

**KHOJA AHMET YASSAWI INTERNATIONAL KAZAKH-TURKISH
UNIVERSITY**



«APPROVED»

Rectector of the University
Idrissova E.K.

Based on the decision of the
Educational-methodical committee

№ 9 protocol « 25 » 04 2025 y.

EDUCATIONAL PROGRAM

(project “Strengthening the potential of teacher education”)

<i>Program level</i>	<i>Bachelor</i>
<i>Code and classification of the field of education</i>	<i>6B01 Pedagogical sciences</i>
<i>Code and name of the direction of training</i>	<i>6B015 Teacher training in natural science subjects</i>
<i>Group and name of EP</i>	<i>B012 Teacher training in Chemistry</i>
<i>Gode and name of EP</i>	<i>6B01522-Chemistry (IP)</i>
<i>EP type</i>	<i>Innovative EP</i>
<i>EP distinctive features</i>	<i>Dual training</i>

Matriculated in 2025 year

Ф-ОБ-001/187

Құрастырушылар: /Разработчики:/ Developers:

«Жаратылыстану пәндері бойынша мұғалімдер даярлау» даярлау бағыты бойынша Академиялық комитет құрамы:/ Состав академического комитета по направлению подготовки «Подготовка учителей по естественнонаучным предметам»/The composition of the academic committee on the direction of personnel training «Teacher training in natural science subjects»

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Ф-ОБ-001/187

«Жаратылыстану пәндері бойынша мұғалімдер даярлау» даярлау бағыты бойынша академиялық комитетте талқыланды/

Обсуждено в Академическом комитете по направлению подготовки «Подготовка учителей по естественнонаучным предметам»/

Discussed in the Academic committee on the direction of personnel training «Teacher training in natural science subjects»

Хаттама/Протокол/Protocol number № 3 « 19 » 03 2025 ж./г./y

Contents

1. General information	5
2. Programme rationale	6
3. Teacher's professional competences	6
4. Program structure and learning outcomes	8
4.1. Structure of the pedagogical component	8
4.2 Structure of the subject component	15
4.3 The structure of the compulsory component	38
4.5 Requirements for the successful completion of curriculum	54
5. Description of students' work	54
6. Evaluation methods/Assessment	54
6.1 Assessment	54
6.2 External evaluation.....	55
7. Faculty requirements	55
7.1 Faculty Requirements.....	55
7.2 Additionally Required Faculty	56
7.3 Required professional development of faculty	56
7.4 Required additional administrative staff	56
8. Resources	56
8.1. Library Resources	56
8.2. IT Resources.....	56
8.3 Infrastructure	56
9. Additional information.....	56
10. Approval.....	57
APPENDIX 1: Main principles of the curriculum	57

1. General information

1.1. Curriculum title	6B01522-Chemistry (<i>IP</i>)						
1.2. Curriculum developing team	<table> <tr> <th>Leader university</th><th>Member universities</th></tr> <tr> <td>M.Utemisov West Kazakhstan University</td><td>Pavlodar Pedagogical University</td></tr> <tr> <td></td><td>Shakarim University of Semey</td></tr> </table>	Leader university	Member universities	M.Utemisov West Kazakhstan University	Pavlodar Pedagogical University		Shakarim University of Semey
Leader university	Member universities						
M.Utemisov West Kazakhstan University	Pavlodar Pedagogical University						
	Shakarim University of Semey						
1.3. Type of curriculum (in accordance with the National Qualifications Framework)	BACHELOR'S DEGREE Level 6						
1.4. Total academic credits	254 academic credits						
1.5. Study mode	full-time						
1.6. Expected program duration	4 years						
1.7. Short curriculum description Curriculum goals and objectives	This Educational Programme (EP) "Chemistry" is a national teacher education curriculum, which has been designed in collaboration by various Kazakh universities and with international consulting. Due to the nature of a national curriculum, the descriptive texts within the curriculum do not provide specific information but highlight general pedagogical principles and cross-cutting themes (see also Annex 1.). The more detailed descriptions of e.g. methodologies and assessment will be identified in the implementation plans of the universities, considering also institutional and regional specific conditions. Educational programme (EP) "Chemistry" is a teacher education programme for pre-service teachers who wish to specialize in teaching chemistry in educational establishments (schools, colleges, high schools). EP consists of a pedagogical component 60 academic credits (incl. pedagogical practice), a compulsory component 56 credits, and a subject component 130 academic credits (incl. a final attestation of 8 academic credits). The subject component consists of 5 modules: "Chemistry around us", "Applied Chemistry", "Chemical Structure and Functions", "Energy and Mechanism of chemical processes", "Pedagogical approach to teaching chemistry". EP is focused on training a chemistry teacher who is able to conduct research of a scientific, laboratory and educational nature, synthesize knowledge of related sciences as a product of integrated processes, develop their own moral and civic position in the context of sustainable development, use language competences for the implementation of academic and professional activities. After graduation, pre-service teachers possess subject competences of conceptual and theoretical knowledge in chemistry, experimental research activities, knowledge of applied and related sciences. EP provides an equal opportunity for learning without compromising pre-service teachers' rights and interests, preserving the principles of equality, respect, tolerance. It is interdisciplinary, student-oriented, scientifically integrated and problem-oriented by nature, and the selection of courses is guided by the topical issues of history and society and corresponds also to the international course descriptors. EP is based on the principles of constructive alignment, where teaching and assessment methods, as well as subject-specific courses are selected to ensure the achievement and measurement of the competences outlined in the EP. The EP also follows an inclusive approach considering the multi-ethnic and multi-confessional composition of pre-service teachers and their versatile needs for support of learning.						
1.8 Main principles of the curriculum							
Competence-based teacher education	A teacher's expertise combines competence in pedagogy and their own subject-specific field with theoretical and practical teaching competence in different kinds of operating environments. A teacher has mastery of the knowledge and skill requirements of their subject-specific field and thus is able to teach and supervise young people and adults studying for the same subject. The competence of a teacher is focused on planning, guidance, teaching and assessment. For this reason, teacher						

must have sufficient theoretical knowledge of learning and competence development. In addition, modern working life emphasises cooperation and networking, development skills, and the support and maintenance of the well-being of oneself and one's community.

A teacher's competence is influenced by changes in the labour market, the structures of education and society as a whole, and all these elements are emphasised in the dynamic nature of a teacher's work. Work characterized by continual change in the variety of working environments places an emphasis on the teacher's ability to assess and adjust their own activities. Self-assessment skills are an essential part of developing one's professional identity. A teacher is making value decisions all the time, which means that the consideration of questions of professional ethics is one of the professional skills needed. Change requires the development of expertise, the ability to learn, as well as the ability to reform and renew the way things are done as part of a community.

Competence-based teacher education curriculum

The competence-based teacher education curriculum is formed of three entities: 1) Pedagogical studies, 2) Subject-specific studies 3) Compulsory studies. Each of the entities includes modules and related courses. The courses' learning outcomes describe the competences required in teaching work and are placed in the NQF system's (National Qualifications Framework) reference level six.

The curriculum is guided by the following main principles:

- Competence-based learning
- Constructive alignment
- Student-centred learning and active learning methodologies
- Research-based teaching
- Interdisciplinary learning
- Inclusion
- Teacher professional development and change management

(see Appendix for more details)

1.9. Academic degree

Bachelor of Education in the Educational Program «6B01522-Chemistry»

2. Programme rationale

In the context of the Education Modernization Project funded by the World Bank, several universities providing pre-service teacher education have designed and revised in international collaboration thirty (30) pre-service teacher education curricula according to the principles of competence-based education that ensure a holistic development of pre-service teachers' competences. Moreover, the student-centered approach better prepares pre-service teachers to teaching profession by providing practical examples, experiments and experiences, which pre-service teachers can transfer to their classroom practices considering better the versatile needs and wellbeing of their students.

In order to match the requirements of the renewed primary and secondary education, teachers' professional competences need to be re-evaluated and completed. The new approaches in secondary education need to be reflected in pre-service teacher education and the pre-service teachers' profiles. Furthermore, these thirty (30) revised or new pre-service teacher education curricula have been designed to better improve pre-service teachers' various generic competences that are essential in teacher's profession. Several important and cross-cutting pedagogical principles that Kazakhstan education system aims to develop, such as inclusiveness and interdisciplinarity, have been taken into consideration in the design and implementation of the curricula. In addition, these curricula emphasize the development of pre-service teachers' research skills in a way that they become practitioners who are constantly reflecting and evaluating their own practices and the practices of their schools to develop their own work and their work community, and the whole sector of education.

3. Teacher's professional competences

Teachers' professional competences are defined as consisting of **pedagogical competences** and **subject-specific competences** as well as **generic competences**. The competence-based teacher education curriculum is thus formed of three entities: 1) Pedagogical studies, 2) Subject-specific studies 3) Compulsory studies. Competence areas and competences have been defined separately for each entity.

3.1. Pedagogical and Generic Competence Areas/Learning Outcomes

- **Competence area for pedagogy and didactics**
 1. Pre-service teachers have basic knowledge and understanding of learning and students and are able consider the diversity of students in learning/teaching process and support their well-being in psychologically and ethically sound manner considering their life and learning contexts.
 2. Pre-service teachers are capable to design, implement, assess, and develop learning and guidance processes in different kinds of learning environments in a pedagogically meaningful way including ability to utilize different digital resources in a manner that supports learning.
- **Competence area for interaction**
 3. Pre-service teachers are able to communicate in different interactive relationships and partner networks in a meaningful manner both in face-to-face and online settings with regard to the goals set for the activity in question.
 4. Pre-service teachers are capable of working in different collaboration networks and have the ability to create

new relationships that are appropriate for the development of one's own and one's community activities. - Pre-service teachers are able to teach in accordance with the tri-lingual approach in secondary education and participate in the global professional community. Competence area for teachers' work environment - Pre-service teachers are familiar with the international and national agreements and documents as well as legislation that affects his/her institution's and his/her work. - Pre-service teachers are able to (a) to perceive his / her own activities in relation to the activities of his/her organization, and (b) work in a meaningful way to create positive relationships between the partners outside the school (families, regional actors, working life). Competence area for professional development - Pre-service teachers are able to reflect and critically assess their values, attitudes, ethical principles and work methods as a teacher and are able to set new goals to his/her own and his/her organization's pedagogical development. - Pre-service teachers are able to develop his / her own and his / her organization's pedagogical activities in relation to the anticipated changes at regional, national and international level. - Pre-service teachers are able to produce, seek and critically select theoretical knowledge that, combined with experiential knowledge, serves the development of both him/her and his/her community's theory-in-use, and the ability and willingness to use knowledge to promote learning and own professional growth.	3.2 Subject-specific and Generic Competence Areas/Learning Outcome
Competence area for conceptual and theoretical knowledge - Pre-service teachers are able to explain and apply conceptual knowledge to substantiate the laws and patterns of changes in substances from a natural science point of view; - Pre-service teachers are able to apply various models to describe and explain the structure of matter and chemical processes, establish a connection between the structure of matter and its properties. - Pre-service teachers are able to generalize and systematize scientific knowledge and teach ways to obtain and critically evaluate various sources of information. - Pre-service teachers are able to analyze and discuss the impact of science on the environment Competence area for experimental research activities - Pre-service teachers demonstrate the ability to apply experimental computational methods to solve various practice-oriented tasks of a scientific, laboratory and educational nature; - Pre-service teachers have the knowledge and skills to pose questions as a starting point for research ; - They are able to give instructions and conduct experimental research in cooperation, safely and consistently achieve their goals, as well as process, interpret, present and evaluate both the results and the entire research process.; - Pre-service teachers are able to plan the educational process and various activities of students in teaching chemistry; - Pre-service teachers have communication strategies and skills of collaborative work Competence area for applied and integrated sciences - Pre-service teachers are able to understand, present and critically analyze basic information in the field of ecology and environmental protection. - Pre-service teachers are able to develop their own moral and civic position in the context of sustainable development. - Pre-service teachers are able to synthesize knowledge of related sciences as a modern product of integrative processes for further teaching students to understand the application of chemistry in technology and participate in cooperation with students and specialists in various fields in the creation of ideas, design, development and application of the results obtained. - Pre-service teachers are able to use language competencies and information and communication technologies to receive, process and present information and research results, involve students in the learning process using modeling illustrating various phenomena. - Pre-service teachers are able to argue their own position and teach students to understand the importance of applying knowledge of chemistry to build a sustainable future and evaluate their own choices in terms of sustainable use of natural resources and product life cycles.	3.3 Compulsory component: Competence Areas/Learning Outcome
Competence area for worldview, historical, and moral development - Pre-service teachers are able to assess the surrounding reality on the basis of ideological positions, formed by a knowledge of the fundamentals of philosophy, which provide scientific understanding and study of the natural and social world by methods of scientific and philosophical knowledge. - Pre-service teachers are capable to interpret the content and specific features of the mythological, religious and scientific worldview - Pre-service teachers have deep understanding and scientific analysis of the main stages, patterns and characteristics of the historical development of Kazakhstan. - Pre-service teachers are able to analyse the causes and consequences of the events in the history of Kazakhstan.	

- **Competence area for social, cultural, and civic development**
- 5. Pre-service teachers are able to develop their own moral and civic position and able to operate with the social, business, cultural, legal and ethical norms of society.
- 6. Pre-service teachers have knowledge and understanding of the basics of socio-political, economic and legal studies and are able to demonstrate personal and professional competitiveness.
- 7. Pre-service teachers are able to assess situations and provide arguments for their own assessments of developments in the social and work environment.
- **Competence area for interpersonal social and professional communication**
- 8. Pre-service teachers are able to assess situations in various spheres of interpersonal, social and professional communication and enter into communication in oral and written forms in Kazakh, Russian and foreign languages.
- 9. Pre-service teachers are able to use in their personal activities various types of information and communication technologies: Internet resources, cloud and mobile services for searching, storing, processing, protecting and distributing information.
- 10. Pre-service teachers are able to maintain a healthy lifestyle to achieve productive social and professional activities through the methods and means of physical education.
- 11. Pre-service teachers are able to select methodology and analysis, use scientific research methods and techniques, and synthesise new knowledge.

4. Program structure and learning outcomes

4.1. Structure of the pedagogical component

The extent of the Pedagogical Component shall be 60 academic credits, including teaching practice. This component is common for all curricula in initial teacher education. The Pedagogical Component has been jointly created by all the involved universities in a collaborative design process. The component is flexible and leaves space for individual universities to implement it according to their specific situation and needs.

The overall structure of the pedagogical studies component:

Module name and main disciplines	Academic credits
SUPPORTING LEARNERS AS INDIVIDUALS	17
Psychology in Education and Concepts of Interaction and Communication	4
Educational Science and Key Theories of Learning	3
Age and Physiological Features of the Development of Children	3
Inclusive Educational Environment	3
Teaching Planning and Individualization of Learning	4
TEACHING AND ASSESSMENT FOR LEARNING	9
Teaching Methods and Technologies	5
Assessment and Development	4
TEACHER AS A REFLECTIVE PRACTITIONER	9
Pedagogical Research	4
Research, Development and Innovation	5
TEACHER AS A FACILITATOR OF LEARNING(PEDAGOGICAL PRACTICE)	25
Introduction to the teaching profession (1st year pedagogical practice)	2
Psychological and pedagogical assessment (2nd year pedagogical practice)	2
Pedagogical approaches (3rd year pedagogical practice)	6
Research and innovation in education (4th year pedagogical practice)	15
Total academic credits	60

The modules, courses, their learning outcomes, and relation to competence areas in more detail:

Supporting learners as individuals 17 Academic credits

This module provides an overview of psychological theories, concepts, and models which help to understand the pupils' individual needs and individual differences in learning. The module provides the pre-service teachers with competences to acknowledge individualization of learning and the diversity of learners in teaching. The module highlights the importance of enhancing learner well-being through creating and maintaining a psychologically safe educational environment.

Course title	Psychology in Education and Concepts of Interaction and Communication
Component	Pedagogical component
Cycle	Core disciplines

Module	Supporting learners as individuals 17 Academic credits
Academic credits	4
Course / competence description	The purpose of this course is to improve the following areas of pedagogical competence: - Competence area for pedagogy and didactics (1) - Competence area for interaction (3, 4) 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. 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.
Learning outcomes	Pre-service teachers who demonstrate competence can: - understand the basic concepts and 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.

Course title	Educational Science and Key Theories of Learning
Component	Pedagogical component
Cycle	Core disciplines
Module	Supporting learners as individuals 17 Academic credits
Academic credits	3
Course / competence description	The purpose of this course is to improve the following areas of pedagogical competence: Competence area for pedagogy and didactics (1, 2) Pre-service teachers explore the basics of educational science such as the conceptions of man leading to various learning theories and pedagogical models. Based on their understanding of the theoretical concepts, pre-service teachers are able to make appropriate pedagogical choices for various learning situations.
Learning outcomes	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 processes.

