MINISTRY OF EDUCATION AND SCIENCE OF THE REPUBLIC KAZAKHSTAN

KARAGANDA UNIVERSITY NAMED AFTER ACADEMICIAN E.A.BUKETOV

AGREED
Director «NTS» (LLP)
_____ Akupov R.
_____ 2022

AGREED
Director SBSI «IT»
_____ Manapova A.A.
«25» 03 _____ 2022

APPROVED
Rector
_____ Dulatbekov N.O
«16» 05 _____ 2022

EDUCATIONAL PROGRAM
on the direction of preparation «7M015- Training of teachers in natural science subjects»

Level: Master-degree

Karaganda, 2022

The educational program in the direction of preparation "7M015-Chemistry" is developed on the basis of:

– The Law of the Republic of Kazakhstan dated July 27, 2007 No. 319-III “On Education”

– The Law of the Republic of Kazakhstan dated July 11, 1997 No. 151-I. “On languages in the Republic of Kazakhstan”

– The state compulsory standard of postgraduate education dated August 31, 2018 No. 604

– National Qualifications Framework of March 16, 2016 by the Republican Tripartite Commission for Social Partnership and the Regulation of Social and Labor Relations.

– Order of the Ministry of Education and Science of the Republic of Kazakhstan “On approval of the Rules for the organization of the educational process on credit technology” dated October 2, 2018 No. 152

– Classifier of training areas with higher and postgraduate education from October 13, 2018. No. 569.

– The state compulsory standard of primary education. Approved by Resolution of the Government of the Republic of Kazakhstan dated August 23, 2012 No. 1080. Resolution of the Government of the Republic of Kazakhstan dated August 15, 2017 No. 484.

– Professional standard “Teacher” (Appendix to the order of the Chairman of the Board of the National Chamber of Entrepreneurs of the Republic of Kazakhstan “Atameken” dated June 8, 2017 No. 133)

Content

1. Code and name of the educational program: «7M01504-Chemistry»
2. Code and classification of the field of education, area of education: 7M01 Pedagogical sciences, 7M015 Preparation teachers in sciences subjects
3. Group of educational programs: «M013 Teacher training in chemistry»
4. Volume of the credits: 120
5. Education form: full time
6. Language of education: russian
7. Academic degree: Master of Education in the educational program «7M01504-Chemistry»
8. EP type: Acting EP
9. Level on ISCE: 7
10. Level on NQF: 7
11. Level on SQF: 7
12. EP distinctive features:
University partner (JEP):
University partner (DDEP):
13. Appendix to the state license to class educational activities: KZ83LAA00018495 No.016 from 28.07.2020
14. The name of the accreditation body and the validity period of the accreditation EP: IAQAE. 29.05.2017-27.06.2022 years.
15. The purpose of the educational program: Preparation of a qualified chemistry teacher with knowledge of the English language, possessing fundamental and applied knowledge, research skills for the implementation of scientific, pedagogical and professional-practical activities..
16. Qualification characteristics of the graduate
а) List of graduate positions of the graduate. A graduate of a magistracy is awarded the degree "Master of Education" in the educational program "7M015-Chemistry". A graduate of the educational program "7M015-Chemistry" receives the following positions: "Teacher. University lecturer", researcher,"Teacher. College Teacher","Teacher. High school teacher"
б) Scope and objects of professional activity of the graduate. The sphere of professional activity of graduates in the educational program "7M015-Chemistry" is: educational organizations, scientific institutions. The objects of professional activity of masters in the educational program "7M015-Chemistry" are: higher education institutions, scientific institutions, secondary schools, grammar schools, lyceums, colleges, regardless of ownership and departmental subordination.
в) Types of professional activity of the graduate:
- educational (pedagogical, educative);
- science-research;
- organizational and managerial ("subject-subject" interaction, management in education).

г) Functions of the graduate's professional activity:
– educational;
– educating;
– research;
– socio-communicative.

