Ф.7.02-09

MINISTRY OF SCIENCE AND HIGHER EDUCATION OF THE REPUBLIC OF KAZAKHSTAN

M.Auezov SOUTH KAZAKHSTAN UNIVERSITY

«APPROVED»
Acting Chairman of the Board – Rector
D.Zh. Akhmed-Zaky
«___» _____ 2025 year

EDUCATIONAL PROGRAM

6B01503 – Chemistry (IP)

Registration number	6B01500476
Code and classification of the field of education	6B01 Pedagogical sciences
Code and classification of training areas	6B015 Teacher training in natural science subjects
Group of educational programs (EP)	B012 Preparation of chemistry teachers
Type of EP	*current*
Level according to the ISCE	6
Level according to the NRC	6
Level according to the IRC	6
Language of training	Kazakh, Russian, English
The complexity of the educational program	240 credits
Distinctive features of EP	-
The university partner (CEP)	-
The university partner (DT)	-

Shymkent, 2025

Developers:

Full name	Post	Signature
Ermakhanov M.	Head of the Department of Chemistry, Candidate of Technical Sciences, Associate Professor	
Urmashev B.	Associate Professor of the Department of Chemistry, c.ch.s.	
Musaeva S.A.	Associate Professor of the Department of Chemistry, c.ch.s.	
Zhatkhanbaev E.T.	Associate Professor of the Department of Chemistry, c.tech.s.	
Sabdenova U.O.	Senior lecturer of the Department	
Alzhanova A.	Director of the specialized Boarding School № 1 for gifted children	P.P.
Almakhankyzy R.	Director of the Lyceum School № 7 named after K. Spataev	P.P.
Sarzhanova Zh.	Director of the Lyceum school № 15 named after D. Mendeleev	P.P.
Umarova A.S.	Director of the gymnasium school № 47 named after T. Tazhibayev	P.P.
Sarsenbayeva Zh.	Director of the gymnasium school № 50 named after A. Baitursynov	P.P.
Khalman N.	Student of the group EPI-24-4K	

The educational program was considered at a meeting of the Academic Quality Committee of the «Natural sciences and pedagogy» Higher School. Minutes № _6__ from «_17_» _March_ 2025 y.

Chairman of the Committee _____ Tursynbaev A.

The EP was considered and recommended for approval at Educational-methodical meeting of M. Auezov SKU. Minutes № 4 from «18» 03 2025 y.

Chairman of the EMC _____ Imangaliyev E.

The EP was approved by the decision of the Academic Council of the University. Minutes № 4 from «24» 03 2025 y.

CONTENT

1. Concept of the Educational program

Mission of the University	Generation of new competencies, training of a leader who translates research thinking and culture
University Values	• Openness – open to change, innovation and cooperation. • Creativity – generates ideas, develops them and turns them into values. • Academic freedom – free to choose, develop and act. • Partnership – creates trust and support in a relationship where everyone wins. • Social responsibility – ready to fulfill obligations, make decisions and be responsible for their results.
Graduate Model	• Deep subject knowledge, their application and continuous expansion in professional activity. • Information and digital literacy and mobility in rapidly changing conditions. • Research skills, creativity and emotional intelligence. • Entrepreneurship, independence and responsibility for their activities and well-being. • Global and national citizenship, tolerance to cultures and languages.
Uniqueness of the EP	• Orientation to the regional labor market and social order through the formation of professional competencies of the graduate, adjusted to the requirements of stakeholders. • Practical orientation and emphasis on the development of critical thinking and entrepreneurship, the formation of a wide range of skills that will allow you to be functionally literate and competitive in any life situation and be in demand in the labor market. The uniqueness of OP 6B01503 – Chemistry (IP) lies in the fact that graduates are universal specialists who have competencies with the ability to teach chemistry in secondary and secondary specialized educational institutions; and are able to solve the tasks of professional activity using e-learning technology; it boils down to the following: the student and his individual work are put at the center of the learning process; when studying before the student real problems are posed by customers, the active role of the student in training; the teacher plays the role of a consultant and assistant to students in their self-education; in the process of studying, the university provides modern laboratories and computer classes; flexible and dynamic modular curriculum and discipline programs. This EP is necessary for the Republic of Kazakhstan, in which more than 40 % of schools are small.
Academic Integrity and Ethics Policy	-The University has taken measures to maintain academic integrity and academic freedom, protection from any kind of intolerance and discrimination: - Rules of academic integrity (Minutes of the Academic Council №. 3 dated 30.10.2018); - Anti-Corruption Standard (Order №. 373 n/a dated 27.12.2019). Code of Ethics (Protocol of the Academic Council №. 8 dated 31.01.2020).

Regulatory and legal framework for the development of an	1. The Law of the Republic of Kazakhstan "On Education" (with amendments and additions as of 01.04.2023) 2. Standard rules for the activities of educational organizations

educational program	implementing educational programs of higher and (or) postgraduate education, approved by Order of the Ministry of Education and Science of the Republic of Kazakhstan dated October 30, 2018 No. 595 with amendments and additions dated 12/29/2021 No. 614; 3. State mandatory standards of higher and postgraduate education, approved by the Order of the Ministry of Education and Science of the Republic of Kazakhstan dated July 20, 2022 No. 2; 4. Order of the Minister of Science and Higher Education of the Republic of Kazakhstan dated January 19, 2023 No. 21 "On Amendments to the Order of the Minister of Science and Higher Education of the Republic of Kazakhstan dated July 20, 2022 No. 2. Registered with the Ministry of Justice of the Republic of Kazakhstan on January 20, 2023 No. 31742. 5. Rules for organizing the educational process on credit technology training approved by the Order of the Ministry of Education and Science of the Republic of Kazakhstan dated April 20, 2011 No. 152. 6. Qualification directory of positions of managers, specialists and other employees, approved by the Order of the Minister of Labor and Social Protection of the Population of the Republic of Kazakhstan dated December 30, 2020 No. 553. 7. Guidelines for the use of ECTS. 8. Guidelines for the development of educational programs of higher and postgraduate education, Appendix 1 to the order of the Director of the Central Research Institute No. 45 o/d dated June 30, 2021.
Organization of the educational process	• Implementation of the principles of the Bologna Process • Student-centered learning • Availability • Inclusivity
Quality assurance of EP	• Internal quality assurance system • Involvement of stakeholders in the development of the OP and its evaluation • Systematic monitoring • Updating the content (updating)
Requirements for applicants	Established according to the Standard Rules of admission to educational organizations implementing educational programs of higher and postgraduate education Order of the Ministry of Education and Science of the Republic of Kazakhstan No. 600 dated 31.10.2018

Conditions for the implementation of educational programs (EP) for persons with disabilities and special educational needs(SSN)	For students with SEN and Persons with disabilities, tactile tiles made of Pvc, specially equipped toilets, a mnemonic circuit, rods in shower rooms are installed in academic buildings and student dormitories. Special parking spaces have been created. A crawler lift is installed. There are desks for MGN, signs indicating the direction of movement, ramps. The academic buildings (main building, No. 8 building) are equipped with 2 classrooms with six workstations adapted for users with disorders of the musculoskeletal system (MSS). For visually impaired users, there is a SARA™ CE machine (2 pcs.) for scanning and reading books. The library's website is adapted for the visually impaired. There is a special NVDA audio program with the service. OFIC web site http://lib.ukgu.kz / in 24/7 operation mode. An individual differentiated approach is provided for all types of classes and in the organization of the educational process.

2. PASSPORT of the Educational program

Purpose of the EP	Preparation of highly qualified, competitive bachelors in the field of chemical education, capable of perceiving and applying innovative teaching technologies and capable of forming intellectual, moral, creative and physically developed students in educational institutions.
Tasks of the EP	– satisfaction of the needs of the individual in intellectual, cultural and moral development through higher education; – preparation of bachelors capable of adaptation and successful development of related fields of professional activity, as well as advanced training, training in additional education programs and continuing education in the master's degree; – acquisition of competence and experience of creative activity in the field of chemistry and methods of teaching chemistry; – meeting the needs of society for qualified specialists in the field of education and teaching chemistry, able to integrate academic values with entrepreneurial ideas; – providing conditions for acquiring a high general intellectual level of development, mastering competent and developed speech, culture of thinking and skills of scientific organization of work in the field of education; – formation of socially responsible behavior in society, understanding the importance of professional ethical standards and following these standards; – creation of conditions for intellectual, physical, spiritual, aesthetic development to ensure the possibility of their employment in the specialty.
Harmonization of EP	• 6th level of the National Qualifications Framework of the Republic of Kazakhstan; • Dublin descriptors of the 6th level of qualification; • 1 cycle of the Qualification Framework of the European Higher Education Area (A Framework for Qualification of the European Higher Education Area); • Level 6 of the European Qualification Framework for Lifelong Learning (The European Qualification Framework for Life long Learning).
Connection of the EP with the professional sphere	Professional standard "Teacher", approved by the order of the Acting Minister of Education of the Republic of Kazakhstan dated December 15, 2022 №. 500. Registered with the Ministry of Justice of the Republic of Kazakhstan on December 19, 2022 №. 31149.