Course title	Age and Physiological Features of the Development of Children
Component	Pedagogical component
Cycle	Core disciplines
Module	Supporting learners as individuals 17 Academic credits
Academic credits	3

Course/ competence description	The purpose of this course is to improve the following areas of pedagogical competence: Competence area for pedagogy and didactics (2) Pre-service teachers are familiar with the formation of psyche, its functioning, and the patterns of development. 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.
Learning outcomes	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.

Course title	Inclusive Educational Environment
Component	Pedagogical component
Cycle	Core disciplines
Module	Supporting learners as individuals 17 Academic credits
Academic credits	3
Course / competence description	The purpose of this course is to improve the following areas of pedagogical competence: - Competence area for pedagogy and didactics (2) - Competence area for teachers' work environment (6, 7) Pre-service teachers have the ability to consider the diversity of learners and identify their individual needs in the learning / teaching process. Pre-service teachers support students' learning and inclusion in the educational process by using suitable ICT, teaching and assistive technologies. Pre-service teachers maintain students' well-being from psychological and ethical perspective in collaboration with the community (teachers, students, parents/guardians) considering the context of students' life and learning.
Learning outcomes	Pre-service teachers who demonstrate competence can: - identify the individual educational needs that affect participation and learning in a diverse group of students; - use ICT and assistive technologies to support students' learning and inclusion in the educational process. - teach values and attitudes beneficial to collaboration and inclusivity; - support collaboration in the community (teachers, students, parents/guardians).

Course title	Teaching Planning and Individualization of Learning
Component	Pedagogical component
Cycle	Core disciplines
Module	Supporting learners as individuals 17 Academic credits
Academic credits	4
Course / competence description	The purpose of this course is to improve the following areas of pedagogical competence: Competence area for pedagogy and didactics (1, 2) 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. 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.
Learning outcomes	Pre-service 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.
Teaching and assessment for learning 9 Academic credits	
This module provides the teacher students with competencies to carry out interactive and student-centered teaching and assessment aligned with learning objectives. The module highlights the use of digital tools and technologies and the ability to update and apply teaching technologies in the context of ongoing changes in the society and the educational environment. This module supports the pre-service teachers' competence to communicate and collaborate in various partnership networks to enhance own pedagogical activity.	
Course title	Teaching Methods and Technologies
Component	Pedagogical component
Cycle	Major disciplines
Module	Teaching and assessment for learning 9 Academic credits
Academic credits	5
Course / competence description	The purpose of this course is to improve the following areas of pedagogical competence: • Competence area for pedagogy and didactics (1, 2) Pre-service teachers have a comprehensive understanding of teaching strategies and methodologies, and can apply them in planning, teaching, and assessment in innovative ways matching the specific pedagogical situations, conditions of a specific school and the capabilities of students. Pre-service teachers are able to design suitable inclusive physical and online learning environments at different stages of the educational process. Pre-service teachers understand and can apply the regulations of copyright and data protection in their learning material planning. Pre-service teachers possess necessary knowledge of didactics, learning technologies and methods of motivating students being able to provide necessary pedagogical assistance to students.
Learning outcomes	Pre-service teachers who demonstrate competence can: • select pedagogical models suitable for teaching; • apply teaching methods in a creative and varied manner, considering the opportunities offered by learning technologies; • use a suitable inclusive learning environment in their teaching; • acknowledge and apply the norms and principles of copyright and data protection; • apply guidance methods to motivate students and to support their learning achievements.
Course title	Assessment and Development
Component	Pedagogical component
Cycle	Core disciplines
Module	Teaching and assessment for learning 9 Academic credits
Academic credits	4
Course / competence description	The purpose of this course is to improve the following areas of pedagogical competence: • Competence area for pedagogy and didactics (2) 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. 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.

Learning outcomes	Pre-service 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 students' self- and peer-assessment skills.
Teacher as a reflective practitioner9 Academic credits	
This module focuses on the methodological foundations of pedagogy, and it provides understanding of how pedagogical research informs teaching practices. The module helps the pre-service teachers to develop their reflection skills to become aware of themselves as teachers and to develop their own teaching as well as the ability to set new goals for pedagogical development to ensure lifelong learning. The module also addresses the ethical aspects of the teachers' work and its development.	
Course title	Pedagogical Research
Component	Pedagogical component
Cycle	Major disciplines
Module	Teacher as a reflective practitioner9 Academic credits
Academic credits	4
Course / competence description	The purpose of this course is to improve the following areas of pedagogical competence: • Competence area for professional development (10) This course provides pre-service teachers with a theoretical foundation on pedagogical research. 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.
Learning outcomes	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.
Course title	Research, Development, and Innovation
Component	Pedagogical component
Cycle	Major disciplines
Module	Teacher as a reflective practitioner 9 Academic credits
Academic credits	5
Course / competence description	The purpose of this course is to improve the following areas of pedagogical competence: • Competence area for professional development (8, 9) • Competence area for interaction (5) To stay up-to-date and be able to continuously develop themselves and their work, pre-service teachers acquire new research-based knowledge and conduct practice-based research in an ethical manner in various networks concerning the development of education and teacher profession, innovative approaches to learning, as well as learning and guidance of students. Pre-service teachers adopt development-oriented mindset and are able to develop, update and apply innovative teaching approaches and technologies in the context of ongoing changes in society and the educational environment. Pre-service teachers design a small-scale research project to familiarize themselves with research-based development of their work as teachers. They identify their research topic/questions, conduct the literature review and design the methodology for the data collection and analysis, including ethical aspects of research. After the course, pre-service teachers are able to develop and update their pedagogical activities based on ethically conducted research and development and carry out or participate in research

	projects. They are also able to present their research and development results using various professional forms and channels.
Learning outcomes	Pre-service teachers who demonstrate competence can: • evaluate their own professional activities and work environment to find areas for improvement; • apply a research-based approach to their professional activities and carry out independent research work; • consider and apply ethical aspects of research procedures; • apply critical thinking in data collection and utilization for the development of initial teacher education; • participate in scientific design research and / or develop cooperation between universities and stakeholders; • document their own research activities and present the results using various forms of communication.

Teacher as a facilitator of learning(Pedagogical practice) 25 Academic credits

This module focuses on the transformation of theoretical knowledge into practical skills through two pedagogical practice periods/courses, as well as the formation of a teacher's professional identity that meets the requirements of teaching profession today and in the future. During the module, pre-service teachers also establish practice-based research skills promoting the continuous process of professional growth.

Pedagogical practice is organized in four periods/courses, one per study year, and each having their specific learning outcomes where the competences of pre-service teachers are progressively deepened from orientation and observation to designing educational processes and conducting own lessons, and developing own work environment through practice-based research activities.

All practice periods have some prerequisites and pre-service teachers must have completed a certain amount of subject and/or pedagogical studies before they can conduct their pedagogical practice, the number of credits may vary between the faculties and/or educational programmes.

Course title	Introduction to the teaching profession(1st year pedagogical practice)
Component	Pedagogical component
Cycle	Core disciplines
Module	Teacher as a facilitator of learning 25 Academic credits
Academic credits	2
Course / competence description	The purpose of this course is to improve the following areas of pedagogical competence: • competence area for pedagogy and didactics (1, 2) • competence area for interaction (3, 4, 5) • competence area for teachers' work environment (6, 7) • competence area for professional development (8, 9, 10) Pre-service teachers familiarize themselves with the educational process and the context of the educational institution and its adaptation to the conditions of future professional activity.
Learning outcomes	Pre-service teachers who demonstrate competence can: • understand the regulatory and legislative framework of the education system of the Republic of Kazakhstan, and the documents regulating educational institutions; • distinguish the main documents for maintaining school records (work plans of the educational institution, Kundelik electronic diary, short-term, medium-term and long-term lesson planning, etc.); • comprehend the theoretical and applied aspects of pedagogy and educational psychology in the educational process at school considering social, age, psychophysical and individual characteristics of students, as well as their special educational needs.

Course title	Psychological and pedagogical assessment(2nd year pedagogical practice)
Component	Pedagogical component
Cycle	Core disciplines

Module	Teacher as a facilitator of learning 25 Academic credits
Academic credits	2
Course / competence description	The purpose of this course is to improve the following areas of pedagogical competence: • competence area for pedagogy and didactics (1, 2) • competence area for interaction (3, 4, 5) • competence area for teachers' work environment (6, 7) • competence area for professional development (8, 9, 10) Pre-service teachers familiarize themselves with the features of the integral pedagogical process of an educational institution and the formation of analytical-reflexive, research, design, and other skills in the field of psychological and pedagogical support of the educational process.
Learning outcomes	Pre-service teachers who demonstrate competence can: • comprehend the psychological and pedagogical foundations of teaching strategies (critical thinking, functional literacy, collaborative learning, self-education, self-improvement, criteria-based learning); • apply psychological and pedagogical diagnostic methods to evaluate the needs of a group of students, and understand how the support processes of the student welfare services function in schools; • understand teacher's work from the socio-pedagogical aspect and reflect own professional identity as a future teacher; • establish effective dialogue to reinforce students' positive and responsible learning behaviours; • collaborate with all stakeholders of the educational process; • analyze and develop a holistic pedagogical process in its various forms (lesson, seminar, round table, debate, etc.), and conduct various forms of subject-related extracurricular activities.

Course title	Pedagogical approaches(3rd year pedagogical practice)
Component	Pedagogical component
Cycle	Core disciplines
Module	Teacher as a facilitator of learning 25 Academic credits
Academic credits	6
Course / competence description	The purpose of this course is to improve the following areas of pedagogical competence: • competence area for pedagogy and didactics (1, 2) • competence area for interaction (3, 4, 5) • competence area for teachers' work environment (6, 7) • competence area for professional development (8, 9, 10) During this course, pre-service teachers go through a comprehensive professional development where they improve in practice their professional practices and develop their pedagogical and subject-specific competences necessary for a teacher (preschool teacher, primary school teacher, subject teacher, assistant class teacher / curator).
Learning outcomes	Pre-service teacherswho demonstrate competence can: • design and organize independently a constructive and inclusive educational process; • choose purposeful and suitable learning materials, innovative pedagogical approaches, and active teaching considering also the use of educational technologies and digital environments; • apply subject-specific knowledge and didactics; • apply formative and summative assessment methods and techniques, and support the development of students' reflection, self- and peer-assessment skills; • establish dialogical atmosphere with all stakeholders of the educational process to solve problems and conflict situations and to promote safe learning environment.

Course title	Research and innovation in education(4th year pedagogical practice)
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Component	Pedagogical component
Cycle	Core disciplines
Module	Teacher as a facilitator of learning 25 Academic credits
Academic credits	15
Course / competence description	The purpose of this course is to improve the following areas of pedagogical competence: • competence area for pedagogy and didactics (1, 2) • competence area for interaction (3, 4, 5) • competence area for teachers' work environment (6, 7) • competence area for professional development (8, 9, 10) The course focuses on establishing pre-service teachers' developmental approach towards their own professional activities and work environment. The course also emphasizes the development of pre-service teachers' collaborative, problem-solving and leadership skills. They deepen their pedagogical skills and develop research skills as well as practical skills (didactics) in accordance with their area of specialization. During this practice period pre-service teachers also collect and analyze data, test the hypothesis, or make experimentations according to the research plan created in the course "<i>Research, Development, and Innovation</i>". They make conclusions and explore various forms and channels of communicating the research results in a professional manner.
Learning outcomes	Pre-service teachers who demonstrate competence can: • design and organize independently a constructive and inclusive educational process to test hypothesis, make pedagogical experimentations and/or collect data according to their research plan; • apply innovative teaching and learning strategies, and methods and tools for designing, conducting and assessing an educational process and/or extracurricular activities based on long-term, medium-term, short-term lesson / lesson plans, and educational and out-of-class activities in the subject; • analyze the results of their experimentations and/or data collected and draw conclusions; • document their research activities and present the results in a professional manner using various forms of communication; • evaluate their professional activities in relation to the activities of the organization and through experimentations and practice-based research create ideas for improvement of their work and their work environment.

4.2 Structure of the subject component

Module name and main disciplines	Academic credits
TURKIC WORLD	16
Optional Component	3
Principles of Atatürk	3
Turkic States history	
University Component	13
Yassawi Study	3
Turkish (Kazakh) Language – (Level 1- A1,B2)	5
Turkish (Kazakh) Language – (Level 2-A2, C1)	5
CHEMISTRY AROUND US	24
University Component	10
Mathematics and Physics in Chemistry	5
Fundamentals of chemical production	5
Optional Component	14
Environmental Chemistry	4
Ecological education and sustainable development	
Biochemistry	5
Chemistry in everyday life	
Colloidal Chemistry	
Polymer Chemistry	5

APPLIED CHEMISTRY	21
University Component	12
Analytical Chemistry	7
Biogeochemical analysis of natural objects	5
Optional Component	9
Chemical analysis	3
Design and data processing in chemistry	
Chemometrics	
Art of Chemical Synthesis	6
Nanochemistry	
CHEMICAL STRUCTURE AND FUNCTIONS	23
University Component	17
Chemical bond and structure	4
Atomic structures and periodicity	6
Chemistry of carbon and its compounds	7
Optional Component	6
Inorganic Chemistry	6
Introduction to Chemistry	
ENERGY AND MECHANISM OF CHEMICAL PROCESSES	20
University Component	10
Chemistry of solutions	5
Physical Chemistry	5
Optional Component	10
Kinetics and catalysis	5
Thermochemistry	
Electrochemistry	5
Radiochemistry	
PEDAGOGICAL APPROACH TO TEACHING CHEMISTRY	26
University Component	21
Academic letter	3
Teaching structural and substantive sections of chemistry at school	6
Chemistry Laboratory and Risk Management	2
Solving problems in chemistry	6
Organization of students' project activities in chemistry and artificial intelligence	4
Optional Component	5
STEM Education	5
CLIL in chemistry lessons	
FINAL ATTESTATION	8
Total academic credits	138

The International Kazakh-Turkish University named after Khoja Ahmed Yasawi was established on the basis of an intergovernmental agreement between Kazakhstan and Turkey. In this regard, in order to train modern highly qualified specialists from the youth of the Turkic-speaking countries, the university has obligations to introduce the module of the Turkic world of the disciplines "Yasaitanu", "Principles of Ataturk", "History of the Turkic States" and teaching the Turkish language in all areas of preparation of educational programs.