17. Formulation of learning outcomes based on competencies

Type of competencies	Learning outcomes Code	Outcomes
Behavioral skills and personal qualities: ((Soft skills)	LO1	Knows and understands the principles of democracy, justice, honesty, respect for the personality of the student, his rights and freedoms; substantiates the modern paradigm of higher education, its content; determines the driving forces and principles of the learning process in higher education.
	LO2	He understands the values of personality, language and communication, applies the skills of cooperation, the ability to resolve conflicts; reveals the features of modern didactic concepts in higher education; demonstrates knowledge in the field of modern educational technologies; Fluent in foreign languages at a level that allows for effective interaction in the professional and scientific environment.
Digital competencies: (Digital skills)	LO3	He knows the conceptual and theoretical foundations of chemistry and chemical technology, its place in the general system of sciences and values, the history of development and the current state.
Professional competencies: ((Hard skills)	LO4	He owns a system of knowledge about fundamental chemical laws and theories, the chemical essence of phenomena and processes in nature and technology.
	LO5	He knows the structure of chemical-technological systems for the analysis of the interaction of technologies and the environment.
	LO6	Able to optimize the basic technological schemes for producing modern materials.
	LO7	He knows the theoretical foundations of inorganic chemistry for mastering the methods of synthesis of substances and materials.
	LO8	Able to analyze the structure, physico-mechanical and rheological properties of inorganic polymers for their practical application.
	LO9	Knows and knows how to analyze gases, liquids, films, ceramics, single crystals, nanoscale structures and composites.
	LO10	Able to explain the behavior of the properties of solvents, materials and composites based on theoretical knowledge of organic chemistry.

18. Determination of modules of disciplines in accordance with the results of training

Learning result Code	Name of module	Name of discipline	Volume (ECTS)
LO1, LO2	Philosophical and historical aspects of social and humanitarian knowledge	History and philosophy of science	4
LO1, LO2		Higher school pedagogy	4
LO1, LO2		Psychology of management	4
LO1, LO2		Pedagogical practice	4
LO1, LO2	Professional Languages	Foreign language (professional)	4
LO1, LO2		Professional foreign terminology in chemistry	5
LO1, LO2		Theory and practice of translation in chemistry	
LO3, LO4	Basics of scientific research and commercialization	Commercialization of the results of scientific and technical activities	5
LO3, LO4		Organization and planning of scientific research in the field of chemical sciences	
LO3, LO4		Innovation in Chemistry	5
LO3, LO4		Current issues in chemistry	
LO5, LO6	Methodology and modern technologies of teaching chemistry	Modern methodological foundations of teaching general and inorganic chemistry	4
LO5, LO6		Modern technologies of teaching chemistry in universities	4
LO5, LO6		Methodology natural-science research	4
LO7, LO8	Actual problems of modern chemistry	Chemistry of conjugated systems	4
LO7, LO8		Chemistry of acyclic and cyclic conjugated systems	
LO7, LO8		Chemistry of supramolecular compounds	4
LO7, LO8		Supramolecular chemistry	
LO7, LO8		Polycondensation (in English)	4
LO7, LO8		Modern direction of organic chemistry (in English)	
LO7, LO8		Research practice	12
LO9, LO10	Actual problems of physical chemistry and ecology	Statistical thermodynamics (in English)	4
LO9, LO10		Computational methods in chemistry (in English)	

LO9, LO10		Aspects of study environmental issues (in English)	4
LO9, LO10		The circulation of substances in the ecosystem and biosphere (in English)	
LO9, LO10		Chemistry of functional materials	5
LO9, LO10		Semiconductor materials chemistry	
	Science-research work	Science-research work of a student, including the internship and fulfill-ment of the master	24
	Final attestation	Formulation and defense of master	12

19. Matrix of achievability of educational outcomes

NN п/п	Name of discipline	Brief description of the discipline (30-40 words)	Quantity of credits	The formed educational outcomes (codes)									
				PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10
Cycle of basic disciplines University component													
D1	History and philosophy of science	History and philosophy of science as the study of the general patterns of scientific knowledge in its historical development and changing socio-cultural context. Philosophy of science and methodology of science. Features of scientific knowledge. Historical development of institutional forms of scientific activity. Scientific communities and their historical types. Training of scientific personnel. Changing the place and role of science in the life of society.	4	+	+								
D2	Higher school pedagogy	The subject and methodological foundations of pedagogy. Development, education and socialization of the individual. Education system in the Republic of Kazakhstan. The essence of the pedagogical process at school, its laws and principles. Theory of education. Patterns and principles of education. Means, forms and methods of education. The team as a means of education. General concept of didactics and its main categories. Laws, patterns and principles of learning.	4	+	+								
D3	Psychology of management	Subject and object of management psychology. Psychology of the object and the object of control. Fundamentals of management psychology. Control functions. Staff motivation and management efficiency. Classification of approaches to making managerial decisions in controlling. Business communication and management conflicts. Psychological features of activity on development of administrative decisions. Psychology of anti-crisis management.	4	+	+								
D4	Foreign language (professional)	Fluent in foreign languages at a level that allows you to effectively interact in a professional and scientific	4	+	+								

