Ф-ОБ-001/187

KHOJA AHMET YASSAWI INTERNATIONAL KAZAKH-TURKISH UNIVERSITY

«APPROVED»
Vice rector of the University
_____ Idrissova E.K.

Based on the decision of the
Educational-methodical committee
№ 7 protocol «__» 03 2024 y.

EDUCATIONAL PROGRAM

(project «Strengthening the potential of teacher education»)

Program level	*Bachelor*
Code and classification of the field of education	*6B01 Pedagogical sciences*
Код и классификация направлений подготовки	*6B015 Training of teachers in Natural science subjec*
Группа и название ОП	*B012 Teacher training in Chemistry*
Код и название ОП	*6B01562 Chemistry-Biology*
EP type	*Innovative EP*
EP distinctive features	*Dual training*

Matriculated in 2024 year

Жаратылыстану пәндері мұғалімдерін даярлау бағыты бойынша Академиялық комитет құрамы:/ Состав академического комитета по направлению подготовки учителей естественных наук:/
The composition of the academic committee on the direction of training teachers of natural sciences:

АК төрағасы:/ Председатель ИК: /Chairman of the AK:

№	Аты жөні/ФИО/Full name	Қызметі, атағы, дәрежесі/Должность, звание, степень/Position, title, rank	Қолы/подпись/ signature
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«**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 №_7_ «_15_» _03_____ 2024 ж./г./у

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1. General information

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<tr><td></td><td>Shakarim University of Semey</td></tr>
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<tr><td>1.3. Type of curriculum
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<tr><td>1.7. Short curriculum description
Curriculum goals and objectives</td><td>This Educational Programme (EP) "Chemistry - biology" 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 - biology" is a teacher education programme for pre-service teachers who wish to specialize in teachingchemistry in educational establishments (schools, colleges, high schools).EP consists of a pedagogical component 60 academiccredits (incl. pedagogical practice), a compulsory component 56 credits, and a subject component 124 academiccredits (incl. a final attestation of 8 academic credits).
The subject component consists of 5 modules: "Introduction to chemistry and Biology", "Natural Sciences", "Research in chemistry and biology", "Fundamentals of biochemistry", "Pedagogical methods of teaching chemistry and biology".
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</td></tr>
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	knowledge in chemistry and biology, 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 per-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 Degree awarded
Bachelor of education in the educational program" 6b01562 – Chemistry-Biology"

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.

5. 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**

6. 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.
7. 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**

8. 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.
9. 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.
10. 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**

1. 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;
2. 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.
3. Pre-service teachers are able to generalize and systematize scientific knowledge and teach ways to obtain and critically evaluate various sources of information.
4. Pre-service teachers are able to analyze and discuss the impact of science on the environment

- **Competence area for experimental research activities**

5. Pre-service teachers demonstrate the ability to apply experimental computational methods to solve various practice-oriented tasks of a scientific, laboratory and educational nature;
6. Pre-service teachers have the knowledge and skills to pose questions as a starting point for research ;
7. 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.;
8. Pre-service teachers are able to plan the educational process and various activities of students in teaching chemistry;
9. Pre-service teachers have communication strategies and skills of collaborative work

- **Competence area for applied and integrated sciences**

10. Pre-service teachers are able to understand, present and critically analyze basic information in the field of ecology and environmental protection.

11. Pre-service teachers are able to develop their own moral and civic position in the context of sustainable development.
12. 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.
13. 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.
14. 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**

1. 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.
2. Pre-service teachers are capable to interpret the content and specific features of the mythological, religious and scientific worldview
3. Pre-service teachers have deep understanding and scientific analysis of the main stages, patterns and characteristics of the historical development of Kazakhstan.
4. 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).

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 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.