The general structure of the university component:

Module name and main disciplines	Academic credits
Turkic World	16
Turkish (Kazakh) Language – (Level 1- A1,B2)	5
Turkish (Kazakh) Language – (Level 2-A2, C1)	5
Principles of Ataturk	3
TurkicStateshistory	
YassawiStudy	3
Total academic credits	60

Course title	Turkish (Kazakh) Language – (Level 1- A1,B2)
Component	University component
Cycle	Major disciplines

Module	Turkic World , 16 academic credits
Academic credits	5
Course competence description	The purpose of this course is to improve the following areas of subject competence: Competence area for applied and integrated sciences (13) This course is designed to study the basic level of the Turkish language. The aim of the course is to equip students with practical knowledge of Turkish at the A1 level in accordance with the Common European Framework of Reference for Languages. The course is aimed at developing students' readiness and ability for intercultural and communicative communication. As a result of studying the discipline, the student understands and uses familiar everyday expressions and the simplest phrases aimed at solving specific problems.
Learning outcomes	Pre-service teachers who demonstrate competence can: Students are at A1 level knows how to communicate in a foreign language, using data, using time categories; we can speak correctly with intonation, based on lexical requirements, within the framework of linguistic concepts and grammatically correct arrangement of words. takes into account stylistic features, determines trends in the development of a foreign language: describes and analyzes the causes and consequences of events in social texts from a linguistic point of view; makes reasonable use of language materials, using sufficient language resources appropriate to this level: promptly and independently corrects errors in error-free speech. Students are at B2 level Communicates in a foreign language, using reasonable data and using tense categories, learns grammatically correct words within the framework of language concepts, based on lexical requirements, speaks correctly with intonation; Social characteristics determine the causes and consequences of events in texts; Reasonable use of sufficient language tools and language materials based on this level; speaks without errors, independently corrects sent errors.
Course title	Turkish (Kazakh) Language – (Level 2-A2, C1)
Component	University component
Cycle	Major disciplines
Module	Turkic World , 16 academic credits
Academic credits	5
Course competence description	The purpose of this course is to improve the following areas of subject competence: Competence area for applied and integrated sciences (13) This course is designed for the advanced level of the Turkish language. The aim of the course is to develop students' practical skills at the A2 level in accordance with the Common European Framework of Reference for Languages. The course is aimed at developing students' written (reading, writing) and direct oral (speaking, listening) communication skills, depending on the language level. As a result of studying the discipline, the student can talk on simple everyday topics, describe simple situations.
Learning outcomes	Pre-service teachers who demonstrate competence can: Students are at A2 level presents in a foreign language, using reasonable information, using categories; Assimilates grammatically correct words within the framework of linguistic concepts, speaks correctly with intonation, based on lexical requirements. Determines the causes and consequences of events in social texts; uses sufficient language resources and language materials appropriate to this level; scans without errors, independently corrects sent errors. Improves knowledge about the structure of the C1 level of the Turkish language; develops professional theoretical and linguistic thinking skills through practical topics; improves writing skills and literacy in Turkish through written assignments; listening and speaking tasks use specific communication methods and develop communication skills. develops vocabulary through reading texts.
Course title	Principles of Atatürk
Component	University component

Cycle	Major disciplines
Module	Turkic World , 16 academic credits
Academic credits	3
Course competence description	The purpose of this course is to improve the following areas of subject competence: Competence area for conceptual and theoretical knowledge (4) The discipline forms students' comprehensive understanding of the historical development of Turkey, develops skills for obtaining, analyzing and summarizing historical information, forms a scientific assessment of the principles of Atatürk. During the course, the student receives knowledge about the basic laws, stages and content of the history of Turkey in the context of the world-historical process, forms students' creative thinking, independence of judgment, interest in studying, preserving, using and multiplying the spiritual, cultural and historical heritage of Atatürk.
Learning outcomes	Pre-service teachers who demonstrate competence can: - conducts scientific research in the field of humanities, applies modern methods, tools and forms of education, comprehensively studies, analyzes, and systematizes scientific data; - possesses research abilities and skills depending on the content of modern education, owns new forms and methods of technology of criterion assessment (design, critical thinking), uses information technologies and technical means at a professional level; - He is able to explain the main trends in the field of humanities, uses the ability to interpret historical problems, events, ideas and theories; - He is able to explain the complex connections between facts, phenomena, and theories in the field of scientific research;

Course title	Turkic States history
Component	University component
Cycle	Major disciplines
Module	Turkic World , 16 academic credits
Academic credits	3
Course competence description	The purpose of this course is to improve the following areas of subject competence: Competence area for conceptual and theoretical knowledge (4) The discipline is aimed at forming students' holistic understanding of the place and role of the Turkic peoples and states in the world-historical process, instilling in students the skills and abilities of searching, systematizing and comprehensive analysis of historical information, developing the ability to understand the historical conditioning of phenomena and processes of both the past and the present, defining their own position in relation to the surrounding reality, fostering feelings of citizenship, patriotism, national identity, interethnic and interreligious tolerance.
Learning outcomes	Pre-service teachers who demonstrate competence can: - establishes the connection of historical events with the historical development of mankind; - he knows the techniques of scientific description and analysis of the course and consequences of historical events; - explains the ways to solve modern social problems based on critically informed data; - defines the importance of the formation of historical consciousness and worldview principles in accordance with national priorities;

Course title	Yassawi Study
Component	University component
Cycle	Major disciplines
Module	Turkic World , 16 academic credits
Academic credits	3
Course competence description	The purpose of this course is to improve the following areas of subject competence: Competence area for conceptual and theoretical knowledge (4) The discipline introduces the values of the Yasawi teaching, forms an understanding of the principles of science, religious tolerance, human relations, human rights in personal, cultural and professional relations. As a result of studying the subject, the student can

	understand the peculiarities of the Yasavi culture, compare it with the social, ethical, confessional, cultural characteristics of society, understand the importance of the Yasavi teaching in the national culture, religion of the Turkic peoples; be able to analyze the role of "Hikmets" in the spiritual life of the people, which is a source of social harmony and unity; develop the ability to establish active professional and social relations.
Learning outcomes	Pre-service teachers who demonstrate competence can: • The student can understand the characteristics of creative culture and compare them with the social, ethical, confessional and cultural characteristics of society; • Forms creative positions on issues of science, religious tolerance, human relations, rights in personal, cultural, professional relationships; • Explains the theoretical foundations of the religious and non-religious worldview of the Turkic peoples and the teachings of Yasawi; • Demonstrates skills in communicating Yasawi's worldview to the public; • Explains the importance of the teachings of Akhmet Yasawi in Kazakh culture from the point of view of the phenomenon of religious transformation;

Chemistry around us 24 academic credits

During the module, pre-service teachers develop their mathematical conceptual apparatus in calculations when studying the quantitative composition of a substance. They also develop their understanding of the spatial structure and geometry of molecules as well as the integration of natural sciences and technology to solve problems in industry and life. During the module, pre-service teachers develop their environmental literacy, as well as social and civic responsibility for the environmental consequences of decisions and actions taken. The module also helps pre-service teachers to master a wide range of comprehensive, objective and creative approaches to discussing, analyzing and evaluating environmental protection and sustainable development issues on a local and global scale.

Course title	Mathematics and Physics in Chemistry
Component	Subject component, University component
Cycle	Major disciplines
Module	Chemistry around us 24 academic credits
Academic credits	5
Course/Competence description	The purpose of this course is to improve the following areas of subject competence: • Competence area for experimental research activities (5) • Competence area for applied and integrated sciences (10,12,14) 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.
Learning outcomes	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; 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.
Course title	Fundamentals of chemical production
Component	Subject component, University component
Cycle	Major disciplines
Module	Chemistry around us 24 academic credits
Academic credits	5
Course/Competence description	The purpose of this course is to improve the following areas of subject competence: • Competence area for conceptual and theoretical knowledge (4) • Competence area for experimental research activities (6,9) • Competence area for applied and integrated sciences (10,11,14) 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.
Learning outcomes	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.
Course title	Environmental Chemistry
Component	Subject component, Optional component
Cycle	Major disciplines
Module	Chemistry around us 24 academic credits
Academic credits	4
Course/Competence description	The purpose of this course is to improve the following areas of subject competence: • Competence area for conceptual and theoretical knowledge (4) • Competence area for experimental research activities (6,9) • Competence area for applied and integrated sciences (10,11,14) During the course, pre-service teachers build their knowledge about the basic

	principles of environmental chemistry on a local and global scale. Pre-service teachers give scientific substantiations of the processes occurring in the environment using knowledge in the field of physics, chemistry, Earth sciences and biology. They also apply methods of analysis of physico-chemical processes involving pollutants in the atmosphere, hydrosphere, and soil. During the course, pre-service teachers develop their civic position to realize the responsibility of their decisions and actions.
Learning outcomes	Pre-service teachers demonstrating 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 for scientific substantiation of processes occurring in the environment; • assess anthropogenic changes in environmental objects.
Course title	Ecological education and sustainable development
Component	Subject component, Optional component
Cycle	Major disciplines
Module	Chemistry around us 24 academic credits
Academic credits	4
Course/Competence description	The purpose of this course is to improve the following areas of subject competence: • Competence area for conceptual and theoretical knowledge (4) • Competence area for experimental research activities (6,9) • Competence area for applied and integrated sciences (10,11,14) 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.
Learning outcomes	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 protection measures against environmental pollution correlate the proposed actions in the field of environmental management with the recommendations of international conventions and other treaties ratified in the country.
Course title	Biochemistry
Component	Subject component, Optional component
Cycle	Major disciplines
Module	Chemistry around us 24 academic credits

Academic credits	5
Course/Competence description	The purpose of this course is to improve the following areas of subject competence: • Competence area for conceptual and theoretical knowledge (2,3) • Competence area for experimental research activities (6) • Competence area for applied and integrated sciences (10) 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. 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.
Learning outcomes	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.

Course title	Chemistry in everyday life
Component	Subject component, Optional component
Cycle	Major disciplines
Module	Chemistry around us 24 academic credits
Academic credits	5
Course/Competence description	The purpose of this course is to improve the following areas of subject competence: • Competence area for experimental research activities (8,9) • Competence area for applied and integrated sciences (13) 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. Pre-service teachers learn to respect for one's health and the environment as well as the creation of a safe and favorable environment.
Learning outcomes	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.; • 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.

Course title	Colloidal chemistry
Component	Subject component, Optional component
Cycle	Major disciplines
Module	Chemistry around us 24 academic credits
Academic credits	5

Course/Competence description	The purpose of this course is to improve the following areas of subject competence: • Competence area for conceptual and theoretical knowledge (3) • Competence area for experimental research activities (7) • Competence area for applied and integrated sciences (12) 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.
Learning outcomes	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 high-molecular compounds and surfactants during elective courses.
Course title	Polymer Chemistry
Component	Subject component, Optional component
Cycle	Major disciplines
Module	Chemistry around us 24 academic credits
Academic credits	5
Course/Competence description	The purpose of this course is to improve the following areas of subject competence: Competence area for conceptual and theoretical knowledge (3) Competence area for experimental research activities (7) Competence area for applied and integrated sciences (12) 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. Pre-service teachers also analyze the rheological and relaxation properties of the obtained polymers and generalize the knowledge gained.
Learning outcomes	Pre-service teachers demonstrating competence can: • apply knowledge about high-molecular 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.
Applied Chemistry 21 academic credits	

During the module, pre-service teachers develop their research skills based on critical thinking and analytical activity. They also improve their abilities to observe, describe, and explain chemical phenomena occurring in nature, in the laboratory, and in everyday life. Pre-service teachers handle substances and laboratory equipment when performing chemical experiments in compliance with the safety regulations. They also develop their skills in independent design (planning) of research, identification of risks and hazards, conducting scientific and practical research, data collection, analysis, and evaluation of their results. Pre-service teachers integrate their knowledge related to the achievements of chemical science, as well as to find the connection of the content of the disciplines with the educational and life experience of students.

Course title	Analytical Chemistry
Component	Subject component, University component
Cycle	Major disciplines
Module	Applied Chemistry 21 academic credits
Academic credits	7
Course/Competence description	The purpose of this course is to improve the following areas of subject competence: • Competence area for conceptual and theoretical knowledge (1,2) • Competence area for experimental research activities (5,7) • Competence area for applied and integrated sciences (14) 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.
Learning outcomes	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.

Course title	Chemical analysis
Component	Subject component, Optional component
Cycle	Major disciplines
Module	Applied Chemistry 21 academic credits
Academic credits	3

Course/Competence description	The purpose of this course is to improve the following areas of subject competence: • Competence area for experimental research activities (7) • Competence area for applied and integrated sciences (10,12,14) The course develops the skills of studying the quantitative composition of a substance through chemical analysis based on critical thinking and analytical actions. Studies chemical processes occurring in nature or carried out in laboratory conditions, the general patterns of their course and the possibilities of controlling them. The content of the discipline contributes to the accumulation of knowledge necessary for the development of new, highly sensitive, accurate and fast-performing methods for qualitative and quantitative analysis of the composition of chemical compounds.
Learning outcomes	Pre-service teachers demonstrating competence can: - describe the basics of chemical analysis methods; - understand the principles of physico-chemical methods of analysis in determining the quantitative composition of a substance; - know the technique of performing identification work (weighing, dissolution, heating, filtration, drying, annealing, etc.) - conduct chemical analysis to determine the composition of compounds, evaluate the result.

Course title	Design and data processing in chemistry
Component	Subject component, Optional component
Cycle	Major disciplines
Module	Applied Chemistry 21 academic credits
Academic credits	3
Course/Competence description	The purpose of this course is to improve the following areas of subject competence: • Competence area for experimental research activities (5) • Competence area for applied and integrated sciences (10,12,14) 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.
Learning outcomes	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.

Course title	Chemometrics
Component	Subject component, Optional component
Cycle	Major disciplines
Module	Applied Chemistry 20 academic credits
Academic credits	3

Course/Competence description	The purpose of this course is to improve the following areas of subject competence: • Competence area for experimental research activities (5) • Competence area for applied and integrated sciences (10,12,14) 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. 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.
Learning outcomes	Pre-service teachers demonstrating competence can: • use knowledge of the basics of chemometrics, a multidimensional analysis method for processing the results of a chemical experiment; • apply modern software tools for processing experimental information; • interpret the analysis data and evaluate the results of the experiment.
Course title	Biogeochemical analysis of natural objects
Component	Subject component, University component
Cycle	Major disciplines
Module	Applied Chemistry 21 academic credits
Academic credits	5
Course/Competence description	The purpose of this course is to improve the following areas of subject competence: • Competence area for experimental research activities (6,7) • Competence area for applied and integrated sciences (12) 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. 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.
Learning outcomes	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 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.
Course title	Art of Chemical Synthesis
Component	Subject component, Optional component
Cycle	Major disciplines
Module	Applied Chemistry 21 academic credits
Academic credits	6

Course/Competence description	The purpose of this course is to improve the following areas of subject competence: • Competence area for conceptual and theoretical knowledge (4) • Competence area for experimental research activities (7) • Competence area for applied and integrated sciences (14) 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. Pre-service teachers develop a constructive approach to conducting chemical synthesis in original ways.
Learning outcomes	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.
Course title	Nanochemistry
Component	Subject component, Optional component
Cycle	Major disciplines
Module	Applied Chemistry 21 academic credits
Academic credits	6
Course/Competence description	The purpose of this course is to improve the following areas of subject competence: • Competence area for conceptual and theoretical knowledge (4) • Competence area for experimental research activities (7) • Competence area for applied and integrated sciences (14) 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. 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.
Learning outcomes	Pre-service teachers demonstrating competence can: • formulate basic concepts about the nature of nanomaterials and 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.
Chemical structure and functions 23 academic credits	
During the module, pre-service teachers develop their system thinking through basic knowledge and understanding of basic concepts, laws and phenomena in the field of chemistry. They also develop a modern understanding of the structure of the atom, and the state and movement of electrons in the atom. Pre-service	

teachers explore the concept of the periodicity of changes in the properties of elements, redox and acid-base properties of metals and nonmetals, and their compounds. They also investigate the dependence of the properties of simple and complex substances on the type of chemical bond and crystal lattice. Pre-service teachers analyze the cause-effect relationships between composition, structure, properties and application of substances, as well as the importance of the development of science for understanding and the holistic perception of the chemical picture of the surrounding world.

Course title	Inorganic chemistry
Component	Subject component, Optional component
Cycle	Major disciplines
Module	Chemical structure and functions 23 academic credits
Academic credits	6
Course/Competence description	The purpose of this course is to improve the following areas of subject competence: • Competence area for conceptual and theoretical knowledge (1) • Competence area for experimental research activities (6,7) During the course, pre-service teachers develop a foundation of general chemical training and scientific outlook, as well as creative thinking as future specialists. When studying the course, they develop modern understanding of quantum-mechanical ideas about the nature of the electron and the structure of the atom, as well as the basic theories of chemical processes. The course is a basis for further study of individual sciences of the chemical cycle and contributes to a deeper understanding of the design of the periodic system and its significance, the theory of the structure of the atom, and the theory of chemical bonding. The course helps pre-service teachers to establish causal relationships between the composition, structure, properties, and use of substances.
Learning outcomes	Pre-service teachers demonstrating competence can: • understand the academic language of chemical concepts and terms; • make formulas and give correct names to oxides, acids, bases and salts; • express the essence of reactions by abbreviated ionic equations and apply the knowledge gained to characterize the chemical properties of acids, bases, salts; • give a comparative characteristic of the elements; • conduct experiments using elementary methods of chemical research of substances and compounds to form research skills.