		environment; possesses skills that allow to carry out further education and development of a linguistic personality with a high degree of independence and self-regulation.											
Cycle of basic disciplines Component of choice													
D5	Professional foreign terminology in chemistry	Chemical language as a goal and means of teaching in higher education. Symbolism and terminology of the chemical language. Nomenclature of the chemical language. Methods of studying chemical terminology. Methods of working on chemical terms and names of foreign origin. Names of prefixes of Latin and Greek numerals in complex word formations. Foreign elements of terms and names encountered in the course of higher school chemistry. Dictionary of chemical terms.	5	+	+								
	Theory and practice of translation in chemistry	Among the numerous complex problems that modern linguistics studies, an important place is occupied by the study of the linguistic aspects of interlingual speech activity, which is called "translation" or "translation activity".		+	+								
D6	Commercialization of the results of scientific and technical activities	Acquire basic knowledge in the field of project management in relation to the specifics of the activities of small and medium-sized businesses in conditions of economic instability. Get practical skills in the formation and implementation of the company's strategic goals using project management, the ability to analyze the quality of existing business processes in the company, etc.	5			+	+						
	Organization and planning of scientific research in the field of chemical sciences	Stages of research work, the foundations of scientific knowledge and creativity, the accumulation and processing of scientific and technical information, the organization of work in scientific libraries and libraries of research institutes; processing of the obtained data using modern methods, modern experimental methods of research, presentation of the results of scientific work, writing a scientific article or a brief informational message.				+	+						
D7	Innovation in Chemistry	Subject, content and objectives of the discipline "Innovation in Chemistry". Basic terms and concepts of	5			+	+						

		chemical innovation. Innovative ideas in the field of industrial waste disposal. Innovation in organic chemistry. Innovation in the synthesis of inorganic substances. Innovation in the production of mineral fertilizers. Innovation in basic chemistry and petrochemistry. Innovative ideas in the production of organic substances.											
	Current issues in chemistry	The discipline is the basis for the study of a new approach to chemistry as a science capable of ensuring the production and consumption of chemical products in such a way as to reduce the maximum damage to nature at all stages of the chemical process, from energy consumption to waste disposal. The course examines the main strategic directions of modern chemistry.				+	+						
Cycle of profile disciplines University component													
D8	Modern methodological foundations of teaching general and inorganic chemistry	The system of content and construction of higher education (tasks, model of a specialist). System-structural approach in teaching general and inorganic chemistry. Principles of high school didactics. The working curriculum is one of the methodological developments in the taught disciplines. Methods of research in the field of methods of chemistry. Lectures, seminars and laboratory classes as the main forms of organization of the educational process. The system for monitoring student knowledge at the university. Quality and evaluation of chemical knowledge.	4					+	+				
D9	Modern technologies of teaching chemistry in universities	Problems of higher chemical education. Specificity of modern methods in teaching chemistry. Active methods in teaching chemical disciplines. Problem learning. CASE STUDY method. Methodology for the formation of critical thinking. design method. Associogram method. Criteria-based assessment of learning outcomes. New technologies for teaching chemistry at the university. Modular learning technology. Forms of organization of the educational process in the university. Credit technology as a form of organization of the educational process	4					+	+				