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 practitioner 9 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 practitioner9 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. The prerequisite for the course is that the Pre-service teachers have completed the courses "*Psychology in Education and Concepts of Interaction and Communication*" and "*Age and physiological features of the development of children*" of the pedagogical component before entering their first pedagogical practice.
Learning outcomes	**Pre-service teacherswho 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. The prerequisite for the course is that the Pre-service teachers have completed the course "*Pedagogical Research*" of the pedagogical component before entering their second pedagogical practice.
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). The prerequisite for the course is that the Pre-service teachers have completed the courses "*Methods and Technologies of Teaching*", "*Assessment and Development*", and "*Inclusive Educational Environment*" of the pedagogical component before entering their third pedagogical practice.
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)**
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 experimentationsaccording to the research plan created in the course *"Research, Development, and Innovation"*. They make conclusions and explorevarious forms and channels of communicating the research results in a professional manner. The prerequisite for the course is that the Pre-service teachers have completed the courses "*Teaching planning and individualization of learning*" and "*Research, development and innovation*"of the pedagogical component.
Learning outcomes	**Pre-service teacherswho 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 Ataturk	**3**
Turkic States history	
University Component	**13**
YassawiStudy	**3**
Turkish (Kazakh) Language – (Level 1- A1,B2)	**5**
Turkish (Kazakh) Language – (Level 2-A2, C1)	**5**
INTRODUCTION TO CHEMISTRY AND BIOLOGY	**11**
University Component	**5**
Cytology, histology and embryology	5
Optional Component	**6**
Inorganic chemistry	6
General chemistry	
Introduction to Chemistry	
NATURAL SCIENCES	**60**
University Component	**44**
Atomic structures and periodicity	5
Structure and functions of plant organisms	6
Analytical Chemistry	7
Structure and functions of animals	6
Academic letter	3
Chemistry of carbon and its compounds	7
Physical chemistry	5
Solving problems in chemistry	5
Optional Component	**16**
Biochemistry	5
Bioorganic chemistry	
Biogeocenology	5
Human anatomy	
Patterns of inheritance and variability	6
Genetics and the basis of breeding	
RESEARCH IN CHEMISTRY AND BIOLOGY	**16**
University Component	**11**
Teaching structural and substantive sections of chemistry at school	6
Organization of students' project activities in chemistry	5
Optional Component	**5**
Methodology of biological research	5
Research and project activities in biological education	
FUNDAMENTALS OF BIOCHEMISTRY	**20**
University Component	**10**
Art of Chemical Synthesis	5
Molecular Biology	5
Optional Component	**10**

Microbiology with the basics of biotechnology	5
Applied biology with the basics of soil science	
Biophysics and bioinformatics	5
Scientific foundations of natural science	
PEDAGOGICAL METHODS OF TEACHING CHEMISTRY AND BIOLOGY	**7**
University Component	**2**
Chemistry laboratory and risk management	2
Optional Component	**5**
STEM education in biology	5
Digital technologies in biology	
Design of STEM education	
FINAL ATTESTATION	**8**
Total academic credits	**138**

Turkic World, 16 academic credits

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 "Yasauitanu", "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:

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 levelknows 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 B2levelCommunicates 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	**TurkicStateshistory**
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;
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 levelknows 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 B2levelCommunicates 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 levelpresents 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.

Introduction to chemistry and biology, 11 academic credits

The module contributes to the development of mathematical conceptual apparatus in calculations when studying the quantitative composition of matter and gives an idea of the spatial structure and geometry of molecules, as well as the structure of cells of living organisms, the functions of organoids and morphological features of subcellular structures. The study of the module forms an idea of the fusion of natural sciences and technologies to solve the problems of production and life. The module forms environmental literacy, social and civic responsibility for the environmental consequences of decisions and actions taken. The module also helps students to adopt a broad, integrated, objective and creative approach to discussing the analysis and assessment of environmental protection and sustainable development issues on a local and global scale.