Course title	Introduction to Chemistry
Component	Subject component, Optional component
Cycle	Major disciplines
Module	Chemical structure and functions 23 academic credits
Academic credits	6

Course/Competence description	The purpose of this course is to improve the following areas of subject competence: • Competence area for conceptual and theoretical knowledge (1) • Competence area for experimental research activities (6,7) During the course, pre-service teachers develop their knowledge of the basic concepts and laws of chemistry. They investigate 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, and redox reactions. They also develop their understanding of the role of chemistry in everyday life, and its applied significance in the life of society.
Learning outcomes	Pre-service teachers demonstrating competence can: • understand the academic language of chemical concepts and terms; • formulate and systematize knowledge about the stereochemical laws of chemistry, the periodic law, 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 the processes taking place in the environment from the point of view of chemical science and sustainable development.
Course title	Chemical bond and structure
Component	Subject component, University component
Cycle	Major disciplines
Module	Chemical structure and functions 23 academic credits
Academic credits	4
Course/Competence description	The purpose of this course is to improve the following areas of subject competence: • Competence area for conceptual and theoretical knowledge (1) • Competence area for applied and integrated sciences (12,14) During the course, pre-service teachers develop a critical and logical understanding of the types and mechanism of chemical bond formation. They also develop their abilities to identify chemical bondtypes and explain the nature and methods of formation of chemical bonds. Pre-service teachers also acquire practical skills and learn to organize their professional activities. After the course, pre-service teachers are able to implement elective courses that contribute to the professional self-determination of students.
Learning outcomes	Pre-service teachers demonstrating competence can: • explain the nature and methods of chemical bond formation; • 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; • solve practical problems on the chemical bond and structure of substances and correlate the dependence of the physical properties of substances on the type of crystal lattice; • draw diagrams of the structure of molecules of substances formed by different types of chemical bonds.
Course title	Atomic structures and periodicity

Component	Subject component, University component
Cycle	Major disciplines
Module	Chemical structure and functions 23 academic credits
Academic credits	6
Course/Competence description	The purpose of this course is to improve the following areas of subject competence: • Competence area for conceptual and theoretical knowledge (1) • Competence area for experimental research activities (6,7) During the course, pre-service teachers develop 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. They also develop their logical thinking to predict the properties of substances. Pre-service teachers model the structure of substances, and establish a causal relationship between the composition, structure, and properties of substances. They develop and improve their skills in conducting a chemical experiment, describing the results of the experiment, and observing the norms and rules of working safely in a chemical laboratory.
Learning outcomes	Pre-service teachers demonstrating competence can: • to characterize chemical elements based on the features of the structure of their atoms and their position in the periodic table; • predict the properties of substances, simulate the structure and structure of a substance; • establish a causal relationship between the composition, structure, properties of substances; • conduct a chemical experiment in compliance with the norms and rules of safe operation in a chemical laboratory.

Course title	Chemistry of carbon and its compounds
Component	Subject component, University component
Cycle	Major disciplines
Module	Chemistry of carbon and its compounds 23 academic credits
Academic credits	7
Course/Competence description	The purpose of this course is to improve the following areas of subject competence: • Competence area for conceptual and theoretical knowledge (3) • Competence area for experimental research activities (6,7) • Competence area for applied and integrated sciences (12) During the course, pre-service teachers develop a systematic knowledge and modern ideas about the properties, structure and chemical behavior, as well as the nature of the chemical bond of organic compounds. During the course, pre-service teachers develop their abilities to discuss the dual role of organic substances in the environment. They also apply the 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. Pre-service teachers develop experimental skills in the study of physico-chemical properties, and identification of organic compounds.
Learning outcomes	Pre-service teachers demonstrating 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.
Energy and the mechanism of chemical processes 20 academic credits	
During the module, pre-service teachers develop their skills in analysis and evaluation through knowledge about the patterns of chemical processes and energy conversion. Pre-service teachers explore the relationship between the structure of a substance and its reactivity, as well as the patterns that determine the possibilities of the processes. They also build their understanding of the mechanisms of chemical reactions and the speed of their course, as well as the influence of various factors on them. The module highlights the importance of electrochemical parameters of electrolyte solutions for electrochemical processes.	
Course title	Chemistry of solutions
Component	Subject component, University component
Cycle	Major disciplines
Module	Energy and the mechanism of chemical processes 20 academic credits
Academic credits	5
Course/Competence description	The purpose of this course is to improve the following areas of subject competence: • Competence area for conceptual and theoretical knowledge (1,2) • Competence area for experimental research activities (6,7) • Competence area for applied and integrated sciences (12) During the course, pre-service teachers develop their knowledge and understanding of the theory of solutions, structure and properties, classification of solvents, ionic processes, phase transformations, critical phenomena in solutions, organic solutions, and polyelectrolyte solutions. They also learn about the influence of various factors on the viscosity of solutions. During the course, pre-service teachers apply the knowledge to solve situational problems of everyday life. They also develop a creative approach to research activities as well as their abilities in self-organizing.
Learning outcomes	Pre-service teachers demonstrating competence can: • apply knowledge in solving situational problems related to the use of solutions; • prepare solutions of a given concentration and convert from one concentration to another; • establish causal relationships between phenomena and processes occurring in solutions and biological objects.
Course title	Physical chemistry
Component	Subject component, University component
Cycle	Major disciplines
Module	Energy and the mechanism of chemical processes 20 academic credits
Academic credits	5

Course/Competence description	The purpose of this course is to improve the following areas of subject competence: • Competence area for conceptual and theoretical knowledge (2) • Competence area for experimental research activities (6,7) • Competence area for applied and integrated sciences (14) During the course, pre-service teachers develop their chemical worldview and acquire modern understanding about the structure of substances and the chemical process based on the laws of thermodynamics and kinetics. They explore the theoretical foundations of classical and statistical thermodynamics, and ways of applying thermodynamic methods to solve chemical problems. When studying the course, pre-service teachers build their knowledge and skills in modeling and performing numerical calculations when describing and explaining various types of chemical and phase equilibria and properties of substances in solutions.
Learning outcomes	Pre-service teachers demonstrating competence can: • formulate laws and concepts of physical chemistry with reasoned judgments; • describe the structure and properties of the main phase states of a substance (gases, solids and liquids); • discuss the physico-chemical basis 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.

Course title	Kinetics and catalysis
Component	Subject component, Optional component
Cycle	Major disciplines
Module	Energy and the mechanism of chemical processes 20 academic credits
Academic credits	5
Course/Competence description	The purpose of this course is to improve the following areas of subject competence: • Competence area for conceptual and theoretical knowledge (2) • Competence area for experimental research activities (6,7) • Competence area for applied and integrated sciences (14) During the course, pre-service teachers develop an understanding of 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 the catalyst. They also 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 teaching content in the school curriculum and elective courses, as well as to find a connection between the content of the discipline and the educational and life experience of students.
Learning outcomes	Pre-service teachers demonstrating competence can: • apply the equations of formal kinetics and kinetics of complex, chain, heterogeneous and catalytic reactions for calculations related to the determination of kinetic parameters and kinetic characteristics of chemical processes; • conduct chemical experiments using laboratory chemical devices and equipment to determine kinetic parameters; • analyze and evaluate the patterns and possibilities of chemical

	processes and energy conversion.
Course title	Thermochemistry
Component	Subject component, Optional component
Cycle	Major disciplines
Module	Energy and the mechanism of chemical processes 20 academic credits
Academic credits	5
Course/Competence description	The purpose of this course is to improve the following areas of subject competence: • Competence area for conceptual and theoretical knowledge (2) • Competence area for experimental research activities (6,7) • Competence area for applied and integrated sciences (14) During the course, pre-service teachers establish the relationship of thermal effects of reactions with various physico-chemical parameters. They also develop their skills in discussing the factors influencing the direction of chemical reactions, the methods of qualitative and quantitative description of the equilibrium state of thermodynamic systems, and modern ideas about the chemical process. During the course, pre-service teachers apply the knowledge of the laws of thermodynamics and their consequences, as well as general approaches to the description of the equilibrium state of thermodynamic systems.
Learning outcomes	Pre-service teachers demonstrating competence can: • discuss chemical phenomena with a thermal effect occurring in nature, in a living organism; • apply knowledge of the basic laws of thermodynamics when discussing the results obtained with the involvement of information databases and other sources; • analyze and evaluate the patterns and possibilities of chemical processes and energy conversion.
Course title	Electrochemistry
Component	Subject component, Optional component
Cycle	Major disciplines
Module	Energy and the mechanism of chemical processes 20 academic credits
Academic credits	5
Course/Competence description	The purpose of this course is to improve the following areas of subject competence: • Competence area for conceptual and theoretical knowledge (2) • Competence area for experimental research activities (6) • Competence area for applied and integrated sciences (12) During the course, pre-service teachers develop the basic mechanisms of electrochemical processes. Pre-service teachers, relying on knowledge from related fields of sciences, study the laws of mutual transformation of chemical and electrical forms of energy and systems, as well as the principles of operation of electrochemical devices and devices. They also construct knowledge on ion systems, processes and phenomena occurring with charged particles at the

	interface of phases.
Learning outcomes	Pre-service teachers demonstrating competence can: • apply knowledge and perform calculations to specific electrochemical processes; • understand the principles of operation and work on electrochemical devices and process experimental information; • identify patterns of electrochemical processes.

Course title	Radiochemistry
Component	Subject component, Optional component
Cycle	Major disciplines
Module	Energy and the mechanism of chemical processes 20 academic credits
Academic credits	5
Course/Competence description	The purpose of this course is to improve the following areas of subject competence: • Competence area for conceptual and theoretical knowledge (2) • Competence area for experimental research activities (6) • Competence area for applied and integrated sciences (12) During the course, pre-service teachers develop their 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. During the course, pre-service teachers become aware of the effects of ionizing radiation on living organisms and develop respect for environmental objects. They also develop their analytical thinking and self-study skills, using the knowledge of related sciences.
Learning outcomes	Pre-service teachers demonstrating competence can: • explain the effects of ionizing radiation on various biological objects; • compose and describe the equations of the radioactive decay reaction; • calculate the radiation yield of radiolysis products with known parameters and experimental data; • justify the decisions made on the safety of people in various life situations.

Pedagogical approach to teaching chemistry 26 academic credits	
During the module, pre-service teachers improve their abilities to analyze the methods and content of teaching chemistry, and to systematize and generalize their knowledge to work with educational and didactic materials in chemistry, as well as the equipment and technical means available in the chemistry classroom, including digital resources. Pre-service teachers use experimental computational methods for solving various practice-oriented educational tasks. They also further improve their competences in the field of academic writing for the application of acquired knowledge and skills in the field of professional and pedagogical research, as well as their competences in interdisciplinary and language teaching.	

Course title	Academic letter
Component	Subject component, University component
Cycle	Major disciplines
Module	Pedagogical approach to teaching chemistry 26 academic credits
Academic credits	3

Course/Competence description	The purpose of this course is to improve the following areas of subject competence: • Competence area for experimental research activities (9) • Competence area for applied and integrated sciences (13) During the course, pre-service teachers develop their academic writing skills, registration of all types of written works, in accordance with existing requirements. They become proficient in communication and teamwork technologies, as well as communication strategies. They also investigate the features of academic writing, ways of correct writing and execution various types of written work in accordance with the principles of academic integrity.
Learning outcomes	Pre-service teachers demonstrating competence can: • prepare and execute the submitted works in accordance with the existing requirements: a scientific essay, an experimental research report, a description and results of project activities, etc. • document the sources of information on one of the citation systems to comply with intellectual property rights; • work with databases of scientific publications, bibliographic sources, make references to the sources used.
Course title	Teaching structural and substantive sections of chemistry at school
Component	Subject component, University component
Cycle	Major disciplines
Module	Pedagogical approach to teaching chemistry 26 academic credits
Academic credits	6
Course/Competence description	The purpose of this course is to improve the following areas of subject competence: • Competence area for conceptual and theoretical knowledge (4) • Competence area for experimental research activities (8,9) • Competence area for applied and integrated sciences (13) During the course, pre-service teacher develop their professional competences as a chemistry teacher in the field of implementing the requirements of the mandatory educational state standard of the Republic of Kazakhstan to the content and structure of chemical education, as well as the basic principles of its formation and conditions of implementation. During the course, pre-service teachers explore through activity-based and personality-developing approaches, the challenges of implementing chemical education in secondary schools, selecting and structuring educational content within the framework of the methodology of standardization of general education.
Learning outcomes	Pre-service teachers demonstrating competence can: • use the actual, 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, generalize the acquired knowledge to work with educational and didactic materials on chemistry, equipment and technical means available in the school chemistry classroom, including digital resources.
Course title	Chemistry laboratory and risk management
Component	Subject component, University component

Cycle	Major disciplines
Module	Pedagogical approach to teaching chemistry 27 academic credits
Academic credits	2
Course/Competence description	The purpose of this course is to improve the following areas of subject competence: Competence area for experimental research activities (5,7,9) During the course, pre-service teachers acquire regulatory and legal knowledge about the safety and labor protection rules. They develop their primary professional skills when working in a chemical laboratory and become familiar with the functions and job responsibilities of a laboratory assistant.
Learning outcomes	Pre-service teachers demonstrating competence can: - prepare instruments for laboratory tests, perform static analysis processing, 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 waste disposal; - manage risks through documenting safety procedures: draw up a manual of educational laboratories, study the manuals of devices and equipment, instructions for the use of equipment, keep safety logs.

Course title	Solving problems in chemistry
Component	Subject component, University component
Cycle	Major disciplines
Module	Pedagogical approach to teaching chemistry 26 academic credits
Academic credits	6
Course/Competence description	The purpose of this course is to improve the following areas of subject competence: - Competence area for conceptual and theoretical knowledge (1) - Competence area for experimental research activities (5) - Competence area for applied and integrated sciences (12,14) During the course, pre-service teachers apply the acquired knowledge to solve basic and more complex level problems of the school chemistry course. They also investigate methods of solving theoretical, computational and experimental problems of various complexity.
Learning outcomes	Pre-service teachers demonstrating competence can: - apply knowledge of stoichiometric laws of chemistry to solve computational and experimental problems; - apply knowledge of experimental calculation methods to solve practice-oriented tasks of a scientific, laboratory and educational nature; - use the knowledge of related sciences to convert formulas and perform calculations.

Course title	Organization of students' project activities in chemistry and artificial intelligence
Component	Subject component, University component

Cycle	Major disciplines
Module	Pedagogical approach to teaching chemistry 26 academic credits
Academic credits	4
Course/Competence description	The purpose of this course is to improve the following areas of subject competence: • Competence area for experimental research activities (5,9) • Competence area for applied and integrated sciences (12) During the course forms the ability to manage and organize the project activities of students, masters the practical mechanisms of project activities with the integration of artificial intelligence (AI) technologies. The course promotes the use of research skills in conducting educational projects in the classroom and extracurricular activities in chemistry, the use of the possibilities of the educational environment and interaction with the subjects of the educational process, the generalization of advanced pedagogical experience using artificial intelligence technologies, the ability to independently organize project activities in teaching chemistry
Learning outcomes	Pre-service teachers demonstrating competence can: • organize and plan project activities in chemistry for students at school; • direct and advise the self-organization of joint active research based on problem solving; • evaluate the project activities of the group according to the developed criteria; • teach students to argue their judgments on the topic of research. • Uses AI models and tools for pedagogical purposes

Course title	STEM education
Component	Subject component, Optional component
Cycle	Major disciplines
Module	Pedagogical approach to teaching chemistry 26 academic credits
Academic credits	5
Course/Competence description	The purpose of this course is to improve the following areas of subject competence: • Competence area for conceptual and theoretical knowledge (4) • Competence area for experimental research activities (6) • Competence area for applied and integrated sciences (12,13) During the course, pre-service teachers explore non-traditional application of interdisciplinary knowledge of natural sciences, engineering, technology, and mathematics in any conditions to achieve the best result. During the course, pre-service teachers examine the forms and methods of STEM education, the development and use of heuristic tasks of a natural science nature, and integrated training on cross-cutting topics. They also apply gamification methods, problem-based learning, 3D models, solving case tasks, etc. Pre-service teachers develop their three-dimensional thinking and their abilities to analyze the main problems and contradictions in the implementation of basic STEM learning approaches.
Learning outcomes	Pre-service teachers demonstrating 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.) mechanisms for their implementation.				
Course title	CLIL in chemistry lessons				
Component	Subject component, Optional component				
Cycle	Major disciplines				
Module	Pedagogical approach to teaching chemistry 26 academic credits				
Academic credits	5				
Course/Competence description	The purpose of this course is to improve the following areas of subject competence: - Competence area for experimental research activities (8,9) - Competence area for applied and integrated sciences (13) During the course, pre-service teachers apply the principles and methods of content and language integrated learning (CLIL). They learn about the general issues of planning and teaching chemistry in English using CLIL as well as the methods of differentiation in content and language integrated chemistry teaching. Pre-service teachers plan and construct lessons using CLIL approach.				
Learning outcomes	Pre-service teachers demonstrating competence can: - application of CLIL technology for the organization of classroom management training activities; - develop an integrated lesson plan with an indication of the language and subject competencies being formed; - create a safe and supportive learning environment; - develop students' reflexive skills in the process of self-assessment of teaching chemistry at school in English; - create a collaborative environment for effective interaction of all participants in the organization of educational activities in the chemistry lesson.				
<table border="1"> <tr> <th>FINAL ATTESTATION 8 academic credits</th><th>FINAL STATE CERTIFICATION 12 academic credits</th></tr> <tr> <td> Final attestation of the graduate is mandatory and is carried out after mastering the educational programme in full. The aim of the attestation is to evaluate the level of maturity of general cultural and professional competences of the graduate, as well as their readiness to perform basic professional activities. Final attestation work (Oral Exam, Written Exam, Diploma work, Research project, Development project, Organisational project, Strategic project, Art project) </td><td> Final state certification of the graduate is mandatory and is carried out after mastering the educational programme in full. The aim of the certification is to evaluate the level of maturity of general cultural and professional competences of the graduate, as well as their readiness to perform basic professional activities – teaching chemistry in schools. Final qualification work (thesis work/ thesis project) </td></tr> </table>		FINAL ATTESTATION 8 academic credits	FINAL STATE CERTIFICATION 12 academic credits	Final attestation of the graduate is mandatory and is carried out after mastering the educational programme in full. The aim of the attestation is to evaluate the level of maturity of general cultural and professional competences of the graduate, as well as their readiness to perform basic professional activities. Final attestation work (Oral Exam, Written Exam, Diploma work, Research project, Development project, Organisational project, Strategic project, Art project)	Final state certification of the graduate is mandatory and is carried out after mastering the educational programme in full. The aim of the certification is to evaluate the level of maturity of general cultural and professional competences of the graduate, as well as their readiness to perform basic professional activities – teaching chemistry in schools. Final qualification work (thesis work/ thesis project)
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4.3 The structure of the compulsory component The Compulsory Component (Cycle of General Education Studies) consists of 56 academic credits (51 academic credits mandatory studies and 5 academic credits optional studies) and includes the following modules and courses <table border="1"> <tr> <th>Name of modules and courses</th><th>Academic credits</th></tr> <tr> <td>COMPULSORY COMPONENT (CYCLE OF GENERAL EDUCATION STUDIES)</td><td>56</td></tr> </table>		Name of modules and courses	Academic credits	COMPULSORY COMPONENT (CYCLE OF GENERAL EDUCATION STUDIES)	56
Name of modules and courses	Academic credits				
COMPULSORY COMPONENT (CYCLE OF GENERAL EDUCATION STUDIES)	56				