Name of the degree awarded	After successful completion of this EP, the graduate is awarded the Bachelor of Education degree in the educational program "6B01540 - Chemistry"
List of qualifications and positions	trainee teacher. Qualification directory of managers, specialists and other employees, approved by the Order of the Minister of Labor and Social Protection of the Republic of Kazakhstan dated December 31, 2020 No. 553.
Field of professional activity	education
Objects of professional activity	organizations and educational institutions of various forms of ownership.
Subjects of professional	- the educational process in the unity of its value-target orientations, content, methods, forms and results;
activity	
Types of professional activity	– educational; – pedagogical; – educational and educational; – organizational and methodological.

Learning outcomes	**LO1.** assess 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 the methods of scientific and philosophical knowledge, taking into account a deep understanding and analysis of the main stages, patterns and features of the historical and economic development of Kazakhstan. **LO2.** apply knowledge in pedagogy and psychology in various types of educational environment, taking into account the principles of student-centered, competence-based, inclusive approaches and focus on supporting a healthy lifestyle. **LO3.** constructively build professional relationships necessary for their own pedagogical and professional activities, pedagogical development and professional well-being. **LO4.** apply the methods of scientific research and academic writing when planning pedagogical research and setting up a chemical experiment, using language competencies, digital resources, advanced innovative experience, Artificial Intelligence to obtain, process and present information and research results. **LO5.** demonstrate conceptual knowledge and understanding of the theory and general theoretical provisions of the main sections of chemistry to substantiate the laws and patterns of changes in substances from a natural science point of view. **LO6.** collect and interpret information to form judgments in the analysis and evaluation of the results of experimental studies and various practice-oriented tasks of a scientific, laboratory and educational nature. **LO7.** apply practical skills and abilities to solve educational, practical and professional tasks in the educational process, pedagogical research to adjust the individual development of the student. **LO8.** synthesize knowledge of related sciences necessary for everyday professional activities and for the formation of functional literacy of students.

3. Competencies of an EP graduate

GENERAL COMPETENCIES (SOFTSKILLS). Behavioral skills and personal qualities

GC 1. Competence in managing one's literacy	**GC1.1.** The ability to make lesson plans taking into account the characteristics and needs of students, defining appropriate teaching methods and assessment tools. **GC1.2.** To design an individual trajectory of students' development taking into account their individual abilities and needs. Design, develop programs and methods of teaching and upbringing, taking into account their individual abilities and needs. **GC1.3.** Knowledge of the basics of labor legislation, safety and labor protection rules. Fundamentals of teaching methods, modern teaching technologies, including information, patterns of age and individual development.
GC 2. Language competence	**GC2.1.** Ability to build communication programs in the state, Russian and foreign languages. **GC2.2.** The ability to interpersonal social and professional communication in the context of intercultural communication.
GC 3. Mathematical competence and competence in the field of science	**GC3.1.** The ability and willingness to apply the educational potential, experience and personal qualities acquired during the study of mathematical, natural science, technical disciplines at the university, to determine ways to control and evaluate the solution of professional problems, the development of mathematical and natural science thinking;
GC 4. Digital competence, technological literacy	**GC4.1.** Ability to confidently and critically use modern information and digital technologies for work, leisure and communication; **GC4.2.** The ability to possess the skills of using, restoring, evaluating, storing, producing, presenting and exchanging information through a computer, communicating and participating in networks using the Internet in the field of professional activity;
GC 5. Personal, social and educational competencies	**GC5.1.** The ability to possess social and ethical values based on public opinion, traditions, customs, norms and to focus on them in their professional activities; **GC5.2.** Know the Rules of pedagogical Ethics approved by the Order of the Minister of Education and Science of the Republic of Kazakhstan dated May 11, 2020 No. 190 "On some issues of pedagogical ethics" (registered in the Register of State Registration of Regulatory Legal Acts, No. 20619); **GC5.3.** The ability to navigate in various social situations; be able to find compromises, correlate your opinion with the opinion of the team; possess the norms of business ethics, ethical and legal norms of behavior; strive for professional and personal growth; **GC5.4.** Ability to work in a team, correctly defend their point of view, offer new solutions; demonstrate tolerance towards other individuals.
GC 6. Entrepreneurial competence	**GC6.1.** The ability to be creative and demonstrate entrepreneurial skills. **GC6.2.** The ability to manage projects to achieve professional goals. **GC6.3.** Ability to work with consumer requests.
GC 7. Cultural awareness and selfexpression	**GC7.1.** The ability to know and understand the traditions and culture of the peoples of Kazakhstan. **GC7.2.** The ability to be tolerant to the traditions and culture of other peoples of the world, to be aware of the attitudes of tolerant behavior; to be not subject to prejudice, to possess high spiritual qualities, formed as an intelligent person.
PROFESSIONAL COMPETENCIES (HARDSKILLS).	
Theoretical knowledge and	**PC1.** The ability to systematize, generalize and disseminate methodological experience (domestic and foreign) in the field of methods of teaching chemistry.

practical skills specific to this field	**PC2.** The ability to apply knowledge of chemistry in educational activities, and knowledge of modern problems of the methodology of teaching chemistry and its latest achievements in their pedagogical and research activities.
	PC3. The ability to apply modern methods and technologies of organizing and implementing the educational process in chemistry at various educational levels in secondary and secondary specialized educational institutions, including when teaching gifted students and students with special needs.
	PC4. Possess knowledge in the field of chemistry, skills in conducting chemical experiments, processing measurement results, observing and interpreting chemical phenomena; and solving typical problems of chemistry, using artificial intelligence.
	PC 5. Ability to apply various methods of chemical research in a selected subject area: experimental methods, statistical methods of experimental data processing, methods of theoretical chemistry, computational methods, methods of mathematical and computer modeling of objects and processes.
	PC6 – The ability to conduct scientific research in the chosen field of education and methods of teaching chemistry using information technology.
	PC7 – The ability to design, organize and analyze pedagogical activities, ensuring consistency of presentation of material and interdisciplinary connections of chemistry with computer science and with other disciplines.
	PC8 – the ability to demonstrate professional values (commitment to the profession of a teacher, citizenship). Performs his professional activity on the basis of respect and responsibility, honesty and fairness.

3.1 Matrix for correlating learning outcomes in the EP as a whole with the competencies being developed

	LO1	LO2	LO3	LO4	LO5	LO6	LO7	LO8
GC1	+	+	+					
GC2	+		+					
GC3		+		+	+			
GC4			+	+			+	
GC5	+	+	+			+		
GC6	+	+						+
GC7	+	+	+					
PC1			+		+		+	
PC2					+		+	+
PC3						+		
PC4				+			+	+
PC5			+	+	+			+
PC6			+		+			+
PC7		+						+

4. Matrix of the influence of modules and disciplines on the formation of learning outcomes and information on labor intensity

	Module name	cycle	component	Name of the discipline	Brief description of the discipline	Amount of credits	Formed learning outcomes (codes)							
							LO1	LO2	LO3	LO4	LO5	LO6	LO7	LO8
1	Module of Historical and Philosophical Competencies	GED	OC	History of Kazakhstan	Purpose: formation of an objective idea of the history of Kazakhstan based on a deep understanding and scientific analysis of the main stages, patterns and originality of the historical development of Kazakhstan. Content: Ancient people and the formation of nomadic civilization. Turkic civilization and the great steppe. Kazakh Khanate. Kazakhstan in the era of modern times. Kazakhstan as part of the Soviet administrativecommand system. Declaration of Independence of Kazakhstan. State system, socio-political development, foreign policy and international relations of the Republic of Kazakhstan. Methods and techniques of historical description for the analysis of the causes and consequences of events in the history of Kazakhstan.	5	v							

2		GED	OC	Philosophy	Purpose: The formation of a holistic idea among students about philosophy as a special form of knowledge of the world, about its main sections, problems and methods of studying them in the context of future professional activity. And also the formation of philosophical reflection, introspection and moral self-regulation among students. Content: Emergence of a culture of thinking. Subject	5	v							
					and method of philosophy. Fundamentals of philosophical understanding of the world: questions of consciousness, spirit and language. Being. Ontology and metaphysics. Cognition and creativity. Education, science, technology and technology. Human philosophy and the world of values. Ethics. Philosophy of values. The subject of aesthetics as a field of philosophical knowledge. Philosophy of freedom. Philosophy of art. Society and culture. Philosophy of history. Philosophy of religion. "Mangilik El" and "Modernization of Public Consciousness" are a new Kazakhstan philosophy.									