Course title	**Cytology, histology and embryology**
Component	Subject component, Optional component
Cycle	Major disciplines
Module	**Introduction to chemistry and biology, 11 academic credits**
Academic credits	5
Course Description/ competencies	The purpose of this course is to improve the following areas of subject competence: • Competence area for Cognitive skills development (1) • Competence area for Development of practical and research skills (6) • Competence area for Interdisciplinary interactions development (9) Pre-service teachers have fundamental knowledge about the structure and principles of cell life, subcellular components, their structure, and functions, as well as the features of embryonic development. They develop their skills in working with optical devices, histopreparations, and fixed material. They also practice the technique of preparing micropreparations.
Learning outcomes	**Pre-service teachers who demonstrate competence can:** • compare the structure of cells of living organisms, the functions of organoids; • describe morphological features of organoids, subcellular

	structures, types and morphology of tissues; • compare methods of reproduction of living organisms and embryology; • put into practice the methods of cytological and histological studies; • explain the types and mechanisms of cell division.
Course title	**Inorganic chemistry**
Component	Subject component, Optional component
Cycle	Major disciplines
Module	**Introduction to chemistry and biology, 11 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	**Жалпы химия**
Component	Subject component, Optional component
Cycle	Major disciplines
Module	**Introduction to chemistry and biology, 11 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) The discipline forms basic knowledge by integrating theoretical and applied aspects of chemistry. Within the framework of the discipline, the student acquires knowledge about the chemical properties of compounds, based on the study of the structure of the atom, types of chemical bonds and patterns of reactions. Masters practical skills in solving problems, conducting laboratory experiments, solving problematic issues, carrying out scientific research based on theories and patterns.
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	**Introduction to chemistry and biology, 11 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.

Natural sciences, 60 academic credits
The module develops research skills based on critical thinking and analytical actions. The module improves the ability to observe, describe and interpret chemical and biological phenomena occurring in nature, laboratory, and everyday life; work with substances and laboratory equipment, observing safety rules during chemical and biological experiments; forms skills for independent design (planning) of research, identification of risks and risks, conducting scientific and practical research, collecting data, analysis and evaluation of their results. The module promotes the integration of knowledge related to the achievements of chemical and biological science, as well as the search for the relationship between the content of subjects and the educational and life experience of students.

Course title	**Atomic structures and periodicity**
Component	Subject component, University component
Cycle	Major disciplines
Module	**Natural sciences, 60 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	**Structure and functions of plant organisms**
Component	Subject component, University component
Cycle	Major disciplines
Module	**Natural sciences, 60 academic credits**
Academic credits	6
Course Description/ competencies	The purpose of this course is to improve the following areas of subject competence: • Competence area for Cognitive skills development (1) • Competence area for Development of practical and research skills (6) • Competence area for Interdisciplinary interactions development (9) Pre-service teachers build fundamental knowledge in the field of botany, anatomy, and morphology of plants, and are able to use correct terminology. They develop their skills in working with optical devices, herbarium and fixed material, and understand the technique of preparing micro-preparations.
Learning outcomes	**Pre-service teachers who demonstrate competence can:** • recognize the structural features of plant cells and tissues; • compare and describe anatomical and morphological features of vegetative and generative organs of plants; • show the complex nature of the interaction between plants and other representatives of the organic world in the biogeocenosis when creating a whole and stable structure; • understand the methods of reproduction and cycles of reproduction of plants; • reveal the role of plants in nature and human life; • generalize the acquired knowledge and skills about the structure of plants, their variability in the process of adaptation to external conditions; • discuss the plant world as the most important component of the biosphere; • conduct research in the organization and planning of educational activities of students.
Course title	**Analytical Chemistry**