MANDATORY STUDIES	51
Module of historical and philosophical competencies	10
<i>History of Kazakhstan</i> Kazakhstan in Ancient and Medieval Times. Prehistoric society. Settlements, economy, and household (2.5 million - 12 thousand B.C. - 4th century). Ethnogenesis of Kazakh nation. Medieval Kazakhstan (IV-XV cc.). Kazakh Khanate. Geopolitical position of the Kazakh state. Kazakh Khanate: formation, rise, decline. Social history (mid- XV - beginning XVIII cc.). Kazakhstan in a colonial period (30-40s of XVIII - 60s XIX cc). Kazakhstan in the beginning of XX century. Formation of a poly-ethnic structure of the population. Kazakhstan in the Soviet period (February-October, 1917 - August, 1991) Kazakhstan - Independent State. The Modern period in the country's history (December 1991 - up to the present).	5
<i>Philosophy</i> Origins of a culture of thinking. The subject and method of philosophy. Foundations of philosophical understanding of the world. Consciousness, spirit and language. Ontology and metaphysics. Ethics. Philosophy of values. Philosophy of freedom. Philosophy of art. Society and culture. Philosophy of history. Philosophy of religion. Philosophy of modern Kazakhstan.	5
Module of socio-political knowledge (sociology, political studies, cultural studies, psychology)	8
<i>Sociology</i> Sociological studies in understanding the social world. Sociological research. Social structure and stratification of society. Socialization and identity. Family and modernity. Deviation, crime, social control. Religion, culture, society. Sociology of ethnicity and the nation. Education and social inequality. Mass media, technology and society. Economics, globalization, labor. Health and medicine. Population, urbanization, and social movements. Social change.	2
<i>Political studies</i> Main stages in the development of political science. Politics as part of social life. Political power. Political elites, leadership. Political system of society. State and civil society. Political regimes. Electoral systems, elections. Political parties, party systems and socio-political movements. Political culture, behavior. Political consciousness, ideology; development, modernization; conflicts and crises. World politics, modern international relations.	2
<i>Cultural studies</i> Morphology of culture. Language of culture. Semiotics of culture. Anatomy of culture. Nomadic culture. Cultural heritage of proto-Turks. Medieval culture. Central Asia. Cultural heritage of Turks. Basis of the Kazakh culture. Kazakh culture in the XVIII - end of XIX century, XX century. Kazakh culture in the context of modern world processes, and in the context of globalization. Cultural policy of Kazakhstan. State program "Cultural heritage".	2
<i>Psychology</i> Personality in the context of national consciousness. Me and my motivation. Emotions, emotional intelligence. Human will, psychology of self-regulation. Individual-typological features. Values, interests, norms. Psychology of the meaning of life, professional self-determination, health. Communication between individuals and groups. The perceptive side of communication. The interactive side of communication. The communicative side of communication. Social and psychological conflict. Patterns of behavior in conflict. Effective communication techniques	2
Instrumental and communication module	25
<i>Russian /Kazakh language</i> Proficiency in accurate use of vocabulary, scientific terms, syntactic constructions in oral and written communication; conversation skills. Business communication, letter-writing, report-writing, review, essay-writing skills; meaningful reading of texts, ability to express own idea. Fluent speaking in various conversations, mastering the ability to carry on a conversation, discussion. Functional styles of speech as a historically developed system of speech means, a variety of literature language.	10

<i>Foreign language</i> Social and domestic sphere of communication. Me and my family. Social and cultural sphere of communication. World map. Customs and Traditions. Educational and professional sphere of communication: Future profession. A modern home. Family in modern society. Cultural and historical background. Education. Profession. Human and nature, environmental problems. News, media, advertising.	10
<i>Information and communication technologies</i> ICT role in society development. Standards in ICT. Introduction to computer systems. Software. Operating systems. Human-computer interaction. Database systems. Data analysis. Data management. Networks and telecommunications. Cybersecurity. Internet technologies. Cloud and mobile technologies. Multimedia technologies. Smart technology. E-technologies. E-business. E-learning. E-government. ICT in industries. Prospects of ICT development.	5
Health Promotion module	8
<i>Physical education</i> Principles of physical education. Scientific basis of physical education. Modern recreational systems, basics of body physical state monitoring. Main methods of practicing sports and physical education independently. Professional physical training. General physical training. Speed. Running. Relay races. Execution of exercises for: endurance, flexibility, agility, coordination, balance, gymnastic and acrobatic exercises. Strength. General training exercises. Special physical training.	8
OPTIONAL COMPONENT	5
<i>Economics, Fundamentals of Entrepreneurship and business</i> The discipline forms students' economic knowledge. Masters scientific skills, methods and techniques of entrepreneurship. In the process of mastering entrepreneurial activity, the student collects data using digital technologies, demonstrates leadership qualities, mastering the subtleties of business and develops skills to achieve goals. The student gets acquainted with the methods of doing business, as well as improves decision-making skills in the organization and management of business.	5
<i>Research skills in law and anti-corruption culture</i> The main provisions of the Constitution, the current legislation of the Republic of Kazakhstan; the system of government bodies, terms of reference, goals, methods of state regulation of the economy, the role of the public sector in the economy; financial law and finance; the mechanism of interaction between substantive and procedural law; the essence of corruption, the reasons for its origin; measure of moral and legal responsibility for corruption offenses; current anti-corruption legislation	5
<i>Ecology and Life Safety</i> The discipline forms a system of knowledge among students about human interaction with the environment, environmental and man-made risks, principles of ensuring the safety of life and the concept of sustainable development of society. The student learns how to develop and justify measures to ensure the safety of life, taking into account the goals of sustainable development and the characteristics of an inclusive environment. He gets used to using means of control, analysis and prevention of emergencies and risks.	5
<i>Research methods</i> Research approaches. Inductive and deductive reasonings. Qualitative, quantitative, mixed methods research. Primary and Secondary research. Action research. Research designs – descriptive, correlational, experimental, quasi-experimental, cross-sectional, longitudinal, case study, ethnographic, exploratory, explanatory. Variables and hypotheses. Reliability and validity of research. Reproducibility and replicability. Random and systematic error. Triangulation. Sampling. Inclusion and exclusion criteria in sampling. Sampling methods. Collecting data – surveys, interviews, experiments, observational studies, systematic review. Data cleansing. Transcribing interviews. Analysing data – statistical analysis, content analysis, discourse analysis, thematic analysis, textual analysis. Research ethics. Peer review.	5
<i>Financial literacy</i> The purpose of studying the discipline is to improve the financial literacy of individuals, the formation of competencies in the field of personal finance management. The objective of the course is the practical application of experience in finance and financial institutions to effectively improve the financial literacy of individuals. The acquired knowledge is necessary for self-development in the field of financial management, making responsible	5

and informed decisions in the field of financial resources management and increasing the ability to implement these decisions.	
Total academic credits	56

Жоғары білім беру бағдарламасы бойынша НЕГІЗГІ ОҚУ ЖОСПАРЫ / Yüksek Eğitim Alanı TEMEL EĞİTİM PLANI
По программе высшего образования ОСНОВНОЙ УЧЕБНЫЙ ПЛАН / High education program BASIC EDUCATION PLAN
6B01522 –Химия (ІР) /6B01522 –Kimya / 6B01522 –Химия (ІР) /6B01522 – Chemistry (ІР)

Пәннің (модульдің) атауы / Наименование предмета (модуля) / Subject (module) name	ECTS	Бакалавр дәрежесі, 4 академиялық жыл / Lisans derecesi, 4 akademik yıl/ Степень бакалавра, 4 академических года / BA degree, 4 academic years								Пререквизит Постреквизит Çekişmeler Sonra görüşecek Prerequisites Post-Requisite
		I		II		III		IV		
		1	2	3	4	5	6	7	8	
Жалпы білім беретін пәндер (ЖБП) циклі /Genel Eğitim Dersler Döngüsü(GED)/ Цикл общеобразовательных дисциплин (ООД)/ Cycle of general education (CGE)- 56акад.кр./akademik kredit/ academ.credits Міндетті компонент МК/ Zorunlu bileşen ZB/ Обязательный компонент ОК/ Required component RC - 51акад.кр./akademik kredit/ academ.credits Тандау компоненті (ТК)/ Seçmeli bileşen SB/Компонент по выбору KB/ Component of Choice CC – 5 акад.кр./akademik kredit/ academ.credits										
Тарихи және философиялық құзыреттіліктер модулі / Tarihsel ve Felsefi Yeterlilikler Modülü / Модуль историко-философских компетенций/ Module of historical and philosophical competencies	10									
Қазақстан тарихы/KazakistanTarihi/История Казахстана/History of Kazakhstan	5		5							
Философия /Felsefe/Философия/Philosophy	5	5								
Қазақ (орыс) тілі/Kazak (Rus) Dili /Казахский (русский) язык/Kazakh(Russian) Language	10	5	5							Қазақ (орыс) тілі A1- пре - жоқ, постA2/ B1- пре A2, пост- B2/ C1 пре B2, C1-пост жоқ
Шетел тілі/Yabancı dil/Иностранный язык/Foreign Language	10	5	5							Ағылшын тілі 1 сем- A2- пре - жоқ, пост B1/B1- пре A2, пост- жоқ 2 сем-B2- пре жоқ, пост - C1/C1 пре B2, C1-пост жоқ
Ақпараттық-коммуникациялық технологиялар /Bilişim veİletişimTeknolojileri /Информационно-коммуникационные технологии /Information and communication technology	5			5						
Әлеуметтік-саяси білім модулі/ Sosyo-politik bilgi modülü / Модуль социально-политических знаний/ Module of socio-political knowledge	8									
Әлеуметтік-саясаттану білім модулі (әлеуметтану, саясаттану, мәдениеттану, психология) / Sosyo-politik bilgi modülü (sosyoloji, siyaset bilimi, kültürel çalışmalar, psikoloji)/ Модуль социально-политических знаний (социология, политология, культурология, психология) /Social and political education module (sociology, political science, cultural studies, psychology)	8			2						
				2						
				2						
				2						
Денсаулықты нығайту модулі/ Sağlğın teşviki modülü /Модуль укрепления здоровья / HealthPromotionmodule	8									
Денешынықтыру/BedenEğitimi/Физическая культура/PhysicalCulture	8	2	2	2	2					
Модуль-Қоғамдық даму негіздері/ Modül - Sosyal gelişimin temelleri /	5									

Модуль-Основы общественного развития/Module- The basis of social development										
Экология және өмір қауіпсіздігі/Ekoloji ve yaşam güvenliği/Экология и безопасность жизнедеятельности/Ecology and Life Safety	5				5					
Құқық және сыбайлас жемқорлыққа қарсы саласындағы зерттеу дағдылары/Hukuk ve yolsuzlukla mücadele kültürü alanında araştırma becerileri / Исследовательские навыки в области права и антикоррупционной культуры/ Research skills in law and anti-corruption culture										
Ғылыми зерттеу әдістері / Bilimsel araştırma yöntemleri/ Методы научных исследований/ Research Methods										
Экономика, кәсіпкерлік және бизнес негіздері /Ekonomi, girişimcilik ve iş temelleri/Экономика, основы предпринимательства и бизнеса/ Economics, Fundamentals of Entrepreneurship and business										
Қаржылық сауаттылық /Finansal okuryazarlık/Финансовая грамотность Financial literacy										
Базалық және бейіндеуші пәндерциклі/ Temel ve profiloluşturma disiplinleri /Базовые и профилирующие дисциплины/ Basic and profile disiplins 198 акад.кр./akademik kredit/ academ.credits										
Базалық пәндер циклі / Temel disiplinleri /Базовые дисциплины Basic and profile disiplins. ПЕДАГОГИКАЛЫҚ КОМПОНЕНТ/ ПЕДАГОГИЧЕСКИЙ КОМПОНЕНТ/ PEDAGOGICAL COMPONENT -60 акад.кр./akademik kredit/ academ.credits										
Модуль-Білім алушыны тұлға ретінде қолдай / Öğretmen Adaylarının Birey Olarak Desteklenmesi / Модуль-Поддержка обучающихся как личностей / Supporting learners as individuals / – 17 акад.кр./akademik kredit/ academ.credits/kredi										
Білім берудегі психология және өзара әрекеттесу мен коммуникация тұжырымдамалары /Eğitimde Psikoloji ve Etkileşim-İletişim Kavramları / Психология в образовании и концепции взаимодействия и коммуникации/ Psychology in Education and Concepts of Interaction and Communication	4			4						
Білім беру туралы ғылым және оқытудың негізгі теориялары / Eğitim Bilimi ve Temel Öğrenme Teorileri / Наука об образовании и ключевые теории обучения / Educational Science and Key Theories of Learning /	3			3						
Инклюзивті білім беру ортасы / Kapsayıcı (Kaынаştırma) Eğitim Ortamları / Инклюзивная образовательная среда / Inclusive Educational Environment	3					3				
Балалардың жас ерекшелік және физиологиялық даму ерекшеліктері / Çocuk Gelişiminde Yaş ve Fizyolojik Gelişim Özellikleri /Возрастные и физиологические особенности развития детей/ Age and Physiological Features of the Development of Children/	3		3							
Оқытуды жоспарлау және дербес оқыту/ Öğretimin Planlaması ve Bireyselleştirilmesi / Планирование преподавания и индивидуализация обучения/ Teaching Planning and Individualization of Learning	4						4			
Модуль-Оқыту және үйрету үшін бағалау/ / Модуль-Преподавание и оценивание для обучения / Teaching and assessment for learning / Öğretme ve Öğrenmenin Değerlendirilmesi – 9 акад.кр./akademik kredit/ academ.credits										