3	Module of Socio-political knowledge	GED	OC	Social and Political Studies	Purpose: forming knowledge about social and political activities, explaining social and political processes and phenomena. Content: Consideration of the system of socio-ethical values of the society. Ways to use social, political, cultural, psychological institutions, features of youth policy in the modernization of Kazakhstan society and solve conflict situations in society and professional environment based on them. To study the methods of analysis and interpretation of political institutions and processes, ideas about politics, power, state and civil society, to understand and use the methods and methods of sociological, comparative analysis, to understand the meaning and content of the political situation in the modern world. Analysis and classification of the main political institutions. Socialization, identity, and deviant behavior: the role of an inclusive approach.	4	v							

4		GE D	OC	Cultural Studies and Psychology	Purpose: the formation of scientific knowledge of history, modern trends, current problems and methods for the development of culture and psychology, the skills of a systematic analysis of psychological phenomena. Content: Morphology, language, semiotics, anatomy of culture. Culture of nomads, proto-Turks, Turks. Medieval culture of Central Asia. Kazakh culture at the turn of the XVIII - XIX centuries, XX century. Cultural policy of Kazakhstan. State Program "Cultural Heritage". National consciousness, motivation. Emotions, intellect. The will of man, the psychology of self-regulation. Individual typological features. Values, interests, norms are the spiritual basis. The meaning of life, professional self-determination, health. Communication of the individual and groups. Sociopsychological conflict. Models of behavior in conflict. Models of behavior in conflict. Socio-psychological foundations and development of inclusive culture in modern society; Psychological characteristics and conditions of professional adaptation of people with disabilities; Psychological support and tolerance as a way of social integration of people with disabilities; Socio-psychological barriers to interaction of people with normal and impaired development in modern society.	4	v	v				v		

5	The Basis of Social and Physical Development	GED	HsC	Ecosystem and Law	Purpose**:** formation of integrated knowledge in the field of economics, law, anti-corruption culture, ecology and life safety, entrepreneurship, scientific research methods. Content**:** fundamentals of safe interaction between man and nature, productivity of ecosystems and the	5	v							
					biosphere. Entrepreneurial activity in conditions of limited resources, increasing the competitiveness of business and the national economy. Regulation of relations in the field of ecology and safety of human life. Knowledge and observance of Kazakh law, obligations and guarantees of subjects, state regulation of public relations to ensure social progress. Application of scientific research methods. Legal foundations of artificial intelligence. Inclusion – the strategy of international lawmaking									
6		GED	HsC	Entrepreneurship and Financial Literacy	**Objective:** To study personal and family financial resources, which are critical to achieving financial wellbeing. **Contents:** Financial planning and consumer safety. Basic methods and techniques for effective spending and saving money. Protecting and investing your own financial resources. The role and significance of personal finance, its capabilities for achieving financial stability. Filtering out a lot of dubious financial information. Incentives for independent management of responsibilities and optimal financial capabilities of the consumer. Making smart financial decisions when building a professional career.	5	v							

7		BD	EC	Abay Studies	Purpose: preservation of the "national code" in the project "Kazakhtan" based on the work of A. Kunanbaev. Content: historical review of the history of Kazakhstan and Kazakh literature of the 19th-20th centuries. Studies of the heritage of Abai in the XX-XXI centuries. Chronology of Abay's creativity. Abai is a great poet, ethnographer, founder of Kazakh written literature. Abay is the compiler of the Code of Laws	3	v							

					"The Regulations of Karamola", social significance. Abai is a thinker, religious scholar, philosopher. The role of Abai in education and science, the concept of the "Whole Man". “Words of Edification” by Abai, epic novel by M. Auezov “The Way of Abai”. K. Tokaev "Abai and Kazakhstan in the XXI century", role, significance.									
8		BD	EC	Mukhtar Studies	Purpose**:** the formation of a historical, literary understanding of the work of M. Auezov in the context of the history of literature, patriotism and cultural and spiritual position. Development of artistic thinking, skills of independent research activity. **Content:** life and career of M. Auezov Semipalatinsk, Tashkent, St. Petersburg periods. The activities of M. Auezov in the magazines "Sholpan", "Abai". Publicism M. Auezov. Artistic review of the stories "Korgansyzdyn kүni", "Kyr suretteri", "Oқyғan azamat", "Kokserek", the play Enlik-Kebek and the stories "Kyly zaman", opei "Abay Zholy".	3	v							

9		BD	EC	Foundations of Anticorruption Culture	**Purpose:** formation of an anti-corruption worldview, strong moral foundations of the individual, citizenship, stable skills of anti-corruption behavior. **Content**: overcoming legal nihilism, forming the foundations of the legal culture of students in the field of anti-corruption legislation. Formation of conscious perception, attitude to corruption. Moral rejection of corrupt behavior, corrupt morality, ethics. Mastering the skills necessary to counteract corruption. Creation of an anti-corruption standard of conduct. Anti-corruption propaganda, dissemination of ideas of legality, respect for the law. Activities aimed at understanding the nature	3	v							
					of corruption, awareness of social losses from its manifestations, the ability to reasonably defend one's position, look for ways to overcome manifestations of corruption. The use of artificial intelligence in combating corruption.									

10		BD	EC	Basics of Artificial Intelligence	**Objective:** To develop competencies in the use of knowledge and practical application of artificial intelligence tools and methods, in alignment with the priorities of the AI-Sana program. **Contents:** Introduction to Artificial Intelligence (AI). Development of practical skills and abilities, including: using AI tools; working with large language models (LLMs); utilizing no-code AI platforms; employing generative AI tools; image recognition; natural language processing (NLP); and data visualization through AI. Understanding the application of AI in various fields and exploring its potential through the integration of AISana program approaches	3				v				
11		GED	OC	Physical Training	purpose: formation of social and personal competencies and the ability to purposefully use the means and methods of physical culture, ensuring the preservation, strengthening of health in order to prepare for professional activities; to the persistent transfer of physical exertion, neuropsychic stress and adverse factors in future work. Content: implementation of physical culture and health and training programs. A complex of general developmental and special exercises. Sports (gymnastics, sports and outdoor games, athletics). Control and self-control in the process of training, insurance and self-insurance. Competition judging.	8		v					v	

					Means of professional-applied physical training. Modern health systems: the respiratory system according to A. Strelnikova, K. Buteyko, K. Dineika, articular gymnastics according to Bubnovsky.									
12	Instrumental and Communication Module	GED	OC	Kazakh (Russian) language	**Purpose:** formation of communicative competence using the Kazakh (Russian) language in the sociocultural, professional sphere and public life, improving the ability to write academic texts. **Content:** levels A1, A2, B1, B2-1, B2-2 (B2, C1 Russian language) are presented in the form of cognitive-linguocultural complexes, consisting of spheres, topics, subtopics and typical situations of communication of the international standard: social and domestic, socio-cultural, educational and professional, simulated forms: oral and written communication, written speech works, listening. Demonstration of understanding of the language material in texts on the educational program, knowledge of terminology and development of critical thinking.	10			v	v				

13		GED	OC	Foreign language	**Purpose:** formation of intercultural and communicative competence of students in the process of foreign language education at a sufficient level of A2 and a level of basic sufficiency B1. The student reaches the level B2 of the Common European Competence, if the language level at the start is higher than the level B1 of the Common European Competence. **Content**. levels A1, A2, B1, B2 are presented in the form of cognitive-linguocultural complexes, consisting of spheres, topics, subtopics and typical situations of communication of the international standard: social, social, cultural, educational and professional, modeled forms: oral and written communication, written speech	10			v	v				
					works, listening. Demonstration of understanding of the language material in texts on the educational program, knowledge of terminology and development of critical thinking.									