D10	Methodology natural-science research	Natural scientific knowledge is the process of comprehending the truth. Reliability of scientific knowledge. Truth is the subject of knowledge. Forms of natural science knowledge. Methods and techniques of natural science research. The concept of methodology and method. Scientific discovery and proof. opening logic. Experiment is the basis of natural science. Practical orientation of the experiment. Modern means of natural science research.	4					+	+				
Cycle of profile disciplines Component of choice													
D11	Chemistry of conjugated systems	The concept of conjugation. Types of conjugated connections. Delocalized chemical bond. Bond lengths and energies in conjugated compounds. Resonance energy of benzene. The concept of the resonance integral. Types of Conjugated Connections: π,π-Conjugated Connections, p,π-Conjugated Connections, Cross-Conjugated Connections.. σ,π-Conjugated Connections. Baker-Nathan effect. Resonance theory. resonant effect. Steric hindrance to resonance. Aromaticity. The concept of induced ring current.	4							+	+		
	Chemistry of acyclic and cyclic conjugated systems	Chemical bond in organic compounds. This type of bond is formed when atoms interact, the electronegativity of which is equal or differ slightly. The structure and reaction mechanisms of conjugated compounds, intermolecular and intramolecular interactions that determine the chemical structure of materials based on conjugated compounds are considered; features of the physicochemical properties of conjugated compounds.								+	+		
D12	Chemistry of supramolecular compounds	The concept of chemistry of supramolecular solid compounds. Ideas about chemical-information synthesis, which makes it possible to create any supramolecular objects (both structured structural products, and electronic and optoelectronic devices, new generation devices based on quantum size effects), etc.	4							+	+		
	Supramolecular chemistry	Supramolecular chemistry is an interdisciplinary field of science that includes the chemical, physical,								+	+		

		and biological aspects of considering chemical systems that are more complex than molecules and linked into a single whole through intermolecular (non-covalent) interactions.											
D13	Polycondensation (in English)	The discipline considers current trends in the development of the chemistry of stepwise polymerization processes, studies their main patterns in order to control macromolecular growth reactions that regulate the size and structure of the polymer chain. Particular attention is paid to the study of the physicochemical and mechanical properties of new polycondensation polymers, thermosetting and thermoplastic materials based on them.	4							+	+		
	Modern direction of organic chemistry (in English)	This course will cover the mechanistic, theoretical and synthetic aspects of a wide range of reactions used in organic chemistry. Classical reactions as well as recently developed reactions will be discussed with examples from the literature. Students will define classes of organic compounds and typical reactions, distinguish intermediate states of stability, postulate reaction mechanisms, plan multi-step synthesis, and analyze/interpret.								+	+		
D14	Statistical thermodynamics (in English)	For equilibrium systems, statistical thermodynamics makes it possible to calculate thermodynamic potentials and write equations of state, phase states, and chemical equilibrium. Non-equilibrium statistical thermodynamics provides a substantiation of the thermodynamic relations of irreversible processes and makes it possible to calculate the kinetic coefficients in the transfer equations. Statistical thermodynamics establishes a quantitative relationship between micro and macro properties of physical and chemical systems.	4									+	+
	Computational methods in chemistry (in English)	Familiarization of students with the conceptual apparatus of the discipline, obtaining knowledge in the field of the theory of the structure of atoms and molecules for their use in quantum-chemical calculations of chemical objects.										+	+
D15	Aspects of study environmental issues (in Eng-	Ecology: basic concepts and terminology. Ecology - definitions. History of science. The subject of ecolo-	4									+	+

	lish)	gy. Scientific approaches to the problem of the relationship between man and nature. The structure of modern ecology, its methods, tasks, connections with other sciences. Basic concepts of modern ecology. System laws of modern ecology. The main modern environmental problems. Environmental Safety. The nature of use. Basic concepts and terminology. The nature of use.										
	The circulation of substances in the ecosystem and biosphere (in English)	The biosphere is the shell of the Earth inhabited by living organisms, being under their influence and occupied by the products of their vital activity, the "film of life", the global ecosystem of the Earth. The biosphere is characterized by closed cycles of substances, the source of energy for which is sunlight. Considers the cycles of some of the most important elements. An ecosystem is a set of living organisms (communities) and their habitats that form a sustainable system of life.									+	+
D16	Chemistry of functional materials	A branch of chemistry that studies various aspects of solid-phase substances, in particular, their synthesis, structure, properties, applications, etc. Its objects of study are crystalline and amorphous, inorganic and organic substances.	5								+	+
	Semiconductor materials chemistry	The structure of the main types of organic semiconductors. Electronic structure of undoped organic semiconductors. Band structure of doped organic semiconductors. Vibrational degrees of freedom and phonons. Electrons, holes, polarons and solitons in organic semiconductors. Band transfer of electrons and holes in organic semiconductors. Hopping charge transfer in undoped and doped organic semiconductors.									+	+