Оқытудың әдістері мен технологиялары / Öğretim Yöntem ve Teknikleri / Методы и технологии преподавания / Teaching Methods and Technologies /	5				5					
Бағалау және дамыту / Değerlendirme ve Geliştirme / Оценивание и развитие / Assessment and Development	4				4					
Модуль-Мұғалім - рефлексиялық практика иесі / Bir Yansıtıcı Uygulayıcı Olarak Öğretmen /Модуль-Учитель как рефлекслирующий практик / Teacher As A Reflective Practitioner/ – 9 Акад.Кр./Akademikkredit/ Academ.Credits										
Педагогикалық зерттеулер / Pedagojik Araştırmalar / Педагогические исследования / Pedagogical Research	4				4					
Зерттеулер, даму және инновациялар/ Araştırma, Geliştirme ve Yenilikçilik / Исследования, развитие и инновации / Research, Development and Innovation	5							5		
Педагогикалық практика – Мұғалім – оқу фасилитаторы / Öğretimin Kolaylaştırıcısı Olarak Öğretmen (Pedagojik Uygulama) / Педагогическая практика – Учитель как фасилитатор обучения / Pedagogical practice -Teacher as a facilitator of learning /– 25 акад.кр./akademikkredit/ academ.credits										
Мұғалім кәсібіне кіріспе (оқу практикасы1-курс) / Öğretmenlik Mesleğine Giriş (Pedagojik Uygulama, 1. sınıf)/ – Введение в профессию учителя (учебная практика, 1 курс)/ Introduction to the teaching profession (1st year, educational practice)	2		2							Пре: - Пост: психологиялық-педагогикалық практика
Психологиялық және педагогикалық бағалау (психологиялық-педагогикалық практика, 2-курс) / Psikolojik ve Pedagojik Değerlendirme (psikolojik ve pedagojik uygulama , 2. sınıf)/ Психолого-педагогическое оценивание (психолого-педагогическая практика, 2 курс) / Psychological and pedagogical assessment (2nd year psychological and pedagogical practice)	2				2					Пре: оқу практикасы Пост: педагогикалық практика
Педагогикалық технология (педагогикалық практика, 3-курс) // Педагогическая технология (Педагогическая практика, 3 курс)/ Pedagogical approaches (3rd year, pedagogical practice) Pedagojik Yaklaşımlar (Pedagojik Uygulama, 3. sınıf)	6						6			Пре: психологиялық-педагогикалық практика Пост: өндірістік-педагогикалық практика
Білім берудегі зерттеулер мен инновациялар (өндірістік-педагогикалық практика, 4-курс) / Eğitimde Araştırma ve Yenilikler (Pedagojik Uygulama, 4. sınıf)/ Исследования и инновации в образовании (производственная-педагогическая практика, 4 курс)/ Research and innovation in education (4th year industrial- pedagogical practice)	15								15	Пре: өндірістік-педагогикалық практика
Бейіндеуші пәндер циклі / Profil oluşturma disiplinleri /Профилирующие дисциплины Profile disiplins – 130 акад.кр./akademikkredit/ academ.credits Жоғары оқу орны компоненті ЖК/ Üniversite Seçmeli/Вузовский компонент ВК/University Component UC -86 акад.кр./akademikkredit/ academ.credits Тандау компоненті (ТК)/ Seçmeli bileşen SB/ Компонент по выбору КВ/ Component of Choice CC - 44 акад.кр./ akademik kredit/ academ.credits)										
Модуль – Түркі дүниесі/ Modül – Türk Dünyası/ Модуль – Тюркский мир/ Module – Turkic World	16									
Ататүрік принциптері/Atatürk İlkeleri/ПринципыАтатюрка/PrinciplesofAtaturk	3				3					
Түркі мемлекеттер тарихы/Türk memleketleri tarihi/История тюркских государств/TurkicStateshistory										
Ясауитану/YesevilikBilgisi/Ясавиведение/YassawiStudy	3				3					

Түрік (Қазақ) тілі – (Деңгей 1-А1,В2) /Türk (Kazak) Dili –(Seviye 1- A1,B2)/Турецкий (Казахский) язык – (Уровень 1- А1,В2)/Turkish (Kazakh) Language – (Level 1- A1,B2)	5	5								Пре: жоқ Пост: Түрік (Қазақ) тілі – (Деңгей 2-А2, С1)
Түрік (Қазақ) тілі – (Деңгей 2-А2, С1) /Türk (Kazak) Dili –(Seviye 2-А2, С1) /Турецкий (Казахский) язык – (Уровень 2-А2, С1) /Turkish (Kazakh) Language – (Level 2-А2, С1)	5		5							Пре: Түрік (Қазақ) тілі – (Деңгей 1-А1, В2) Пост: жоқ
ПӘНДІК КОМПОНЕНТ/ KONU BİLEŞENİ / ПРЕДМЕТНЫЙ КОМПОНЕНТ/ SUBJECT COMPONENT -114 академиялық кредит										
Модуль - Айналамыздағы химия/ Modül - Çevremizdeki kimya/ Модуль - Химия вокруг нас/ Module - Chemistry around us	24									
Химиядағы математика мен физика /Kimyada Matematik ve Fizik Математика и физика в химии /Mathematics and Physics in Chemistry	5	5								Пре:- Пост: Физикалық химия
Қоршаған орта химиясы /Çevre Kimyası Химия окружающей среды /Environmental Chemistry	4						4			
Экологиялық білім беру және тұрақты даму/Çevre Eğitimi ve Sürdürülebilir Kalkınma/Экологическое образование и устойчивое развитие/Ecological education and sustainable development										
Биохимия /Biyokimya /Биохимия /Biochemistry	5						5			
Тұрмыстағы химия /Günlük yaşamda kimya Химия в быту /Chemistry in everyday life										
Коллоидты химия /Kolloidal Kimya /Коллоидная химия/Colloidal chemistry	5							5		
Полимерлер химиясы/Polimerlerin kimyası Химия полимеров/Polymer Chemistry										
Химиялық өндіріс негіздері /Kimyasal üretimin temelleri Основы химического производства /Fundamentals of chemical production	5							5		
Модуль - Қолданбалы химия/ Modül - Uygulamalı Kimya /Модуль - Прикладная химия/ Module - Applied chemistr	21									
Аналитикалық химия /Analitik Kimya Аналитическая химия /Analytical Chemistry	7			7						Пре:- Пост: Табиғат нысандарының биогехимиялық талдауы
Химиялық талдау /Kimyasal analiz /Химический анализ/Chemical analysis	3				3					
Химиядағы жобалау және мәліметтерді өңдеу/Kimyada veri tasarımı ve işleme Проектирование и обработка данных в химии/Design and data processing in chemistry										
Хеометрика /Kemometrikler /Хеометрика /Chemometrics	5							5		Пре:Аналитикалық химия
Табиғат нысандарының биогехимиялық талдауы/Doğal nesnelerin Biyojeokimyasal analizi/Биогехимический анализ природных объектов Biogeochemical analysis of natural objects										
Химиялық синтездеу өнері /Kimyasal Sentez Sanatı	6							6		

Искусство химического синтеза /Art of Chemical Synthesis											
Нанохимия /Nanokimya/Нанохимия/Nanochemistry											
Модуль - Химиялық құрылымы мен қызметтері/ Modül - Kimyasal Yapı ve Fonksiyonlar /Модуль - Химическая структура и функции/Module-Chemical structure and functions	23										
Бейорганикалық химия /İnorganik kimya Неорганическая химия /Inorganic chemistry	6	6									
Химияға кіріспе /Kimyaуа Giriş/Введение в химию /Introduction to Chemistry											
Химиялық байланыс және құрылым /Kimyasal bağ ve yapı Химическая связь и структура/Chemical bond and structure	4		4								
Атом құрылысы және периодтылық/Atomik yapı ve periyodiklik Строение атома и периодичность/Atomic structures and periodicity	6			6							
Көміртек және оның қосылыстарының химиясы/Karbon ve bileşiklerinin kimyası/Химия углерода и его соединений/Chemistry of carbon and its compounds	7					7					
Модуль - Энергетика және химиялық процестердің механизмі/ Modül - Enerji ve kimyasal süreçlerin mekanizması/Модуль - Энергетика и механизм химических процессов/Module - Energy and mechanism of chemical processes	20										
Ерітінділер химиясы/Çözeltilerin kimyası Химия растворов/ Chemistry of solutions	5				5						
Физикалық химия /Fiziksel Kimya Физическая химия /Physical chemistry	5					5				Пре: Химиядағы математика мен физика Пост:-	
Кинетика және катализ/Kinetik ve Kataliz Кинетика и катализ /Kinetics and catalysis	5						5				
Термохимия /Termokimya/Термохимия/Thermochemistry											
Электрохимия /Elektrokimya /Электрохимия /Electrochemistry	5							5			
Радиохимия /Radyokimya /Радиохимия /Radiochemistry											
Модуль - Химияны оқытудың педагогикалық тәсілі/ Modül - Kimya eğitimi Pedagojik Yaklaşım / Модуль - Педагогический подход к обучению химии/Pedagogical approach to teaching chemistry	26										
Академиялық жазылым /Akademik abonelik Академическое письмо /Academic letter	3				3						
Мектепте химияның құрылымдық-мазмұндық бөлімдерін оқыту Okulda kimyanın yapısal ve içerik bölümlerinin öğretilmesi Обучение структурно-содержательных разделов химии в школе Teaching structural and substantive sections of chemistry at school	6					6				Пост: Химия бойынша оқушылардың жобалық қызметін ұйымдастыру және жасанды интеллект	

Химиядан есептер шығару /Kimya problemlerinin çözümü Решение задач по химии /Solving problems in chemistry	6					6					
Химия бойынша оқушылардың жобалық қызметін ұйымдастыру және жасанды интеллект Kimya öğrencilerinin proje faaliyetlerinin organizasyonu ve yapay zeka Организация проектной деятельности учащихся по химии и искусственный интеллект Organization of students' project activities in chemistry and artificial intelligence	4							4		Пре: Мектепте химияның құрылымдық-мазмұндық бөлімдерін оқыту Пост: -	
Химия зертханасы және тәуекелдерді басқару Kimya Laboratuvarı ve Risk Yönetimi Лаборатория химии и управление рисками Chemistry laboratory and risk management	2								2		
STEM-білімберу /STEM Eğitimi STEM-образование /STEM education	5								5		
Химия сабақтарындағы CLIL /CLİL kimya dersinde CLIL на уроках химии /CLIL in chemistry lessons											
Қорытынды аттестаттау / Final Sınav/ Итоговая аттестация/ Final Attestation - / 8 акад.кр./ akademik kredit/ academ.credits)											
Дипломдық жұмысты, дипломдық жобаны жазу және қорғау немесе кешенді емтихан тапсыру/Tezi Veya Projeyi hazırlama ve Savunma yada Kapsamlı Snavına girme/Написание и защита дипломной работы, дипломного проекта или подготовка и сдача комплексного экзамена/Writing and defending a diploma work, diploma project or preparing and passing of Complex exam									8		
Жалпы барлығы/ Genel Toplam /Общий итог/ General:	254	33	31	35	35	31	29	30	30		

Matrices for LO and disciplines included in the EP register 6B01522 –Chemistry (IP)

LEARNING OUTCOMES (LO):	Graduates of the educational program will be able to: 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 legal-economic development of Kazakhstan; LO 2– 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; LO 3 – constructively build professional relationships necessary for their own pedagogical and professional activities, pedagogical development and professional well-being; LO 4 - apply scientific research and academic writing methods when planning pedagogical research and staging a chemical experiment, using language competencies, digital resources, artificial intelligence technologies and advanced innovative experience to obtain, process and present information and research results; LO 5 – 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; LO 6- 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; LO 7– 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; LO 8 – synthesize knowledge of related sciences necessary for everyday professional activities and for the formation of functional literacy of students
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	Кр саны	ОН 1	ОН 2	ОН 3	ОН 4	ОН 5	ОН 6	ОН 7	ОН 8
Экология және өмір қауіпсіздігі/Ekoloji ve yaşam güvenliği/Экология и безопасность /жизнедеятельности/EcologyandLifeSafety	5	+	+						
Құқық және сыбайлас жемқорлыққа қарсы саласындағы зерттеу дағдылары/Hukuk ve yolsuzlukla mücadele kültürü alanında araştırma becerileri / Исследовательские навыки в области права и антикоррупционной культуры/ Research skills in law and anti-corruption culture		+							
Экономика, кәсіпкерлік және бизнес негіздері /Ekonomi, girişimcilik ve iş temelleri/Экономика, основы предпринимательства и бизнеса/ Economics, Fundamentals of Entrepreneurship and business		+							
Ғылыми зерттеу әдістері / Bilimsel araştırma yöntemleri/ Методы научных исследований/ Research Methods					+			+	
Қаржылық сауаттылық /Finansal okuryazarlık/Финансовая грамотность Financial literacy		+							
Білім берудегі психология және өзара әрекеттесу мен коммуникация тұжырымдамалары /Eğitimde Psikoloji ve Etkileşim-İletişim Kavramları /	4		+	+					

Психология в образовании и концепции взаимодействия и коммуникации/ Psychology in Education and Concepts of Interaction and Communication									
Білім беру туралы ғылым және оқытудың негізгі теориялары / EğitimBilimiveTemelÖğrenmeTeorileri / Наука об образовании и ключевые теории обучения /EducationalScienceandKeyTheoriesofLearning /	3				+				
Инклюзивті білім беру ортасы / Kapsayıcı (Kaynaştırma) Eğitim Ortamları / Инклюзивная образовательная среда / Inclusive Educational Environment	3		+						
Балалардың жас ерекшелік және физиологиялық даму ерекшеліктері / Çocuk Gelişiminde Yaş ve Fizyolojik Gelişim Özellikleri /Возрастные и физиологические особенности развития детей/ Age and Physiological Features of the Development of Children/	3		+					+	
Оқытуды жоспарлау және дербес оқыту/ Öğretimin Planlaması ve Bireyselleştirilmesi / Планирование преподавания и индивидуализация обучения/ Teaching Planning and Individualization of Learning	4		+					+	
Оқытудың әдістері мен технологиялары / Öğretim Yöntem ve Teknikleri / Методы и технологии преподавания / Teaching Methods and Technologies /	5		+						+
Бағалау және дамыту / DeğerlendirmeveGeliştirme / Оценивание и развитие /AssessmentandDevelopment	4		+					+	+
Педагогикалық зерттеулер / PedagojikAraştırmalar / Педагогические исследования / PedagogicalResearch	4		+	+	+				
Зерттеулер, даму және инновациялар/ Araştırma, Geliştirme ve Yenilikçilik / Исследования, развитие и инновации / Research, Development and Innovation	5		+	+	+				
Ата түрік принциптері/Atatürk İlkeleri/ПринципыАтатюрка/PrinciplesofAtaturk	3	+							
Түркі мемлекеттер тарихы/Türk kmemleketleri tarihi/История тюркских государств/TurkicStateshistory		+							
Ясауитану/YesevilikBilgisi/Ясавиведение/YassawiStudy	3	+							
Түрік (Қазақ) тілі – (Деңгей 1-A1,B2) /Türk (Kazak) Dili –(Seviye 1- A1,B2)/Турецкий (Казахский) язык – (Уровень 1- A1,B2)/Turkish (Kazakh) Language – (Level 1- A1,B2)	5				+				
Түрік (Қазақ) тілі – (Деңгей 2-A2, C1) /Türk (Kazak) Dili –(Seviye 2-A2, C1) /Турецкий (Казахский) язык – (Уровень 2-A2, C1) /Turkish (Kazakh) Language – (Level 2-A2, C1)	5				+				
Мұғалім кәсібіне кіріспе (оқу практикасы1-курс) / Öğretmenlik Mesleğine Giriş (Pedagojik Uygulama, 1. sınıf)/ – Введение в профессию учителя (учебная практика, 1 курс)/ Introduction to the teaching profession (1st year, educational practice)	2		+						
Психологиялық және педагогикалық бағалау (психологиялық-педагогикалық практика, 2-курс) / Psikolojik ve Pedagojik Değerlendirme (psikolojik ve	2		+	+					

pedagojik uygulama , 2. sınıf)/ Психолого-педагогическое оценивание (психолого-педагогическая практика, 2 курс) / Psychological and pedagogical assessment (2nd year psychological and pedagogical practice)									
Педагогикалық технология (педагогикалық практика, 3-курс) / / Педагогическая технология (Педагогическая практика, 3 курс)/ Pedagogical approaches (3rd year, pedagogical practice) Pedagojik Yaklaşımlar (Pedagojik Uygulama, 3. sınıf)	6		+	+				+	
Білім берудегі зерттеулер мен инновациялар (өндірістік-педагогикалық практика, 4-курс) / Eğitimde Araştırma ve Yenilikler (Pedagojik Uygulama, 4. sınıf)/ Исследования и инновации в образовании (производственная-педагогическая практика, 4 курс)/ Research and innovation in education (4th year industrial- pedagogical practice)	15		+	+	+			+	
Химиядағы математика мен физика Kimyada Matematik ve Fizik Математика и физика в химии Mathematics and Physics in Chemistry	5				+		+		+
Қоршаған орта химиясы Çevre Kimyası Химия окружающей среды Environmental Chemistry	4	+				+			+
Экологиялық білім беру және тұрақты даму Çevre Eğitimi ve Sürdürülebilir Kalkınma Экологическое образование и устойчивое развитие Ecological education and sustainable development		+							+
Биохимия Biyokimya Биохимия Biochemistry	5					+			+
Тұрмыстағы химия Günlük yaşamda kimya Химия в быту Chemistry in everyday life						+			+
Коллоидты химия Kolloidal Kimya Коллоидная химия Colloidal chemistry	5					+		+	+
Полимерлер химиясы Polimerlerin kimyası Химия полимеров Polymer Chemistry						+		+	+