14		GE D	OC	Information and communication Technologies	**Purpose:** formation of the ability to critically evaluate and analyze processes, methods of searching, storing and processing information, methods of collecting and transmitting information through digital technologies. Development of new "digital" thinking, acquisition of knowledge and skills in the use of modern information and communication technologies in various activities. **Content:** Introduction and architecture of computer systems. Software. OS. Human interaction with computers. Database systems. Database management. Networks and telecommunications. Cyber protection. Internet technologies. Cloud and mobile technologies. multimedia technologies. smart technologies. Electronic technologies. Electronic business. Electronic control.	5	v		v	v		v		
15	Basics of Psychological and Pedagogical Preparation	BD	Hs C	Psychology in Education and Concepts of Interaction and Communication	**purpose**: Pre-service teachers are familiar with the modern psychological theories and models, as well as personality functioning and individual properties. They can apply the knowledge in their teaching in diverse educational contexts. Pre-service teachers support positive development of learners by fostering dialogue, interaction, and communication in the educational process. **Content**: They are able to communicate, interact, and collaborate with pupils' families as well as in various other partnership networks and create new relationships suitable for the development of their own pedagogical activity. Pre-service teachers who demonstrate competence can: • understand the basic concepts and	5		v	v					

					terms of educational psychology, and the main practical applications of psychological knowledge; • understand the patterns, facts, and phenomena of cognitive and personal development of a person in the processes of education and upbringing; • apply an integrated approach to design, implementation, evaluation, and development of educational environments; • understand the concept of continuous learning as a part of the process of cognitive and personal development of a person. • apply basic communication and interaction concepts and theories at the individual, community, and network levels; • select the methods of communication and interaction that are most appropriate to facilitate learning in various forms (offline, online, blended, hybrid); • recognize the patterns of group dynamics and act in ways that promote community development and well-being.								

16		BD	Hs C	Psychological-pedagogical assessment (pedagogical practice, 2nd year)	Purpose: psychological preparation and adaptation of students to the activities of the class teacher and teacher at school: psychological and pedagogical study of a group of students, training in the ability to draw conclusions, the formation of managerial, teaching, control, developmental, organizational abilities, the formation of teacher's activities in a single pedagogical process as a single system for learning to accept. Content: methodological knowledge of a psychological and pedagogical nature; deepening and improving their application in practice; formation of the ability to analyze and study all areas of the educational program of a school institution, planned, organized work in it; level of training; educational activities and educational work, taking into account the psychological, age and	2		v	v					
					individual characteristics of children.									

17	Supporting Learners as Individuals	BD	Hs C	Educational Science and Key Theories of Learning	purpose: Pre-service teachers explore the basics of educational science such as the conceptions of man leading to various learning theories and pedagogical models. Content: Based on their understanding of the theoretical concepts, pre-service teachers are able to make appropriate pedagogical choices for various learning situations. Pre-service teachers who demonstrate competence can: • distinguish between concepts of human and their importance for understanding learning and the design of an educational process; • differentiate between learning theories and their importance for understanding learning and the design of an educational process; • apply learning theories and pedagogical models suitable for versatile learning	3				v				
18		BD	Hs C	Introduction to the teaching profession (pedagogical practice, 1st year)	Purpose: development of professional competencies among students, including: consolidation and deepening of theoretical knowledge accumulated in the process of studying at the University. Content: familiarization with the content of educational practice, the development of professional competencies of students, including: consolidation and deepening of theoretical knowledge acquired in the process of practice, the acquisition by students of practical skills in the field of teaching, the formation of a holistic vision. the content, types and forms of educational practice among students. To consolidate the theoretical knowledge gained during training and practical skills acquired in	1		v						

19		BD	Hs C	Age and Physiological Features of the Development of Children	Purpose: Pre-service teachers are familiar with the formation of psyche, its functioning, and the patterns of development. Content: Pre-service teachers can observe the development of their students, and accordingly, plan and implement age-appropriate learning processes considering individual needs of students. Pre-service teachers act creatively and appropriately in different situations and support learning and well-being of the learners. Pre-service teachers who demonstrate competence can: • recognize the individual starting points of different students, their learning potential and specific support needs; • consider the individual needs of their students for specific support, guidance, teaching and assessment; • introduce various methodological solutions for inclusion and for providing specific support.	4		v					v	
20		BD	Hs C	Inclusive Educational Environment	Purpose: formation of the concept of inclusive education, models of inclusive education, conditions for organizing inclusive education for various categories of children with disabilities. Inclusion of children with sensory impairments in the general educational process. Content: models and legal foundations for the organization of inclusive education. She studies the conditions for organizing inclusive education for various categories of children with disabilities. Characterizes the inclusion of children with sensory, motor, intellectual disabilities, emotional-volitional sphere in the general educational process. Introduces the organization of psychological and pedagogical support for children with disabilities. Instills	4		v						

					critical thinking skills in managing inclusive processes in education.									

21		BD	UC	Planning and Individual Chemistry Training	**Purpose:** Pre-service teachers are familiar with the curriculum in their area of teaching and the guiding pedagogical principles and cross-cutting development themes of a specific level of education, such as entrepreneurship and sustainable development. **Content:** Pre-service teachers possess the necessary skills of individualization of teaching, considering the diversity of students and their inclusion to the learning process, as well as the use of teaching technologies, based on pedagogical and independent research. Preservice teachers who demonstrate competence can: • understand the main principles and requirements of the curriculum in their area of teaching and apply them in planning and conducting educational activities; • identify factors and conditions that affect students' learning; • apply in practice the principles of inclusion as well as individualized teaching and guidance (adapting curricula, developing differentiated lessons) by considering the needs of the students and support the development of their personality and self-esteem, including career guidance.	4		v					v	

22	Teaching and Assessment For Learning	BD	HsC	Methods and Technologies for Teaching Chemistry	Future teachers have a comprehensive understanding of teaching strategies and methodologies and can apply them in planning, teaching, and evaluation in innovative ways appropriate to specific pedagogical situations, school conditions, and student opportunities. Future teachers are able to create suitable inclusive, physical and online learning environments at different stages of the educational process. Future teachers understand and can apply copyright and data protection rules when planning their teaching materials. Future teachers have the necessary knowledge in the field of didactics,	5		v						v

					teaching technologies and methods of student motivation, being able to provide the necessary pedagogical assistance to students. Future teachers who demonstrate competence can: • choose pedagogical models suitable for their teaching; • apply teaching methods in a creative and diverse way, taking into account the opportunities provided by learning technologies; • use a suitable inclusive learning environment in their teaching; • know and apply the norms and principles of copyright and data protection; • apply guidance methods to motivate students and support their academic achievements; apply artificial intelligence in the educational process; use artificial intelligence in chemistry teaching.									

23		BD	Hs C	Assessment and Development	purpose: Pre-service teachers have a thorough understanding of the meaning of assessment in learning process and are able to provide constructive assessment in ethical manner in different phases of learning processes and engage learners in assessment. Content: Pre-service teachers identify, differentiate, and use different assessment technologies, principles, stages, and assessment tools in their own field of expertise (including formative and summative assessment and self- and peer- assessment, etc). They can critically evaluate and analyze their understanding and practices concerning assessment and develop them further. Preservice teachers who demonstrate competence can: • use and apply a variety of methods and tools of assessment and feedback (formative and summative assessment); • apply pedagogical principles in defining and recognizing competence levels of learners; • understand the importance and support the development of	4		v					v	v
					students' self- and peer-assessment skills.									