20. Coordination of the planned educational outcomes with the methods of teaching and evaluation within the module

Learning outcomes	Planned learning outcomes for the module	Teaching methods	Assessment methods
LO1	Knows and understands the principles of democracy, justice, honesty, respect for the personality of the student, his rights and freedoms; substantiates the modern paradigm of higher education, its content; determines the driving forces and principles of the learning process in higher education.	interactive lectures and seminars	Test, colloquium, preparation of speeches and writing of abstracts
LO2	He understands the values of personality, language and communication, applies the skills of cooperation, the ability to resolve conflicts; reveals the features of modern didactic concepts in higher education; demonstrates knowledge in the field of modern educational technologies; Fluent in foreign languages at a level that allows for effective interaction in the professional and scientific environment.	interactive lectures and seminars, project training	Project defense, test, colloquium, report
LO3	He knows the conceptual and theoretical foundations of chemistry and chemical technology, its place in the general system of sciences and values, the history of development and the current state.	Discussion, case methods, dispute	Presentations, essay writing
LO4	He owns a system of knowledge about fundamental chemical laws and theories, the chemical essence of phenomena and processes in nature and technology.	Practical classes, seminars, training games	Test, program development, preparation of information on specific issues.
LO5	He knows the structure of chemical-technological systems for the analysis of the interaction of technologies and the environment.	Practical classes, seminars, trainings, project method	Test, program development, preparation of information on specific issues, presentations
LO6	Able to optimize the basic technological schemes for producing modern materials.	Interactive lectures, practical classes, seminars, training, project	Project protection, written work
LO7	He knows the theoretical foundations of inorganic chemistry for mastering the methods of synthesis of substances and materials.	Practical classes, seminars, trainings	Prepared tasks for distance learning
LO8	Able to analyze the structure, physico-mechanical and rheological properties of inorganic polymers for their practical application.	interactive lectures, seminars, experimental workshops	Test, colloquium, laboratory journals
LO9	Knows and knows how to analyze gases, liquids, films, ceramics, single crystals, nanoscale structures and composites.	practical classes, seminars, trainings pedagogical practice	Development of training lessons, report on pedagogical practice
LO10	Able to explain the behavior of the properties of solvents, materials and composites based on theoretical knowledge of organic chemistry.	practical classes, seminars, trainings pedagogical practice	Written work, development of evaluation criteria for specific topics of the school course in chemistry and biology, tests

21. Criteria for assessing the achievability of learning outcomes

Codes of LO	Criteria
LO1	**Knows:** the history of the development of human society in Kazakhstan, the dynamics of the development of national history (driving forces, mechanisms, trends, patterns of historical development), the general course of history (the structure of history, its dynamics), traditions and culture of the peoples of Kazakhstan
	Can: establish causal relationships in the history of Kazakhstan, comprehend historical events and phenomena based on comparative analysis, creatively apply historical knowledge in practice
	Owns: the skills to analyze historical events, develop forecasts of historical events, be tolerant of the traditionsand culture of other peoples of the world.
LO2	**Knows:** the history of language development, the dynamics of the development of a foreign language, new trends and features of language development
	Can: analyze the stages and trends in the development of a modern foreign language
	Owns: all types of speech activity (writing, speaking, listening, reading), effective intercultural communication in a professional environment.
LO3	**Knows:** knows in the field of project management to the specifics of the activities of small and medium-sized businesses in conditions of economic instability
	Can: how to use tools and methods of project risk assessment, as well as the ability to counter risks
	Owns: the skills to form and implement the company's strategic goals using project management, the ability to analyze the quality of existing business processes in the company
LO4	**Knows:** the basics of inorganic chemistry and the chemistry of elements, is free to navigate in chemical synthesis and the study the properties of inorganic materials, have a correct picture of the world and acquire knowledge in various fields of natural science.
	Can: apply theoretical skills, skills in solving urgent problems of modern chemical science in professional activity, to find, extract, systematize and apply the necessary information
	Owns: the skills to handle chemical equipment and conduct chemical experiments, knowledge of the place of inorganic chemistry in the system of other chemical sciences, about the main categories of chemistry
LO5	**Knows:** the main modern means of evaluating learning outcomes, methodological foundations of their application; basic methods of scientific research; modern educational model of teaching BL, including online; methods and techniques of conducting classes using elements of research work
	Can: effectively organize the educational process in BL format in English, including online; independently, determine the effectiveness and methodology of the use of learning outcomes assessment tools in structuring the educational process; apply research planning methods and data processing techniques
	Owns: the skills to apply methods of organizing work related to research and project activities of students, discussions and other problematic teaching methods; modern information and communication technologies in the educational process
LO6	**Knows:** phenomena, basic concepts, basic laws and their experimental and theoretical basis from various fields of chemistry
	Can: apply in research and professional activities the basic mathematical methods used for modelling and analysis of chemical processes; achievements and problems of modern chemistry
	Owns: the skills to carry out scientific work and observations on chemical processes, use an apparatus for collecting experimental data and work using physico-chemical equipment.