Химиялық өндіріс негіздері Kimyasal üretim temelleri Основы химического производства Fundamentals of chemical production	5					+	+		+
Аналитикалық химия Analitik Kimya Аналитическая химия Analytical Chemistry	7					+	+	+	+
Химиялық талдау Kimyasal analiz Химический анализ Chemical analysis	3								
Химиядағы жобалау және мәліметтерді өңдеу Kimyada veri tasarımı ve işleme Проектирование и обработка данных в химии Design and data processing in chemistry						+	+		+
Хеометрика Kemometrikler Хеометрика Chemometrics							+		+
Табиғат нысандарының биогеохимиялық талдауы Doğal nesnelerin Biyojeokimyasal analizi Биогеохимический анализ природных объектов Biogeochemical analysis of natural objects	5						+	+	+
Химиялық синтездеу өнері Kimyasal Sentez Sanatı Искусство химического синтеза Art of Chemical Synthesis	6					+	+		+
Нанохимия Nanokimya Нанохимия Nanotechnology						+			+
Бейорганикалық химия İnorganik kimya Неорганическая химия Inorganic chemistry	6					+	+		+
Химияға кіріспе Kimyaya Giriş Введение в химию Introduction to Chemistry						+	+		

Химиялық байланыс және құрылым Kimyasal bağ ve yapı Химическая связь и структура Chemical bond and structure	4					+			+
Атом құрылысы және периодтылық Atomik yapı ve periyodiklik Строение атома и периодичность Atomic structures and periodicity	6					+			+
Көміртек және оның қосылыстарының химиясы Karbon ve bileşiklerinin kimyası Химия углерода и его соединений Chemistry of carbon and its compounds	7					+	+		+
Ерітінділер химиясы Çözeltilerin kimyası Химия растворов Chemistry of solutions	5					+	+		+
Физикалық химия Fiziksel Kimya Физическая химия Physical chemistry	5					+	+		+
Кинетика және катализ Kinetik ve Kataliz Кинетика и катализ Kinetics and catalysis	5					+			+
Термохимия Termokimya Термохимия Thermochemistry						+			+
Электрохимия Elektrokimya Электрохимия Electrochemistry	5					+			+
Радиохимия Radyokimya Радиохимия Radiochemistry						+			+
Академиялық жазылым Akademik abonelik Академическое письмо Academic letter	3			+	+				

Мектепте химияның құрылымдық-мазмұндық бөлімдерін оқыту Okulda kimyanın yapısal ve içerik bölümlerinin öğretilmesi Обучение структурно-содержательных разделов химии в школе Teaching structural and substantive sections of chemistry at school	6		+	+				+	
Химиядан есептер шығару Kimya problemlerinin çözümü Решение задач по химии Solving problems in chemistry	6					+	+	+	
Химия бойынша оқушылардың жобалық қызметін ұйымдастыру және жасанды интеллект Kimya öğrencilerinin proje faaliyetlerinin organizasyonu ve yapay zeka Организация проектной деятельности учащихся по химии и искусственный интеллект Organization of students' project activities in chemistry and artificial intelligence	4		+	+	+			+	
Химия зертханасы және тәуекелдерді басқару Kimya Laboratuvarı ve Risk Yönetimi Лаборатория химии и управление рисками Chemistry laboratory and risk management	2			+		+	+		
STEM-білім беру STEM Eğitimi STEM-образование STEM education	5				+			+	+
Химия сабақтарындағы CLIL CLIL kimya dersinde CLIL на уроках химии CLIL in chemistry lessons					+			+	+

4.5 Requirements for the successful completion of curriculum

For successful completion of the educational program, students shall have:

- minimum credits for core and major subjects;
- achievement of all learning outcomes;
- successful completion of compulsory and optional courses;
- successful fulfillment and defense of Final attestation work (*Oral Exam, Written Exam, Diploma work, Research project, Development project, Organisational project, Strategic project, Art project*);
- the minimum average achievement score.

5. Description of students' work

Students' work includes contact teaching, individual, pair and group work, assignments, exams, etc. 1 ECTS = 30 hours of student work.

Students' individual and/or pair and group work is divided into two parts: individual and/or pair and group work supervised by a teacher and the work that is performed entirely independently.

Students' individual and/or pair and group work is carried out on a specific list of topics allocated for independent/group study, provided with educational and methodical literature and recommendations for each course. Students' individual and/or pair and group work supervised by a teacher is carried out according to the schedule, which determines the university or the teacher themselves.

The entire scope of work performed entirely independently is supported by assignments that require the student to work independently on a daily basis.

The ratio of time between classroom contact work, students' individual and/or pair and group work supervised by a teacher, and the work that is performed entirely independently for all types of educational activities is determined by the educational institution independently. At the same time, the amount of classroom work and students' individual and/or pair and group work supervised by a teacher is 1440 hours per year, the scope of work that is performed entirely independently - 360 hours per year.

6. Evaluation methods/Assessment

6.1 Assessment

The Assessment of learning outcomes is based on the competence objectives of the modules and the resulting evaluation criteria of the courses. Assessment criteria are used as a basis for various tasks. Learning tasks include independent tasks, group tasks, plans, reports, group discussions, group tests, development tasks, laboratory tasks, various tasks for reflection and evaluation, or activating tasks. The assessment generates information for the pre-service teacher about his or her achievement of the competence goals of the pedagogical education modules.

Assessment is at the heart of all competence-based education. Competence-based assessment should measure not only what a pre-service teacher knows, but also take into account skills and whether pre-service teachers can apply what they know to real life problems or situations. Pre-service teachers should be given assignments and non-standard problems in situations that students are likely to encounter in the workplace. Assessment plays a very important role in competence-based training. Based on the recognition of prior competence and personal situation, competence can be demonstrated on a per-course basis. The demonstration of competence can cover the entire training module. Specific guidelines regarding the practice of recognizing and accrediting prior training or training received elsewhere.

Studies are evaluated on a scale basis. Learning achievements (knowledge, abilities, skills and competencies) of pre-service teachers are evaluated in points on a 100-point scale, corresponding to the internationally accepted letter system with a numeric equivalent (positive grades, in descending order, from "A" to "D", and "unsatisfactory" - "FX", "F")

Alphabetic system of evaluation of pre-service teachers' learning achievements, corresponding to the digital equivalent of the four-point system.

Assessment by letter system	Digital equivalent of points	% content	Assessment according to the traditional system
A	4.0	95-100	Excellent
A-	3.67	90-94	
B+	3.33	85-89	Good

B	3.0	80-84	Satisfactory
B-	2.67	75-79	
C+	2.33	70-74	
C	2.0	65-69	
C-	1.67	60-64	
D+	1.33	55-59	
D	1.0	50-54	Unsatisfactory
FX	0.5	25-49	
F	0	0-49	

The purpose of assessment is to provide guidance and encouragement to pre-service teachers, develop their self-assessment abilities, provide information about pre-service teachers' competences, and ensure that the competences and intended learning outcomes defined in the educational programme are achieved. Self-assessment skills and peer assessment are considered as the main skills of the world of work, and assessment is a central tool to support the development of these skills during study.

6.2 External evaluation

1) Design of new educational programmes Internal quality assurance system

The new curriculum needs to be designed through engagement with all stakeholders, including students, faculty and employers. The aim throughout the process is to retain and further develop the strengths and high quality of the existing programme while addressing some of the challenges of the current programme, such as the workload demand on students and the need for a course on education management. A survey of all students and alumni, together with focus group discussions and interviews with alumni and employers, also inform the design of the programme. All faculty are involved in discussions of programme aims and learning outcomes, and programme teams worked collaboratively to design the courses for their area of specialization.

On the basis of the faculty (school) of the university, a council on academic quality is formed, which makes decisions on the content and conditions of implementation of curricula, on the policy of evaluation and other academic issues of the faculty (school), organizing a survey of students on the quality of curricula and (or) disciplines/modules.

2) Procedures for external evaluation of the educational programmes. Continuous Improvement

All faculty are actively engaged in continuous improvement of their courses as an integral part of the culture of university and their own professionalism as experts in education. In addition to formal student feedback mechanisms such as course evaluations and Student Committee meetings, faculty and students are to communicate closely regarding specific courses and the programme as a whole. The process of continuous reflection and improvement informs the Annual Programme Monitoring process, in which individual faculty reflect on courses they have taught, this feeds into specialization-level reflection and suggestions for improvements, and this in turn goes to programme and School level reflection and plans for further improvement.

Universities have regular, formal mechanisms for obtaining feedback from employers and the professional community. These interactions also inform the continuous improvement of the programme.

For the improvement of the quality assurance of the educational programmes, the universities need to:

- develop an internal quality system that has a delicate balance between quality assurance and quality enhancement. While quality assurance is more of a preventive measure, quality enhancement has higher-order aims and implies transformational change (Jones, 2003).
- raise institutional awareness and develop deep understanding of the Standards and Guidelines for Quality Assurance in the European Higher Education Area (ESG) (2015) and implement ESG 2015 standards.
- regularly revisit the existing institutional quality processes for ongoing improvement.

3) Accreditation

There are institutional and specialised accreditation in Kazakhstan, they remain voluntary for higher educational institutions. However, accreditation is one of the conditions for obtaining state grants for student education.

7. Faculty requirements

7.1 Faculty Requirements

Availability of teachers in accordance with the disciplines of the educational programme, the correspondence of teachers' education to the profile of the taught disciplines and/or their academic or research degree of "Doctor of Philosophy (PhD)" or "Doctor in Profile", and/or the academic title of "Associate Professor (Associate Professor)", or "Professor" (if any) and/or teachers with the degree of "Master" to the profile of disciplines and (or)

senior teachers with at least three years of experience as a teacher or experience practical work on the profile for at least five years.

The advanced/academic degree of the teaching staff corresponds to the academic degree of the doctor/candidate of sciences or the advanced/academic PhD degree of the doctor or master. Basic education or postgraduate education or doctorate/candidate of science degree, advanced/academic PhD degree must correspond to the subjects taught.

7.2 Additionally Required Faculty

Part-time teachers in the main place of work engaged in practical professional activities in the profile of the subjects taught, with at least 3 years of work experience in the field of training. Additionally, leading scientists, specialists from other higher education institutions and research organizations, teachers, and supervisors of schools in corresponding categories such as: expert teacher, research teacher, master teacher, can be involved in the work.

7.3 Required professional development of faculty

On the basis of the Law of the Republic of Kazakhstan "On Education" (2007; with amendments dated 27.12.2019) and other regulatory legal acts regulating the activities of higher education organizations in the Republic of Kazakhstan, a teacher who carries out professional activity in a higher education organization has the right for professional development at least once every five years for a duration of no more than four months.

The development of professional competences is also one of the priorities adopted in the Republic of Kazakhstan "Concepts of lifelong learning (continuing education)" (2021).

7.4 Required additional administrative staff

Vice-rector for academic affairs is responsible for planning and monitoring the implementation of educational services.

Responsibility for arranging and coordinating the implementation of the specific steps of the procedure and the quality of the outputs rests with the heads of divisions.

8. Resources

8.1. Library Resources

The library collection is an integral part of the information resources and includes educational, teaching, scientific and other literature.

Availability of a library fund of educational and scientific literature: in the format of printed and electronic publications for the last ten years, providing 100% of the disciplines of the curricula, including those published in the languages of instruction. Updating of the library fund should be carried out in accordance with the regulations of the Republic of Kazakhstan.

8.2. IT Resources

University provides pre-service teachers with educational and teaching literature and (or) electronic resources necessary for successful implementation of curricula, provides the functioning of the information system of education management (high-tech information and educational environment, including the website, information and educational portal, automated system of credit technology training, a set of information and educational resources).

8.3 Infrastructure

University provides equipment with educational, methodological, scientific and other literature, classrooms with multimedia complexes, computer rooms, access to broadband Internet, sports, material and technical, educational and laboratory facilities and equipment necessary for the implementation of curriculum.

9. Additional information

9.1 Additional materials

Inclusion is one of the most important cross-cutting principles of the curriculum (see more in Annex 1.). Inclusion in education means that all students, regardless of their possible impairments or disability, should have the opportunity to participate in the regular school systems and study with their peers. The teacher education emphasizes on pre-service teachers' perceptions of themselves as experts in implementing curriculum for diverse learners based on the principles of pedagogy of difference or universal design for all. It is important to renew inclusive pedagogies such as co-teaching and differentiating. It is important that not only the specialized teachers (special education teachers) but all teachers can work in an inclusive educational environment. Thus, competences of all pre-service teachers need to be developed in areas such as:

Knowledge of the concepts and principles of inclusive education:

- Evaluation of one's own activity in terms of the values of inclusion.
- Understanding of the implementation of the principle of inclusiveness in education implemented by a flexible

model of the educational process: adaptive programmes, changing the ways of assessing educational achievements.

- Understanding of children's different abilities and application of different trajectories to support versatile learners.

Practical applications in teaching:

- Designing of an adapted/individual programme for a child with special education needs in specific subject.
- Using of multimodal universal teaching methods, simple structured speech, use alternative communication.

9.2 E-learning

The rapid development of digital technologies requires the study of not only specific software tools, but the development of pre-service teachers' competences on using virtual learning environments and tools in teaching and choosing pedagogical methods suitable for learning processes in digital learning environments (psychological and didactic justification). For this the universities need:

- to create provisions for the professional development of pre-service teachers with the effective use of digital technology;
- to develop competences of pre-service teachers on understanding how individual educational needs of their students can be considered when using digital tools or in virtual learning environments;
- to develop digital competences of pre-service teachers on using digital learning environments and tools in assessment, such as gamification, digital tests and quizzes, and other formats of digital evaluation;
- to promote pre-service teachers' capabilities in assessing their digital competences and the use of digital tools in pedagogical processes in relation to the requirements of the employers (schools) daily operations;
- to put into practice the integration of education, science, and industry, and involve professional communities in teaching school students the basics of applying and using digital technology, and perform an independent assessment of the practical skills acquired;
- to include digitalization into the educational process for in-service teachers to increase efficiency and practical application of digitalization in education;
- to promote the implementation of global standards in digitalization in initial teacher education (i.e. International Society for Technology in Education (ISTE) and the establishment of an expert community of educators in digitalization.

10. Approval

- Ensure a review of the developed curricula, its coordination and approval by the Republican Educational and Methodological Council of Higher and Postgraduate Education.
- Scale up all developed curricula in pedagogical universities

APPENDIX 1: Main principles of the curriculum

Competence-based approach

Competence-based approach is a learning-oriented way to organise and implement teaching. It is an alternative to more traditional educational approaches mainly focusing on what learners are expected to learn about in terms of traditionally-defined subject content. In designing the curriculum following the principles of competence-based approach, the focus is on what we want our students to learn. Thus, it is essential to define the competences that the students are supposed to learn during their degree programs. The articulation of competences should include both discipline specific skills as well as the generic competences or soft skills that the teacher students should develop during the curricula. Soft skills include, for example, leadership, communication and collaboration skills, reflection skills, social and emotional intelligence etc. The development of these soft skills should be included in all the curricula, the competences and learning outcomes as well as the implementation of the curricula.

After defining the degree level competences, the learning outcomes of study units and study modules should be compiled by comparing them to the objectives of the entire degree. Learning outcomes represent the desired state, which is expressed as knowledge, skills and attitudes. The written learning outcomes of all the interconnected study units should also make visible the accumulated competence. Planning competence-based learning thus starts at degree programme level and is then realised at study unit level through the learning outcomes, the execution of the study unit and its assessment.

The reason for using competence-based approach to designing curricula is that it makes it possible to design courses and study programs in a more student-centred way. Student-centred approach means that the key knowledge and skills that the students need to achieve during their studies determine the content of the course or study programme. The aim of the competence-based approach to designing curricula is that the students acquire the

knowledge, skills and attitudes/values that are essential. Further, the competence-based approach supports students to identify the knowledge and skills specific to their discipline or field of education as well as the generic competences that accumulate during their studies and are common to all degrees.

To sum up the key elements in designing competence-based curricula, it is essential to focus on describing explicitly a) what competences (including subject-specific and general competencies) should a student have after graduation/after study unit/after an individual course, b) how do different study modules, courses and study modes support the development of the competencies, c) how is it ensured that the degree program and the learning objectives of the courses form a coherent entity supporting the development of the competencies, and d) how is it possible for students to make their competence visible (assessment related decision).

The implementation of all curricula should introduce methodologies that promote student-centeredness and active learning, such as gamification, PBL, etc. In a student-centred learning approach, students are active participants, placed at the core of the learning process. The learner is not seen as a passive receiver of knowledge but, rather, an active participant. The teacher's role becomes that of a guide who assists the learner in the difficult process of constructing his/her knowledge. Student-centred approach to teaching broadly means the shift of focus from the teacher to the student and their learning processes (Tran et al., 2010). The emphasis in student-centred approach to teaching is on what the student does and the ways to improve students' active engagement and deep approach to learning (Biggs and Tang, 2011; Prosser and Trigwell, 2014). In student-centred approach the student is seen as an active constructor of knowledge. Thus, the focus of the student-centred teaching practices is to develop autonomy and active learning that eventually enable lifelong learning.