24		PD	Hs C	Pedagogical approaches (pedagogical practice, 3rd year)/ dual	Purpose: formation of professional and pedagogical competence of future teachers in studying the technology of organization and implementation of educational activities, the basics of the educational process Content: during the internship, the student studies the school's work plan; the State Standard; the normative and teacher-developed subject plans for the specialty; the classroom teacher's plans; the classroom on the subject; the state of the educational process in its various forms; the introduction of modern educational technologies into the educational process; prepares didactic material for the lesson of the subject teacher; performs lesson analysis.	3.		v	v				v	
25	The Teacher as a Reflective Practitioner	BD	EC	Pedagogical Research	Purpose: This course provides pre-service teachers with a theoretical foundation on pedagogical research. Content: Pre-service teachers possess skills to seek and critically select theoretical knowledge from various reliable sources, utilize research findings in the development their pedagogical thinking and practice, and adopt willingness to promote research-based learning and education as well as their own continuing development and professional growth. Pre-service teachers who demonstrate competence can: • recognize the nature of pedagogy and its basic terminology; • identify the central areas of research in pedagogy and understand the difference between everyday thinking and scientific knowledge; • follow the changes in the field of education and consider how they influence own work as a teacher.	5		v	v	v				

26		BD	EC	Action Research	During the course, pre-service teachers develop their research interests as future teachers. They master the theoretical foundations of pedagogical approaches Lesson Study and Action Research as well as plan the processes of teaching mathematics based on their own scientific research. They also provide professional support to colleagues in a pedagogical community setting and develop their abilities for self-improvement.	5		v	v	v			v	
27		BD	EC	Research, Development, and Innovation (Chemistry	Objective: to form a research- and development-oriented mindset, the ability to develop, update and apply innovative learning approaches and technologies in the context of ongoing changes in society and the educational environment, using artificial intelligence.	4		v	v	v				
28		BD	EC	Lesson Study	The course is aimed at developing a research component in the field of professional interests of the future teacher. The discipline helps future chemistry teachers to master the theoretical foundations of the pedagogical approaches of Lesson Study, planning chemistry teaching processes based on their own scientific research. Providing professional support to colleagues in the context of the teaching community and the ability to improve themselves (lesson research: a cycle of reflective questioning, when teachers study the curriculum and determine the purpose of the survey, plan a lesson, teach in certain classroom conditions and collect data, reflect and revise the curriculum).	4.		v	v	v			v	
29		BD	Hs C	Digital in Technologies Education	The course promotes the development of a teacher's professional competence through the formation of a holistic view of the role of digital technologies in the	3				v		v	v	

					modern educational environment. Formation of the ability to organize pedagogical activities based on the use of digital technologies.									

30	Methodical Fundamentals of Teaching	BD	Hs C	Mathematics and Physics in Chemistry	Purpose: Pre-service teachers develop the necessary knowledge and skills in the selected sections of mathematics and physics, which are the basis for the development of fundamental chemical disciplines: - "Elements of probability theory and mathematical statistics" and "Mathematical analysis": composing equations with one and two unknowns, rounding numbers, differential calculus of functions of one and two variables; - “Graph Theory”: visual interpretation of data and research results; - "Molecular Physics and Thermodynamics", "Atomic and Nuclear Physics": gas laws and laws of thermodynamics, the heat of dissolution of salts, the heat of neutralization; the nature and properties of radioactive radiation; - "Optics": optical properties of dispersed systems, scattering, absorption, reflection, refraction of light and Rayleigh"s laws During the course, pre-service teachers develop their understanding and skills in applying the knowledge to explain the chemical properties of substances based on their structure and physical properties. Content: Pre-service teachers demonstrating competence can: apply knowledge when composing an equation with one and two unknowns, rounding numbers, differential calculus of functions of one and two variables in calculations of the quantitative determination of a substance; design mathematical models of chemical processes; explain the nature and properties of radioactive radiation; apply gas laws and laws of thermodynamics to determine the mass of a mole of a substance by measuring its volume in a gaseous state;	4				v		v		v

					determining the heat of dissolution of salts, the heat of neutralization; describe the optical									

					properties of dispersed systems, scattering, absorption, reflection, refraction of light and coloring of light solutions based on Rayleigh"s laws; describe chemical changes occurring under the influence of light; simulate the process of radioactive decay.									
31		BD	Hs C	Fundamentals of Chemical Production	**Purpose:** The course focuses on the study of the basic principles of chemical production, types of chemical pollution of the environment and its consequences. The discipline forms the students" understanding of modern production processes and the structure of chemical engineering systems. The study of the discipline contributes to the application of knowledge to analyze and assess the probability of occurrence of technological processes. **Content:** Pre-service teachers demonstrating competence can: · determine the positive and negative environmental impacts of the chemical production operations under consideration; · design methods and techniques for constructing process diagrams of production; compose the main characteristics of a chemical process; assess the technological efficiency of production; and provide arguments for efficiency of production in view of resource- and energy-saving technologies. evaluate the prospects of development of the nuclear industry in Kazakhstan.	5					v	v		v

32		BD	EC	Environmental Chemistry	This course builds knowledge about the basic principles of environmental chemistry on a local and global scale. Future teachers provide scientific justifications for the processes occurring in the environment, using knowledge in the fields of physics, chemistry, Earth sciences and biology. Future teachers apply methods of analyzing physico-chemical processes involving	5	v				v			v
					pollutants in the atmosphere, hydrosphere and soil. The course promotes the formation of students' citizenship in order to realize responsibility for their decisions and actions. Future teachers who demonstrate competence can: • form an understanding of the basic principles of environmental chemistry; • form their own moral and civic position for their decisions and actions; • apply knowledge in the field of physics, chemistry, Earth sciences and biology to scientifically substantiate the processes occurring in the environment; • assess anthropogenic changes in objects environment; have an understanding of Green chemistry; apply elements of artificial intelligence in environmental chemistry.									

33		BD	EC	Ecological and Education Sustainable Development	purpose: During the course, pre-service teachers develop a conscious understanding of the global consequences of human influence on nature, the prospects for the transition of the world community to sustainable development, and the general patterns of interaction of living organisms with the environment. During the course, pre-service teachers develop their logical thinking in the analysis and search for optimal solutions to problems in the field of environmental education and nature conservation. Content: Pre-service teachers demonstrating competence can: · apply knowledge of the content of the concept of sustainable development to discuss the global consequences of human influence on nature; · discuss and analyze the most acute and complex problems in the field of ecology and nature management, taking into account the main provisions of the concept of sustainable development to assess human impacts on the environment; · plan and organize environmental	5	v							v

					protection measures against environmental pollutioncorrelate the proposed actions in the field of environmental management with the recommendations of international conventions and other treaties ratified in the country.									

34		BD	EC	Biochemistry	**purpose:** During the course, pre-service teachers apply knowledge about the structure of bioorganic substances to explain metabolic processes in the body. They also conduct a biochemical analysis to study the structure of various substances. **Content:** Pre-service teachers learn to follow the logical relationship between the stages of the experiment and the basics of related sciences, and master the skills in conducting a school chemical experiment. Pre-service teachers demonstrating competence can: · explain the patterns and possibilities of chemical processes and energy conversion in a living organism; · describe the mechanisms of regulation of chemical transformations occurring in the body and their role in ensuring vital activity; · conduct a full cycle of experimental research.	5					v			v
35		BD	EC	Chemistry in Everyday Life	**purpose:** During the course, pre-service teachers develop their knowledge about the composition and properties of household chemicals. They also develop their functional literacy skills to use the obtained chemical information in a particular sphere of life and activity. **Content:** Pre-service teachers learn to respect for one"s health and the environment as well as the creation of a safe and favorable environment. Pre-service teachers demonstrating competence can: · highlight the main points in the instructions and labels on the use of various chemicals, washing powders, cleaning agents, etc.; ·	5					v			v

					explain the influence of household chemicals on metabolic processes in the body; · handle household chemicals in a safe way; · use the information received in the field of household chemicals in a particular area of life and activity.									
36		BD	EC	Polymer Chemistry	**Purpose:** During the course, pre-service teachers develop their understanding about the basic laws of reactions of production and transformation of plastics and elastomers, and the features of their chemical structure. They also use their knowledge in natural science to discuss the physico-chemical and kinetic features of polymer production. **Contents:** Pre-service teachers also analyze the rheological and relaxation properties of the obtained polymers and generalize the knowledge gained. Pre-service teachers demonstrating competence can: · apply knowledge about highmolecular compounds, chain and step processes of formation of macromolecules, chemical reactions of polymers to substantiate the characteristics of new composite polymer materials; · conduct and analyze laboratory experiments to study the structure and composition of polymers; · assess the main characteristics of polymer materials and indicate the areas of their application, including nanotechnology.	4					v		v	v