LO7	**Knows:** phenomena, basic concepts, basic laws and their experimental and theoretical basis from various fields of chemistry
	Can: apply in research and professional activities the basic mathematical methods used for modelling and analysis of chemical processes; achievements and problems of modern chemistry
	Owns: the ability to carry out scientific work and observations on chemical processes, use an apparatus for collecting experimental data and work using physico-chemical equipment
LO8	**Knows:** the basic concepts of statistical thermodynamics and its place in science; the basic laws (principles) of static thermodynamics; the relationship of statistical physics with thermodynamics; the conditions of thermodynamic stability of the system
	Can: the mathematical apparatus of static thermodynamics; analyze the behaviour of the simplest systems; use the studied methods in fluctuation phenomena
	Owns: the skills to master the mathematical apparatus of thermodynamics and statistical physics; the use of knowledge for the analysis of the simplest systems
LO9	**Knows:** the impact analysis of industrial facilities and environmental monitoring
	Can: analyze the effects of industrial facilities and environmental monitoring
	Owns: the skills to monitor the state of the environment
LO10	**Knows:** suitable physical methods for solving practical problems
	Can: analyze the results of theoretical and experimental solutions to practical problems and assess their reliability.
	Owns: the skills to describe the results of experiments and their corresponding theories

22. The graduate model of the educational program

Graduate Attributes:

- High professionalism in the field of education and chemistry
- Emotional intelligence
- Adaptability to global challenges
- Leadership
- Entrepreneurial thinking
- Global citizenship
- Understanding the importance of the principles and culture of academic integrity

Types of competencies	Description of competencies
1. Behavioral skills and personal qualities: ((Soft skills)	Knows the principles of democracy, justice, honesty; respect for the student's personality, his rights and freedoms; makes judgments and makes decisions to achieve specific goals; Understands the values of personality, language and communication; cooperation skills, ability to resolve conflicts; is ready to be responsible for the results of his professional activity;
2. Digital competencies: (Digital skills)	Conducts classes using optimal means, forms, methods and techniques of education and training, as well as modern educational technologies, including ICT, stimulating interest in knowledge and cooperation, including e-learning
3. Professional competencies: ((Hard skills)	Knows the conceptual and theoretical foundations of chemistry, its place in the general system of sciences and values, the history of development and the current state; Owns a system of knowledge about fundamental chemical laws and theories, the chemical essence of phenomena and processes in nature and technology; Applies knowledge of theoretical and experimental foundations of chemistry and chemistry teaching technologies, owns methods of formation of subject skills and skills of students, knows the techniques of forming an interest in chemistry and using knowledge in the field of chemistry in everyday life; Possesses the skills of organizing and staging a chemical experiment (laboratory, demonstration, computer); Applies knowledge of general and theoretical chemistry, fundamental, applied mathematics and information technologies for the analysis and synthesis of phenomena and processes; Implements analytical and technological solutions in the field of experimental and theoretical chemistry; Owns a wide range of teaching strategies, teaching and behavior management of students, uses a suitable learning strategy for a specific person

Compiled by:

C.ch.s., associate prof., head of department	Mukusheva G.K.
D.ch.s., professor of the department	Merhatuly N.
C.ch.s., professor of the department	Kokibasova G.T.
C.ch.s., associate professor of the department	Kezdikbaeva A.T.
Master student of the 1st course of the EP "Chemical technology of inorganic substances"	Pashaeva A.B.

Примечания.

Educational program reviewed to of faculty board by 25.03.2022 protocol No. 8

Educational program discussed at the meeting of the Academic Council by 28.04.2022 protocol No. 5

The educational program is considered and approved at a meeting of the University Board by 26.05.2022 protocol No. 12

Member of the Board - Vice-Rector for Academic Affairs	**T.Z.Zhussipbek**
Director of the Academic Affairs Department	**G.S.Akybayeva**
Dean of the Faculty of Chemistry	**M.Zh. Burkeev**