancement of national and world cultural heritage;- practical skills of practical use of knowledge and skills in taking into account the specifics of cultural behavior of various individuals and collectives in the modern conditions of the formation of civil society in the Republic of Kazakhstan.
1	Psychology	Competence of general education	Know: the meaning and place of psychology in the system of sciences; the main directions of personality development in modern psychology; personal values and meanings in professional self-determination; the relationship and mutual influence of the psyche and body; techniques and techniques of effective communication. Be able to: interpret basic psychological theories, concepts; use methods and mechanisms of emotion regulation in everyday life; identify patterns of behavior in a conflict situation and conduct self-diagnosis. Own: determination of individual psychological characteristics of personality, value-semantic representations in professional self-determination of personality; recognition of psychological impact and effective communication.
1	Fundamentals of economic and legal knowledge	Competence of general education	To know: methods of scientific research in economics,various theories about entrepreneurship, financial literacy and market economy, types of entrepreneurial activity, spheres of entrepreneurship, to master various quantitative and qualitative methods for creating the future of your own business, entrepreneurial calculations, analytical calculations and forecasts, the main provisions of the Constitution and the current legislation of the Republic of Kazakhstan, the system of public administration bodies and their terms of reference, the mechanism of interaction of substantive and procedural law, the essence of corruption and the reasons for its origin, current legislation in the field of anti-corruption. Be able to: analyze and justify the reality of business plans, market segmentation, competently and professionally assess the market situation for the organization of their business, creatively approach the solution of various economic tasks, possess practical skills of independent economic work in the field of entrepreneurship, calculate your personal budget, have clear background information and fast and correct orientation to economic indicators, analyze events and actions from the point of view of the field of legal regulation and be able to refer to the necessary regulations, navigate the current legislation, using the law to protect their rights and interests, to use spiritual and moral mechanisms to prevent corruption. Skills: acquire practical skills in building graphs and diagrams illustrating various economic models, independent economic work in the field of entrepreneurship, quickly and correctly navigate the actual source information and estimated economic indicators, determine the levels of financial security, have the skills to identify problems of an economic nature in the analysis of specific situations and their solutions, taking into account the actions of economic patterns at the micro and macro levels, conducting discussions on legal issues, on the application of norms in the modern period, analysis of the situation of conflict of interests and moral choice.

	Fundamentals of scientific and environmental knowledge	Competence of general education	To know: forms and methods of pre-scientific, scientific and extra-scientific cognition, modern approaches to socio-humanitarian knowledge and their commensurability; basic epistemological models, the nature of transformations of the concept of rationality; fundamentals of ecology and safe human activity in the habitat, environmental factors and their impact on living organisms, methods for identifying, eliminating the influence of harmful factors on humans and environment, and providing comfortable conditions for human life and activity. Be able to: formulate and solve problems that arise in the course of research and require in-depth professional knowledge; modify existing and develop new methods based on the tasks of a specific study; choose methods of protection from hazards in relation to the field of their professional activities and choose ways to ensure comfortable living conditions. Possess: the skills of conducting independent research and scientific and pedagogical activities that require extensive education in the appropriate direction; the ability to apply methodological and methodological knowledge in conducting scientific research; the skills to ensure the safety of life in professional activities, living conditions and in emergency situations.
1	Developmental physiology and school hygiene	Basic	Know: • general patterns of growth and development of the body; • age-related features of physiology and hygiene of all systems of the child's body;• hygienic requirements for buildings, classrooms, the air environment, lighting of classrooms and equipment of schools; • hygienic foundations of the organization of the educational process and the daily routine for children of six years of age; • fundamentals of the health of children and adolescents, familiarization with the rules of a healthy lifestyle; Be able to: • apply methods and means of cognition, training and self-control for their intellectual development, cultural level improvement, professional competence, preservation of their health, moral and physical self-improvement; Skills: possess skills • to use knowledge about the modern natural science picture of the world in educational and professional activities;• organization of educational work with children and adolescents, taking into account the anatomical and physiological characteristics of the body in different age periods, as well as taking into account hygienic requirements for buildings and classrooms, furniture and equipment of schools; • ensuring the protection of life and health of students in the educational process and extracurricular activities; • countering adverse environmental factors by introducing children and adolescents to the formation of a healthy lifestyle and health promotion.
1	Pedagogy	Basic	To know: - about the role of science and education in public life; - about current trends in the global educational space; - about the professional competence of a teacher of 12-year secondary education; - about the social purpose and role of a teacher in modern society;- about the social meaning and content of their future specialty;- about the object of the future teacher's activity; - about the factors of continuous professional and personal formation of the teacher;- about the education system of the Republic of Kazakhstan;- theoretical and methodological foundations of pedagogy and the history of its development, the world pedagogical heritage; - theory and practice of the holistic pedagogical process; - technology for the implementation of the pedagogical process;
1	Psychology and human development	Basic	Be able to: - carry out pedagogical communication and interaction in the pedagogical process; - to design and carry out educational work in accordance with the laws, educational mechanisms of the pedagogical process; - carry out diagnostics of the educational process in the classroom according to the main characteristics (variables) and predict its further development; - formulate educational tasks, choose activities adequate to these tasks, forms and methods; - develop their own approaches to the process of education and upbringing, comprehend the trends in the development of educational systems at different stages of history; Skills: possess the skills of: - research activities; - pedagogical communication and pedagogical techniques; - organization of subject-subject interaction of all participants in the pedagogical process; - the use of pedagogical technologies in the educational process; - application of the acquired knowledge during the period of professional practice.