37		BD	EC	Colloidal Chemistry	**Purpose:** During the course, pre-service teachers develop their knowledge and skills in managing colloidal chemical processes in biological systems. They select the colloidal-chemical content of training for elective courses and extracurricular work at school, as well as find a connection between the content of the discipline and the educational and life experience of students.	4					v		v	v
					Content: Pre-service teachers demonstrating competence can: · show the importance of knowledge of the properties of colloidal substances in everyday life, technological processes of industry and agriculture, biology, medicine and ecology; · apply the fundamentals of fundamental knowledge in the field of colloidal chemistry to solve situational problems of everyday life; · select colloidal chemical content for conducting experiments with solutions of highmolecular compounds and surfactants during elective courses.									
38		PD		Industrial Practice (pedagogical, 4th year)	**Purpose:** to deepen theoretical knowledge in general scientific, cultural, psychological and pedagogical, basic and profile disciplines, to acquire skills and competencies. **Content:** the main actions of the teacher and the class teacher in the integrity system using the experience of teachers-methodologists. The basics of students' work with parents. Psychological and pedagogical methods of personality formation in unity through the study and analysis of the educational situation. Methods of analysis and introspection of various forms of educational work.	10		v	v	v			v	

39	Applied Chemistry	BD	Hs C	Analytical Chemistry	**Purpose:** During the course, pre-service teachers examine the main theoretical issues of analytical chemistry, as well as the methods of qualitative and quantitative analysis. They develop their knowledge of identification, detection, separation, and determination of chemicals. They also acquire skills in performing and completing experimental work, and handling reagents and equipment, as well as safety techniques. **Contents:** Pre-service teachers demonstrating competence can: describe the basics of qualitative and quantitative research methods; · explain the principles of titrimetric methods of analysis in determining the quantitative composition of a substance; · master the technique of performing individual operations in a chemical experiment (weighing, dissolving, heating, filtering, drying, calcination, etc.,); · conduct a qualitative analysis to determine cations and anions, explain the essence of specific reactions and their analytical effects; · perform calculations of theoretical titration curves; · analyze and process the results obtained from the point of view of scientific laws and facts of related disciplines; · evaluate the results of the experiment through the determination of systematic and random errors.	5					v	v	v	v

40		BD	Hs C	Biogeochemical Analysis of Natural Objects	**purpose:** During the course, pre-service teachers determine the effects of chemicals on water, soil, and biological objects as well as the possibility of solving the problems that arise with the means and methods of chemical analysis. level. **Content:** Pre-service teachers deepen their skills in conducting an experiment using modern methods of studying the elemental and material composition. The course is implemented with a multidisciplinary approach, which allows pre-service teachers to connect generalized facts from different academic subjects with their common knowledge system and find their applications in practice. Pre-service teachers demonstrating competence can: · explain the effects of chemicals on water, soil and biological objects, and the possibility of finding ways of disinfection by means and methods of chemical analysis; · justify the choice of	4	v					v	v	v
					optimal sampling methods for various natural objects; · plan and perform safe chemical and analytical studies with natural objects; · carry out metrological and statistical processing of the results of biogeochemical analysis; · interpret and critically analyze the results of biogeochemical studies.									

41	BD	EC	Design and Data Processing in Chemistry	**purpose:** Pre-service teachers acquire skills in making plans for various types of experiments and master the methods of processing the results of the analysis and decision-making. During the course, pre-service teachers develop their abilities to make a mathematical model of an experiment, to argue the results by statistical processing, and to ensure the representativeness of the experimental data. **Content:** Pre-service teachers demonstrating competence can: · prove the reliability of the experimental results using factor analysis methods; · establish causal relationships between the quantitative characteristics of the experimental results; · substantiate the confirmation or refutation of the hypothesis of the experiment.	3					v	v		v
42	BD	EC	Chemometrics	**Purpose:** During the course, pre-service teachers develop their knowledge on the basics of chemometrics and multidimensional methods of analysis. They also consider examples of practical tasks. **Content:** During the course, pre-service teachers master the methods and means of chemometrics for processing chemical analysis data. They also use modern software tools for processing experimental information. Pre-service teachers demonstrating competence can: · use knowledge of the basics of chemometrics, a multidimensional analysis method for processing the	3						v		v
				results of a chemical experiment; · apply modern software tools for processing experimental information; ·									

					interpret the analysis data and evaluate the results of the experiment.									
43	BD	EC	Art of Chemical Synthesis	**purpose:** During the course, pre-service teachers improve their practical skills in research activities when performing independent, individual work. They also develop their abilities to plan chemical synthesis, and select methods of separation and purification of substances. **Content:** Pre-service teachers develop a constructive approach to conducting chemical synthesis in original ways. Pre-service teachers demonstrating competence can: · plan and design chemical synthesis in an original way; · evaluate the advantages and disadvantages of the synthesis and suggest ways to improve; · determine the purity and to argue the characteristics of the resulting product; identify and manage risks during synthesis.	5					v	v		v

44	BD	HsC	Nanochemistry	**purpose:** During the course, pre-service teachers develop a system of knowledge about nanochemistry, synthesis and analysis of nanomaterials, as well as application of nanotechnology in organic chemistry, biology and medicine. **Content:** Pre-service teachers apply the knowledge about the possibilities of nanotechnology and modifications of nanoobjects in the development of elective courses, as well as find a connection between the content of the discipline and the educational and life experience of students. They also integrate knowledge related to the achievements of nanochemistry and nanotechnology. Pre-service teachers demonstrating competence can: · formulate basic concepts about the nature of nanomaterials and	4					v			v
				nanoscience, about their classification and special physico-chemical properties; · discuss existing and prospective applications of nanotechnology and nanomaterials; · work with databases of scientific publications, bibliographic sources and scientific literature on topical issues of nanochemistry; · assess the harmful effects of nanomaterials on the environment, human health and safety, as well as ways to prevent them. Production of new substances and materials. Application of artificial intelligence technologies in nanochemistry.									

45		BD	Hs C	Atomic Structures and Periodicity	The course provides fundamental theoretical knowledge about the structure of the atom, the dependence of the properties of elements and their compounds, and the types of chemical bonds. The course promotes the development of logical thinking, predicting the properties of substances, modeling the structure and structure of substances, and establishing a causal relationship between the composition, structure, and properties of substances. The course develops and improves the skills of conducting a chemical experiment, describing the results of an experiment, and observing the norms and rules of safe operation in a chemical laboratory. Future teachers who demonstrate competence can: • characterize chemical elements based on the structural features of their atoms and their position in the periodic table; • predict the properties of substances, model the structure and structure of substances; • establish a causal relationship between the composition, structure, properties of substances; • conduct chemical experiments in compliance with norms and rules safe work in a chemical laboratory.	4					v			v

46		BD	Hs C	Chemical Bo and Structure	This course develops a critical and logical understanding of the types and mechanisms of chemical bond formation. It develops the ability to identify types and explain the nature and methods of chemical bond formation. The course helps you acquire practical skills and organize your own activities. Future teachers who have completed the course will be able to implement elective courses that promote a student's professional self-determination. Future teachers who demonstrate competence can: · explain the nature and methods of chemical bond formation; to discuss and establish the relationship between facts and the theory of chemical bonding, cause and effect when analyzing the nature of chemical bonding and justifying decisions based on chemical knowledge; to solve practical problems on chemical bonding and the structure of substances and correlate the dependence of the physical properties of substances on the type of crystal lattice; to draw diagrams of the structure of molecules of substances formed by different types of chemical bonds.	5					v			v

47	Chemical Structure and Functions	BD	Hs C	Chemistry of carbon and its compounds	The course forms a systematic knowledge of the properties, structure and chemical behavior, as well as modern ideas about the nature of the chemical bond of organic compounds. The course helps to master the ability to discuss the dual role of organic substances in the environment; to apply knowledge of the nature of the chemical bond of organic compounds and the mutual influence of atoms in a molecule to establish a genetic link between classes of inorganic and organic compounds. Develops experimental skills in the study of physico-chemical properties, identification of organic compounds. Future teachers who demonstrate	6.					v	v		v

					competence can: • apply fundamental knowledge of the laws and theory of classical and modern organic chemistry; • explain the chemical nature of bioorganic molecules in living organisms and the relationship between individual chemical processes based on the theory of the structure of organic substances; • describe the mechanisms of chemical reaction of organic substances; • discuss the impact of organic compounds on the environment; • conduct chemical experiments with organic substances in compliance with safety regulations.									