Student-centred approach & Active Learning Methodologies

Student-centredness differs from traditional teaching approach, also known as teacher-centredness, in that the focus is on designing the teaching-learning process in a way that it promotes students' active participation and deep approach. Teaching that requires active engagement from students is likely to increase quality learning (Biggs and Tang, 2011). However, student-centered learning does not sideline or diminish the role of teachers. Instead, it seeks to use teachers' expertise in different ways to increase student engagement.

Student-centredness requires a change in the mindset of the teachers and has many implications for the teaching practices. For example, teaching and learning activities should be designed in a way that they support and promote active learning. Active learning methods place greater responsibility on the learner rather than passive approaches such as lectures. Active learning activities promote higher order thinking skills such as application of knowledge and analysis and engage students in deep learning processes rather than surface learning. Furthermore, they enable students to transfer and apply knowledge better. There is a variety of active learning methods, such as case studies, problem-solving, group projects, debates, peer teaching, games etc. to mention a few. However, it should be kept in mind that the methods should always be chosen purposefully to support the attainment of the intended learning outcomes. Thus, when choosing the active learning methods, it should always be considered from the perspective of which methods support the attainment of the intended learning outcomes in a best possible way.

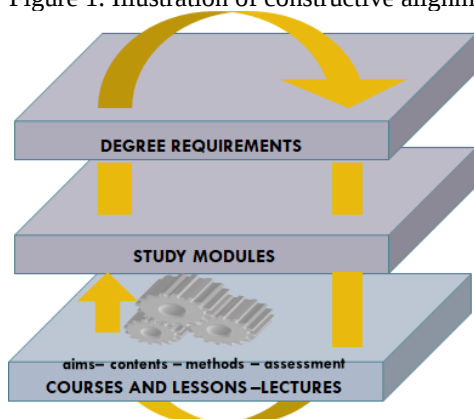
Constructive alignment

The principle of constructive alignment has long been promoted as a powerful way to enhance the quality of teaching and learning (Biggs and Tang, 2011). Constructive alignment is an integrative design for teaching and curriculum design in which the alignment between intended learning outcomes/competences, teaching-learning activities and assessment tasks is emphasised to optimise the conditions for quality learning. The fundamental principle is that curriculum should be designed in such a way that the learning activities and assessment tasks are aligned with the intended learning outcomes (ILOs), and what the students should be able to do or demonstrate after completing the degree, module or a course. High quality learning may be supported by integrating these components together.

Constructive alignment reflects the more general paradigm shift from teacher-centred teaching to student-centred teaching described above. The central step in designing teaching is to define the intended learning outcomes or the competences that the students are supposed to learn during the learning process and how they will demonstrate that learning has taken place (Biggs and Tang, 2011). The role of the instructor is to engage the student in relevant activities that support the attainment of the intended learning outcomes (Biggs, 1996). By choosing appropriate teaching and assessment methods and tasks and aligning them with the intended learning outcomes/competences it is possible to effectively guide students' study practices and enhance deep, meaning-oriented learning (Biggs and Tang, 2011; Boud and Falchikov, 2006). Constructively aligned teaching is essentially a criterion-referenced system where the central elements, that is, intended learning outcomes, teaching-learning activities and assessment, are aligned and there is consistency throughout these elements.

Constructive alignment should be applied at all levels of the educational system, including institutional, departmental and classroom levels as teaching and learning take place in the whole system. In a good system, all aspects of teaching and assessment are tuned to support high level learning, so that all students are encouraged to use higher-order learning processes.

Figure 1. Illustration of constructive alignment



Research-based Initial Teacher Education

The recognition of the importance of research-based teacher education is growing worldwide (Flores, 2018). The research-teaching integration in the teacher educators' work has been suggested to be an effective solution to develop the profession in many aspects. They should be able to make explicit links between the educational theory, research and teaching practices. There is an increasing recognition that research is an important component of teacher education practices and is beneficial for preparing reflective practitioners (Flores, 2018). Research-based teacher education can take place in different forms. In its simplest form, it can mean that the teaching content is based on research, or that the teaching methods and pedagogical designs are based on research. It can also mean that teachers use inquiry-oriented methods in their teaching to enhance their students' own knowledge construction and research skills. Moreover, research-based teacher education can mean that the teacher educators themselves conduct research of their own work or more generally about topics related to teacher educators' work. The different forms of research-based teacher education identified in a recent research are presented in Table 1.

Table 1. Forms of research-based teacher education (Cao, Postareff, Lindblom-Ylänne & Toom, 2021)

Teaching content is based on research	Teacher educators use their own or others' research as their teaching content to transfer academic knowledge to student teachers and develop the student teachers' independent thinking (Visser-Wijnveen et al. 2010).
Teaching methods and course design are based on research	Teacher educators benefit from their research work in teacher education and develop their teaching methods accordingly (Cochran-Smith 2005; Krokfors et al. 2011).
Applying inquiry-oriented methods in teaching	Teacher educators organise the course based on inquiry-oriented activities to guide student teachers to learn in an analytical and inquiring way to develop their pedagogical thinking (Krokfors et al. 2011).
Acting as researchers in teacher education	Teacher educators work as researchers and conduct research on what and how they teach, and on topics in teacher education (Cochran-Smith 2005).
Encouraging student teachers' involvement in research work	Teacher educators involve student teachers in research process to provide them with the experience of conducting research (Visser-Wijnveen et al. 2010).
A supportive relationship between research and teaching	Teacher educators consider the research-teaching nexus is complementary and fairly evident. Teaching and research support each other in a general and broad sense.

Teacher education can adopt the research-based approach in diverse ways, and it is important to consider what kind of forms fit the cultural context and practices. The ultimate goal of research-based teacher education is to support student teachers to become pedagogically-thinking, reflective and inquiry-oriented teachers with an inquiring attitude towards teaching. Teachers' pedagogical thinking means the ability to analyse and conceptualise educational occasions and phenomena, to evaluate them as part of larger instructional processes and to make rational

and theory-based decisions and justify their decisions and actions as teachers. Their readiness to consume as possibly also conduct research enhances their ability to meet the challenges of the future (Toom et al., 2010).

Research-based teacher education not only enhances the teacher educators' own professional development, but also enhances teacher students' reflective and deep learning. By engaging in research-based activities, the students can acquire a set of highly valued competences, such as critical thinking, problem solving and reflective skills (Lunenberg, 2010). Thus, it is important, that teacher educators support the student teachers' to become reflective practitioners with an inquiring attitude (see Toom et al., 2010), which they can learn not only from what their teachers say about how to teach, but most importantly, from how their teachers engage their students in collaborative and interactive teaching-learning activities (Berry, 2004).

To make research-based teacher education occur in practice, it should be made visible in the teacher education curricula. Secondly, the teacher education programmes should develop their students' inquiry-oriented and research-oriented approach to their work and enhance their research skills. Becoming an inquiry-oriented reflective practitioner requires time and space to deeply reflect on theory, practice, and the link between them. Therefore, the curriculum of teacher education should provide possibilities for reflection and practicing new skills.

Interdisciplinary learning

Content and Language Integrated Learning (CLIL)

CLIL (Content and Language Integrated Learning) is a dual-focused educational approach in which an additional language is used for learning and teaching of both content and language (Coyle, Hood & Marsh, 2010:1). The umbrella term of CLIL also includes a range of other language programs, such as bilingual education, English-medium of education or immersion programs (Coyle, 2007; Mehisto, Marsh, and Frigols, 2008). But CLIL differs from those language programs by its equal focus on both content and language (Coyle, 2008; Dalton-Puffer, 2008; De Zarobe, 2008; Marsh, 2012). Thus, this approach is neither language learning nor subject learning but a combination of both; hence, attention is given both to the language and the content. Contrary to the common belief, the CLIL instruction takes place with and through a foreign language and it is not the approach when non-language subjects are taught in the foreign language (Eurydice, 2006).

The reasons for introducing CLIL include provision of a more holistic educational experience for the student as well as content-and language-learning outcomes realized in class. Furthermore, benefits of CLIL are also linked with insights from interdisciplinary research within neurosciences and education (Coyle, Hood & Marsh, 2010). Due to these advantages CLIL is increasingly attracting stakeholders' attention across continents.

In terms of the curriculum implementation, the CLIL approach is inclusive and flexible; it includes a range of models that can be adapted according to the age, ability and needs of the students (Coyle, 2007). Thus, implementing CLIL varies based on the context. In primary stage, language learning can be embedded across the curriculum and link with one or more subjects of the curriculum. For example, through specific themes or projects (e.g. lifestyle, sports, and holidays).

Secondary CLIL can make specific links between a language and a subject (e.g. history through Kazakh, science through English) or it can take a broader approach integrating language with parts of curriculum. More recently, CLIL is less aligned to a single subject and is evolving through links with a variety of subjects or themes. The content for lessons can include particular aspects of the curriculum for individual subjects. In practical terms, lesson planning involves joint effort across a number of subjects focusing on the cross-curriculum feature for the secondary curriculum. But there is a need for research to explore whether such an approach is compatible with the local context.

The existing curriculum models integrating CLIL vary in length from a single unit which comprise a sequence of 2-3 lessons to a more sustained approach through modules lasting half a term or more. Some successful cases include schools with bilingual sections where subjects are taught through the medium of another language for extensive periods (Coyle et al., 2010).

STEM (Science, Technology, Engineering, Mathematics) education

Interdisciplinarity in natural sciences and mathematics, so called STEM -education can be defined as "an effort to combine some or all of the four disciplines of science, technology, engineering, and mathematics into one class, unit, or lesson that is based on connections between the subjects and real-world problems" (Moore et al. (2014). Implementation and integration of engineering in K-12 STEM education. In S. Purzer, J. Strobel, & M. Cardella (Eds.), *Engineering in Pre-College Settings: Synthesizing Research, Policy, and Practices* (pp. 35–60). West Lafayette: Purdue University Press.). STEM -pedagogy in teacher education aims to prepare students to design, teach and develop research-based active learning STEM -lesson plans to educate competent citizens, who can access and make sense of science relevant to their lives and global perspectives (Feinstein, N. W., Allen, S., & Jenkins, E. (2013). Outside the pipeline: Reimagining science education for nonscientists. *Science*, 340(6130), 314-317.).

Active learning includes student centered active methods, such that project based education, and benefitting from diverse out of classroom learning environments and communities of learners and ICT. On the hand, Science education should also focus on competences with an emphasis on learning through science and shifting from STEM

to STEAM (A = All) by linking science with other subjects and disciplines (Hazelkorn, Ellen & Ryan, Charly & Beernaert, Yves & Constantinou, Costas & Deca, Ligia & Grangeat, Michel & Karikorpi, Mervi & Lazoudis, Angelos & Pintó, Roser & Welzel-Breuer, Manuela (2015). Science Education for Responsible Citizenship. 10.2777/12626). In the ITE curricula in Kazakhstan, the A should include at least developing the English linguistic skills of teacher students (KAZ ITE D-3 Framework Report).

Digitalisation in Education and Teachers' Digital competence development

New information and communication technologies (ICTs) provide teachers and learners with an innovative learning environment to stimulate and enhance the teaching and learning process. In this context, novel educational concepts such as online learning, or blended and hybrid learning are being developed (López-Pérez, Pérez-López & Rodríguez-Ariza, 2011). Hybrid or blended learning can be defined as the integration of face-to-face classroom instruction learning with web-based tools and materials (e.g. Garrison & Kanuka, 2004), as contrast to fully online learning. Blended or hybrid learning is becoming increasingly significant to complement traditional forms of learning. Often these two terms are defined similarly, but can also be differentiated. Blended learning can be defined as a mix of various event-based activities, including conventional face-to-face classrooms instruction, e-learning, and self-paced learning, while in hybrid learning a part of the learning activities and assignments are transferred from the face-to-face environment to the distance learning environment (see Valiathan, 2002, in Koohang, Britz & Seymor, 2006).

Blended forms of learning has the potential to enhance both the effectiveness and efficiency of meaningful learning experiences, and some researchers have suggested that blended learning has the potential to be even more effective and efficient when compared to a traditional classroom model (see Garrison & Kanuka, 2004). Other benefits of blended forms of learning include convenience, student satisfaction, flexibility and higher retention (Koohang, Britz & Seymor, 2006).

Especially in situations where student numbers are high, online, blended or hybrid forms of learning have the potential to provide greater opportunities for improved learning (Osguthorpe & Graham, 2003). In teacher education, student teachers can also learn from their teachers the use of various digital tools and platforms. Thus, not only teacher educators should have the skills to adopt digital tools in their teaching, but also student teachers should develop their digital skills during teacher education. Times faced with uncertainty and sudden changes, such as pandemics, require flexible and advanced use of digital tools and instructional practices functional in online contexts.

Inclusion in education and recognition of different learners

Inclusion in education is a principle which means that all students, regardless of their possible impairments or disability, should have the opportunity to participate in the regular school systems and study with their peers. Inclusion is based on several international United Nations declarations, such as the Salamanca Statement (1994) and The Universal Declaration of Human Rights (1948). Inclusive pedagogy is a pedagogical approach that is impacted by the sociocultural context of learning (Florian & Black-Hawkins, 2011) and it aims to respond to the diverse learning needs of students in as varied ways as possible.

The concepts of 'inclusion' and 'diversity' are reviewed in the teaching and education practices with the activities and arrangements that promote inclusion as the centre. The key words in education are educational equality, accessibility, individuality, lifelong learning and co-operation. The teacher training emphasizes on teachers' perceptions of themselves as experts in implementing curriculum for diverse learners based on the principles of pedagogy of difference or universal design for all. It is important to renew inclusive pedagogies such as co-teaching and differentiating. The teacher's task is to teach and guide students to become lifelong learners while taking each student's individual learning style into account. Four core values related to teaching and learning have been identified as the basis for the work of all teachers in inclusive education (European Agency). These core values are associated with areas of teacher competence. The areas of competence are made up of three elements: attitudes, knowledge and skills. All teachers must commit to the idea of equality for all students. (Saloviita, 2018.)

Teachers' professional development and change management

Considering the dynamic and constantly changing nature of teachers' work, teachers at all levels must be continuous learners throughout their professional careers. Teachers' professional development needs to address simultaneously the teachers' beliefs and conceptions and the improvement in their practices (Timperley & Phillips, 2003), as well as integration of theoretical and practical knowledge (Tynjälä, Häkkinen & Hämäläinen, 2004). Often an experience of a successful implementation in teaching changes teachers' attitudes and beliefs, and therefore, positive experiences are central for teachers' professional development (Guskey, 1989).

Development and growing as a teacher can be understood in different ways: 1) growing understanding of one's content area, in order to become more familiar with what to teach; 2) getting more practical experience as a teacher, in order to become more familiar with how to teach; 3) building up a repertoire of teaching strategies, in order to become more skilful as a teacher; 4) finding out which teaching strategies work best for the teacher, in order

to become more effective as a teacher, and 5) continually increasing understanding of what works for students, in order to become more effective in facilitating student learning (Åkerlind, 2007).

It is important to notice, that professional development of teachers is often a slow process. Furthermore, the development is not a linear continuum, but instead, the development may be interrupted by various reasons (Beijaard, Meijer & Verloop, 2004). Some teachers may experience change and development as threatening and change processes often include feelings of anxiety or uncertainty (Postareff et al., 2008). Such negative emotions towards the change may narrow the teacher's attention (Fredrickson, 2001). Therefore, it is important to ensure that teachers receive enough support from diverse sources (e.g. peers, supervisors, work environment) and encouraging feedback. It is also important for teachers to understand, that failures are part of the teachers' professional development, and mistakes should be seen as learning opportunities. When teachers have the possibility to share experiences and engage in collaboration with their peers, it has been shown to have positive influences of their learning and development (Voogt, et al., 2011). When teachers feel well and are engaged in their work, they are more likely to engage in pedagogical practices that promote their development (Fredrickson, 2001) The development of teaching is, at best, a continuous process, and thus, teachers should be encouraged to reflect on their own teaching on a continuous basis to increase their pedagogical awareness (Parpala & Postareff, 2021).

Teachers should also be provided with agency, which refers to the teacher's possibilities to influence, make decisions and take actions. The aim of exercising agency is to create new work practices and transforming the course of activities (Hökkä et al., 2012). When teachers have a possibility engage in development and changes, and when they experience that their opinions truly matter, they are likely to become highly engaged in their work (e.g. Day, Elliot & Kington, 2005; Pyhältö et al. 2012).

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