1,2	Physical culture	Competence of general education	To know: - the history of the development of the subject of psychology and human development and Soviet and foreign psychology; - characteristics of psychology and human development as a science, its methods and tasks; dynamics of development and structure of personality and human activity; - To have an idea of the psychological characteristics of a person's personality in ontogenesis and phylogeny.
2	Philosophy	Competence of general education	Know: -basic philosophical concepts and categories, patterns of development of nature, society and thinking; - the essence of philosophical categories, terminology of philosophy and the structure of philosophical knowledge, functions of philosophy methods of philosophical research; - the place and role of philosophy in public life; Be able to: - to use the basics of philosophical knowledge to form a worldview position; - analyze ideological, socially and personally significant philosophical problems; - to orient oneself in the system of philosophical knowledge as a holistic view of the foundations of the universe and the prospects for the development of planetary society; - to understand the characteristic features of the modern stage of philosophy development Own: - the skills of philosophical analysis of various types of worldview; - the skills of philosophical thinking to develop a systematic, holistic view of the problems of society; - the skills of analyzing texts with philosophical content
2	Management in education	Basic	To know: - theoretical and methodological foundations of management in education: functions, patterns, principles, methods of pedagogical management, system-forming factors of pedagogical management, the history of the development of management concepts in education: features of school management based on systematic, humane, competence and technological approaches: - fundamentals of the management of the holistic pedagogical process of the school; -conditions for effective management of pedagogical by the school staff
2	Theory and methodology of upbringing work	Basic	Be able to: - apply the acquired theoretical knowledge in the practice of managing an educational institution; - to carry out diagnostic, analytical and design activities within the framework of a unified management system of an educational institution; - to design and carry out various types of management activities; - to use the skills of a systematic, humane, human-centered, competence-based and technological approaches to the management of an educational institution; - to assess the quality of management activities from the standpoint of the holistic pedagogical process of the school as an open pedagogical system; - to be involved in the methodological work of an educational institution, analyze and evaluate the effectiveness of the educational process using modern methods of assessing the quality of teaching, education and development of students, to apply methods of work to overcome the limitations of pedagogical management.
2	Inclusive education	Basic	Skills: possess theoretical knowledge on the basics of pedagogical management in accordance with modern requirements; skills in designing and analyzing the management of the holistic pedagogical process of the school. - skills of research activity; - skills of pedagogical communication; - skills of organizing subject-subject interaction of all participants in the pedagogical process; - skills of applying the acquired knowledge during the period of professional practice, as well as in solving professional tasks; be flexible and mobile in various conditions and situations related to the activities of the management of the CPP.