48		BD	EC	Introduction to Chemistry	The course builds students' knowledge of the basic concepts and laws of chemistry, the basics of atomic and molecular theory, the structure of matter, the Periodic Law, chemical bonding, the laws of the chemical process, the doctrine of solutions, exchange reactions in electrolyte solutions, redox reactions. The proposed course forms an understanding of the role of chemistry in everyday life, its applied importance in the life of society. Future teachers who demonstrate competence can: • understand the academic language of chemical concepts and terms; • formulate and systematize knowledge about the stereochemical laws of chemistry, the periodic law, and the laws of the chemical process; • conduct experiments using elementary methods of chemical research of substances and compounds to form research skills; • establish the relationship of chemistry with other sciences; • discuss processes occurring in the environment from the point of view of chemical science and sustainable development	5.					v	v		
49		BD	EC	Inorganic chemistry	The course forms the foundation of general chemical training and a scientific worldview, develops the	5.					v	v		v

					creative thinking of a future specialist. When studying the discipline, modern quantum mechanical concepts about the nature of the electron and the structure of the atom and the basic theories of chemical processes are formed. The discipline serves as a basis for further study of individual sciences of the chemical cycle and contributes to a deeper understanding of the design of the periodic table and its significance, the theory of atomic structure, and the theory of chemical bonding. The course helps to establish causal relationships between the composition, structure, properties and use of substances. Future teachers who demonstrate competence can: • understand the academic language of chemical concepts and terms; • compose formulas and give correct names to oxides, acids, bases and salts; • express the essence of reactions in abbreviated ionic equations and apply the knowledge gained to characterize the chemical properties of acids, bases, salts; • give comparative characteristics of the elements; • conduct experiments using elementary methods of chemical investigation of substances and compounds to form research skills.								

50		PD	Hs C	Physical Chemistry	The course is aimed at developing students' chemical worldview and acquiring modern ideas about the structure of substances and the chemical process based on the laws of thermodynamics and kinetics; mastering the theoretical foundations of classical and statistical thermodynamics and ways to apply thermodynamic methods to solve chemical problems. When studying the discipline, future teachers develop knowledge and skills that allow them to model and perform numerical calculations in describing and explaining various types	5					v	v		v
					of chemical and phase equilibria and properties of substances in solutions. Future teachers who demonstrate competence can: • formulate the laws and concepts of physical chemistry with sound judgments; • describe the structure and properties of the basic phase states of matter (gases, solids and liquids); • discuss the physico-chemical foundations of surface phenomena and factors affecting free surface energy and features of adsorption at the interface of phases; • analyze phase equilibria based on state diagrams; • perform safe experiments using physico-chemical devices.									

51	Energy and Mechanism of Chemical Processes	PD	Hs C	Chemistry of solutions	The course builds knowledge and understanding of the theory of solutions, structure and properties, classification of solvents, ionic processes, phase transformations, critical phenomena in solutions, organic solutions, polyelectrolyte solutions; the influence of various factors on the viscosity of solutions. The course promotes the application of knowledge to solve situational problems of everyday life; the development of a creative approach to research activities and the formation of the ability to selforganize. Future teachers who demonstrate competence can: • apply knowledge in solving situational problems related to the use of solutions; • be able to prepare solutions of a given concentration and convert from one concentration to another; • be able to establish causal relationships between phenomena and processes occurring in solutions and biological objects.	4					v	v		v
52		PD	EC	Thermochemistry	During the course, future teachers establish the relationship between the thermal effects of reactions and various physico-chemical parameters. In this course, future teachers develop the skills of discussing the	4.					v			v

					factors influencing the direction of chemical reactions, ways to qualitatively and quantitatively describe the equilibrium state of thermodynamic systems and modern concepts of the chemical process. The course promotes the use of knowledge of the laws of thermodynamics and their consequences, as well as general approaches to describing the equilibrium state of thermodynamic systems. Future teachers who demonstrate competence can: • discuss chemical phenomena with a thermal effect occurring in nature, in a living organism; • use knowledge of the basic laws of thermodynamics when discussing the results obtained using information databases and other sources; • analyze and evaluate the patterns and possibilities of chemical processes and energy conversion.								

53		PD	EC	Kinetics and catalysis	The course is aimed at developing and understanding the basic laws and concepts of formal kinetics, elementary stages and kinetic patterns of homogeneous, heterogeneous and enzymatic catalytic transformations, and physico-chemical methods for studying the surface and nanostructure of a catalyst. During the study, future teachers improve their skills in composing a system of kinetic equations and analyzing the mechanisms of chemical reactions. The course helps future chemistry teachers to apply the content of education in the school curriculum and elective courses, as well as to connect the content of the discipline with the educational and life experience of students. Future teachers who demonstrate competence can: • apply the equations of formal kinetics and kinetics of complex, chain, heterogeneous and catalytic reactions to calculations related to the determination of kinetic parameters and	4.					v			v
					kinetic characteristics of chemical processes; • conduct chemical experiments using laboratory chemical instruments and equipment to determine kinetic parameters; • analyze and evaluate patterns and possibilities of chemical processes and energy conversion.									

54		PD	EC	Electrochemistry	This course helps to master the basic mechanisms of electrochemical processes. Future teachers, relying on knowledge from related fields of science, study the laws of mutual transformation of chemical and electrical forms of energy and systems, principles of operation of electrochemical devices and devices. The course promotes the construction of knowledge on ion systems, processes and phenomena occurring with charged particles at the interface of phases. Future teachers who demonstrate competence can: • Apply knowledge and perform calculations to specific electrochemical processes; • understand the principles of operation and be able to work on electrochemical devices and process experimental information; • identify patterns of electrochemical processes.	4.					v			v
55	Final Certification	PD	EC	Radiochemistry	The course builds knowledge and understanding of the terms and definitions of radiation chemistry, various sources of ionizing radiation, dosimetric systems used in practice, as well as radiolysis of clean water. The course promotes awareness of the effects of ionizing radiation on living organisms and respect for environmental objects. The course promotes the development of analytical thinking, self-study, using knowledge of related sciences. Future teachers who demonstrate competence can: • know and understand the effects of ionizing radiation on various biological objects; • to	4.					v			v

				compile and describe the equations of the reaction of radioactive decay; • to calculate the radiation yield of radiolysis products with known parameters and experimental data. • to justify the decisions made on the safety of people in various life situations.									
56	PD	HsC	Academic Letter	The course is aimed at developing writing skills, designing all types of written works, in accordance with existing requirements. Future teachers are proficient in communication and teamwork technologies, and communication strategies. Future teachers study the features of academic writing, ways to write correctly and design written types of work in accordance with the principles of academic integrity. Future teachers who demonstrate competence can: • compose and arrange written papers in accordance with existing requirements: a scientific essay, an experimental research report, a description and results of project activities, etc.; • document information sources on one of the citation systems to comply with intellectual property rights; • work with databases of scientific publications, bibliographic sources, provide links to used sources	3			v	v				

57		PD	Hs C	Chemistry Laboratory and risk management	The course helps students acquire regulatory knowledge about occupational safety and health regulations, primary professional skills when working in a chemical laboratory, and familiarization with the functions and duties of a laboratory assistant. Future teachers who demonstrate competence can: • prepare instruments for laboratory tests, perform statistical analysis processing, and evaluate the reproducibility and correctness of the analysis; • identify the risks associated with storing chemicals in the laboratory, handling dishes and equipment, conducting experiments and disposing of	3.			v		v	v		
					waste; • manage risks through documenting safety procedures: draw up a safety data sheet for educational laboratories, study the passports of devices and equipment, instructions for using the equipment, keep safety logs.									

58		BD	Hs C	Teaching and structural substantive of sections at chemistry school	The course forms the professional competence of a chemistry teacher in the field of implementing the requirements of the state mandatory standard of education of the Republic of Kazakhstan for the content and structure of chemical education, the basic principles of its formation and conditions of implementation. Based on activity-based and personality-developing approaches, the problem of organizing school chemical education, selecting and structuring educational content within the framework of the methodology of standardization of general education is discussed. Future teachers demonstrating competence can: • use the factual, conceptual, procedural and metacognitive knowledge of school students in chemistry lessons; • analyze the content and concepts of the school chemistry course taking into account the requirements of new educational standards; • systematize and summarize the knowledge gained to work with educational and didactic materials on chemistry, equipment and technical means, available in the school chemistry classroom, including digital resources.	4.		v	v				v	
59		BD	Hs C	Organization of students' project activities in chemistry	The course builds students' ability to manage and organize project activities. The course promotes the use of research skills in conducting educational projects in regular and extracurricular activities in chemistry, using the opportunities of the educational environment and interaction with subjects of the educational process,	4.		v	v	v			v	

					generalizing advanced pedagogical experience, and the ability to independently organize project activities in chemistry education. Future teachers who demonstrate competence can: • Organize and plan chemistry project activities for students at school; • to direct and advise the self-organization of joint active research based on problem solving; • to evaluate the project activities of the group according to the developed criteria; • to teach students to argue their judgments on the research topic.									
60		PD	HsC	Solving problems in Chemistry	The course is aimed at applying the acquired knowledge to solve problems of the basic level of the school chemistry course and an increased level of complexity. The methods of solving theoretical, computational and experimental problems of varying complexity are considered. Future teachers who demonstrate competence can: • apply knowledge of the stoichiometric laws of chemistry to solve computational and experimental problems; • apply knowledge of experimental computational methods to solve practiceoriented tasks of a scientific, laboratory and educational nature.; • use the knowledge of related sciences to convert formulas and perform calculations	6					v	v	v	

61	PD	EC	STEM-Education	The course promotes the non-traditional application of interdisciplinary knowledge of natural sciences, engineering, technology and mathematics in any setting to achieve the best result. The course examines the forms and methods of STEM education, the development and use of natural science-based heuristic assignments, and integrated learning on "cross-cutting topics." It encourages students to apply gamification methods, problem-based learning, 3D models, solving case tasks, etc. Develops three-dimensional thinking, the	4.				v			v	v
				ability to analyze the main problems and contradictions in the implementation of the basic approaches of STEM learning. Future teachers who demonstrate competence can: • Apply interdisciplinary knowledge of natural sciences, engineering, technology and mathematics to achieve the best result. • discuss the technical solution of the task; • model the image of future activities (constructive, project, speech, etc.); • invent creative ideas (own products: projects, creative inventions, models, games, etc.) and mechanisms for their implementation.										

62	PD	EC	CLIL in chemistry lessons	The course is aimed at applying the principles and methods of subject-language integrated learning. The general issues of planning, teaching chemistry in English using CLIL and ways of differentiation in the subject-language integrated chemistry teaching are considered. Future teachers plan and construct lessons using CLIL technology. Future teachers who demonstrate competence can: • apply CLIL technologies to organize classroom management learning activities; • develop an integrated lesson plan indicating the language and subject competencies being formed; • to create a safe and supportive learning environment; • to develop students' reflective skills in the process of selfassessment of chemistry teaching in English; • to create a collaborative environment for effective interaction of all participants in the organization of educational activities in the chemistry lesson.	4				v			v	v
63	PD		Research and innovation in education (pedagogical	**Purpose:** consolidation, grouping and systematization of knowledge through their application in real life; expansion and deepening of knowledge; formation of professional skills;	8			v	v	v	v		
			practice, 4th year)	**Content:** Knowledge of the requirements for the content and design of the graduation thesis; ability to formulate and solve the purpose and objectives of scientific research; plan and conduct laboratory experiments; analyze, systematize and summarize the results; possess: modern methods of scientific research using information and innovative technologies; skills working with Internet resources.									

64	PD		Writing and Defence of Degree Work (Project) or Preparing and Passing a Graded Exam	Choosing a research topic and planning research work. Substantiation of the relevance of the chosen topic, setting the research goal, determining the object and subject of research. Formulation of the research hypothesis and definition of the main objectives of the study. Selection and study of the main literary sources. The expected results of the study. Drawing up a schedule of work on a thesis. Writing, registration and defense of a thesis	8			v	v	v	v	v	

5. Summary table reflecting the volume of disbursed loans by EP modules

Course of study	Semester	Amount of modules to be mastered	Amount of subjects studied			Amount of KZ credits				Total in hours	Total KZ credits	Amount	
			OC	HsC	EC	Theoretical training	Educational practice	Production practice	Final certification			exam	dif. offset
1	1	4	5		2	30				900	30	6	1
	2	3	4		2	29	1			900	30	5	2
2	3	6	2	4	2	29		1		900	30	6	3
	4	6	1	3	3	28		2		900	30	6	2
3	5	6	1	2	3	28		2		900	30	5	1
	6	5			3	26		4		900	30	3	1
4	7	5		1	5	33		10		1290	43	5	2
	8	2						9	8	510	17		2
total		14	13	10	20	203	1	28	8	7200	240	36	14

6. Strategies, teaching methods and artificial intelligence, monitoring and assessment

Learning strategies	**Student–centered learning:** The student is the center of teaching/learning and an active participant in the learning and decision-making process. **Practice-oriented training:** orientation to the development of practical skills.
Teaching methods	Conducting lectures, seminars, various types of practices with: • the use of innovative technologies: • problem-based learning; • case study; • work in a group and creative groups; • discussions and dialogues, intellectual games, olympiads, quizzes; • reflection methods, projects, benchmarking; • Bloom's taxonomies; • presentations; • rational and creative use of information sources: • multimedia training programs; • electronic textbooks; • digital resources. Organization of independent work of students, individual consultations.
Monitoring and evaluation of the achievability of learning outcomes	Current control on each topic of the discipline, control of knowledge in classroom and extracurricular classes (according to syllabus). Assessment forms: • survey in the classroom; • testing on the topics of the discipline; • * control works; • protection of independent creative works; • discussions; • trainings; • colloquiums; • essays, etc. Boundary control at least twice during one academic period within the framework of one academic discipline. Intermediate certification is carried out in accordance with the working curriculum, academic calendar. Forms of holding: • exam in the form of testing; • oral examination; • written exam; • combined exam; • project protection; • protection of practice reports. Final state certification.

7. EDUCATIONAL AND RESOURCE SUPPORT FOR EP

Information Resource Center	The structure of the JRC has 6 subscriptions, 16 reading rooms, 2 electronic resource centers (IRC). The basis of the network infrastructure of the OIC consists of 180 computers with Internet access, 110 automated workstations, 6 interactive whiteboards, 2 video doubles, 1 videoconferencing system, 3 A-4 scanners, the software of the OIC – AIBS "IRBIS-64" for MSWindows (a basic set of 6 modules), an autonomous server for uninterrupted operation in the IRBIS system. The library fund is reflected in the electronic catalog available to users on the website http://lib.ukgu .kz is on-line 24 hours 7 days a week. Thematic databases of their own generation have been created: "Almamater", "Works of scientists of SKSU", "Electronic Archive". Online access from any device 24/7 via an external link http://articles.ukgu.kz/ru/pps . Catalogs are processed electronically. The EC consists of 9 databases: "Books", "Articles", "Periodicals", "Works of the teaching Staff of the UCU", "Rare books", "Electronic Fund", "UCU in print", "Readers" and "SKO". The JIC provides its users with 3 options for accessing its own electronic information resources: from the Electronic Catalog terminals in the catalog hall and divisions of the JIC; through the university's information network for faculties and departments; remotely on the library's website http://lib.ukgu.kz /. Access to international and republican resources is open: "SpringerLink", "Envoy", "Web of Science", "EVSSO", "Epigraph", to electronic versions of scientific journals in open access, "Zan", "RMEB", "Adebiet", Digital library "Akpigress", "Smart-kitar", "Kitar.kz", etc. For people with special needs and disabilities, the library's website has been adapted to the work of visually impaired users in the JRC
Material and technical base	For the preparation of bachelors in this direction, there is an appropriate material and technical base of the specialty, that is, classrooms, laboratories, a computer class that meets the requirements of the SES. The Department of Chemistry includes 8 classrooms (221, 225, 227, 229, 238, 240, 242, 242a) in building No. 7, with a total area of 328.3 m2. Room 238 (74.4 m2) is an auditorium where various types of classes are held. Room 221 (51.8 m2) is a teaching room. 242a office with an area of 35 m2 is a utility room. 240 office (28.4 m2) - organic chemistry laboratory (an interactive whiteboard is installed here). 242 (26.1 m2) office - laboratory of analytical chemistry. 227 office (34.7 m2) - laboratory of physical and colloidal chemistry. 229 office (42.2 m2) - laboratory of inorganic chemistry.

APPROVAL SHEET

for the Educational program "6B01503 – Chemistry (IP)"

Director DAA _____ Naukenova A.

Director DASc _____ Nazarbek U.