Table 3. List of modules included in the educational program

Module No.	Name of the module	List of disciplines included in the module	Block	Semester	Volume of loans	Form of control	Total credits by module
M.1	Language and communication	Foreign language	MC GE	1,2	10	Ex.	20
		Kazakh (Russian) language	MC GE	1,2	10	Ex.	
M.2	Introduction to the teaching profession	Pedagogy	UC BD	1	5	Ex.	14
		Psychology and human development	UC BD	1	4	Ex.	
		Educational (introductory) practice	UC BD	2	2	Diff.c.	
		Developmental physiology and school hygiene	UC BD	2	3	Ex.	
M.3	Socio-political knowledge and philosophy	Sociology	MC GE	1	8	Ex.	23
		Political science	MC GE	2		Ex.	
		Cultural studies	MC GE	1		Ex.	
		Psychology	MC GE	2		Ex.	
		History of Kazakhstan	MC GE	1	5	SE	
		Information and communication technologies	MC GE	2	5	Ex.	
		Philosophy	MC GE	3	5	Ex.	
M.4	Economic-legal and scientific-ecological knowledge	Fundamentals of economic and legal knowledge	UC GE	2	3	Ex.	5
		Fundamentals of scientific and environmental knowledge	UC GE		2	Ex.	
M.5	Physical culture	Physical culture	MC GE	1,2,3,4	8	Diff.c.	8
M.6	Cell, structure and use	Cytology and histology/Immunology	CC BD	3	3	Ex.	17
		General and molecular genetics/Genetic foundations of plant breeding	CC BD	3	4	Ex.	
		Microbiology and virology/Soil microbiology	CC BD	3	5	Ex.	
		Cell biotechnology/ Introduction to biotechnology	CC BD	4	5	Ex.	
M.7	Chemistry 1	General and iInorganic chemistry	UC BD	3	5	Ex.	10
		Chemistry of elements	UC BD	4	5	Ex.	
M.8	Pedagogical and educational process and its management	Management in education	UC BD	3	3	Ex.	11
		Theory and methodology of upbringing work	UC BD	3	3	Ex.	

		Inclusive education	UC BD	4	3	Ex.	
		Psychological and pedagogical practice	UC BD	4	2	Diff.c.	
M.9	The structure of the plant organism	Anatomy and morphology of plants	UC BD	4	5	Ex.	6
		Educational and field practice (plant morphology)	UC BD	4	1	Diff.c.	
M.10	Animals and humans	Zoology of invertebrates and vertebrates	UC BD	4	5	Ex.	11
		Educational and field practice (zoology)	UC BD	4	1	Diff.c.	
		Human and animal anatomy and physiology/Physiology of higher nervous activity	CC BD	5	5	Ex.	
M.11	Professional languages	Professional kazakh (russian) language	UC BD	5	3	Ex.	6
		Professionally-oriented foreign language	UC BD	6	3	Ex.	
M.12	Methods of teaching biology	Methodology of teaching biology	UC PD	5	6	Ex.	22
		Modern methods of teaching biology/Methods of organization of extracurricular work in biology	CC PD	6	4	Ex.	
		Room and garden floriculture/Decorative gardening with the basics of landscape design	CC PD	5	5	Ex.	
		Pedagogical practice	UC BD	5	6	Diff.c.	
		Educational practice (the organization of the school decorative and teaching and experimental site)	UC PD	6	1	Diff.c.	
M.13	Chemistry 2	Analytical chemistry	UC BD	5	5	Ex.	11
		Physical and colloidal chemistry/Polymer chemistry	CC BD	6	5	Ex.	
		Educational practice (chemistry)	UC BD	6	1	Diff.c.	
M.14	Organic and biochemistry. Processes occurring in plants.	Organic chemistry	UC BD	6	5	Ex.	15
		Biochemistry	UC BD	7	5	Ex.	
		Plant physiology/Physiology of steppe plants	CC BD	7	5	Ex.	
M.15	Species composition of plants	Plant taxonomy/Flora of Kazakhstan	CC BD	6	4	Ex.	5
		Educational and field practice (study of plant species composition)	UC BD	6	1	Diff.c.	
M.16	Methods of teaching chemistry	Methodology of teaching chemistry	UC PD	6	6	Ex.	31
		Innovative technologies for teaching chemistry/Methods of organizing extracurricular work in chemistry	CC PD	7	5	Ex.	
		Methodology for calculating tasks in chemistry/Methodology of conducting a school chemical experiment	CC PD	7	5	Ex.	
		Industrial pedagogical practice	UC PD	8	15	Diff.c.	

M.17	Applied chemistry. Chemistry and technology	Applied chemistry/Chemical synthesis	CC PD	7	**5**	Ex.	17
		Modern chemistry and chemical safety/Nanotechnology in chemistry	CC PD	8	4	Ex.	
		Environmental and green chemistry/Coordination chemistry	CC PD	8	3	Ex.	
		Chemical technology/Organization of pupils' research activities in chemistry	CC PD	7	5	Ex.	
M.18	Final Attestation	Final Attestation	ATT	8	8	FA	8