Component	Subject component, University component
Cycle	Major disciplines
Module	**Natural sciences, 60 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	**Structure and functions of animals**
Component	Subject component, University component
Cycle	Major disciplines
Module	**Natural sciences, 60 academic credits**
Academic credits	6
Course Description/ competencies	The purpose of this course is to improve the following areas of subject competence: • Competence area for Cognitive skills development (1) • Competence area for Development of practical and research skills (6) • Competence area for Interdisciplinary interactions development (9) Pre-service teachers investigate the laws of the animal world development from the simplest unicellular forms to highly

	organized taxa (arthropods, mollusks, chordates). They examine the features of morphophysiological organizations, phylogeny, embryogenesis, physiology, and reproduction. They also research their geographical distribution, the role in ecosystems and the practical significance of the main types and classes of invertebrates, as well as the importance of biodiversity conservation as a leading factor in ecosystem sustainability. During the course, pre-service teachers build their understanding of the importance of zoology in the formation of a scientific worldview.
Learning outcomes	**Pre-service teachers who demonstrate competence can:** • describe anatomical, morphological, physiological, ecological features of invertebrates using special terminology; • identify primitive and progressive features of invertebrate structure based on comparative analysis; • determine the taxonomic affiliation and classify invertebrates; • conduct surveillance of biological objects; • carry out cameral processing of zoological material, to produce micro- and macro-preparations of invertebrates; • mount systematic and biological collections; • apply the acquired knowledge and skills during the experiment, organization and planning of educational activities of students; • participate in discussions and negotiations about the scientific problems of the evolution of the animal kingdom; • describe the structure and role of invertebrates in ecosystems in written and oral form; • analyze, generalize and systematize scientific information in the field of invertebrate zoology; • sketch and design the results of their work; • Substantiate phylogenetic relationships between organisms.
Course title	**Academic letter**
Component	Subject component, University component
Cycle	Major disciplines
Module	**Natural sciences, 60 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	**Chemistry of carbon and its compounds**
Component	Subject component, University component
Cycle	Major disciplines
Module	**Natural sciences, 60 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 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.

Course title	**Physical chemistry**
Component	Subject component, University component
Cycle	Major disciplines
Module	**Natural sciences, 60 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	**Solving problems in chemistry**
Component	Subject component, University component
Cycle	Major disciplines
Module	**Natural sciences, 60 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) • 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	**Biochemistry**
Component	Subject component, Optional component
Cycle	Major disciplines
Module	**Natural sciences, 60 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	**Bioorganic chemistry**
Component	Subject component, Optional component
Cycle	Major disciplines
Module	**Natural sciences, 60 academic credits**
Academic credits	5
Course Description/ competencies	The purpose of this course is to improve the following areas of subject competence: • Competence area for Cognitive skills development (2) • Competence area for Development of practical and research skills (5, 6, 7) • Competence area for Interdisciplinary interactions development

	(8, 9, 13) During the course, pre-service teachers examine the issues and problems of bioorganic chemistry and develop their skills in obtaining and identifying organic substances in a living organism. During lectures and laboratory classes, pre-service teachers analyze the relationship between the structure of organic substances and their biological functions, and conduct laboratory studies of the structure, properties and functions of biologically important natural (biopolymers, vitamins, hormones, antibiotics) and synthetic compounds (drugs, pesticides, etc.). Pre-service teachers practice skills in working with devices and materials and choose ways and methods of conducting individual and group research. They solve creative tasks and offer new non-standard solutions to problems. They also demonstrate practical application of the results of a biological experiment for their professional development, and evaluate experimental and calculated data, as well as prepare research reports and pass an exam.
Learning outcomes	**Pre-service teachers who demonstrate competence can:** • classify organic compounds by nomenclature when composing names and writing formulas of biologically active substances; • conduct experiments to study the chemical structure and properties of biologically important substances; • demonstrate the skills of conducting a biological experiment using chemical, physical, physico-chemical, mathematical and biological methods; • evaluate the importance of biopolymers, enzymes, hormones, vitamins, signaling substances, antibiotics, and others in the vital activity of living organisms; • conduct small projects: formulation of hypotheses and conclusions, planning, assessment of strengths and weaknesses, preparation of a report; • collect, process and interpret research data on design and laboratory work; • use scientific language, subject terminology and conventions appropriately; • offer creative non-standard solutions to problems in the field of bioorganic chemistry; • apply the results of biological research for their professional development;
Course title	**Human biology**
Component	Subject component, Optional component
Cycle	Major disciplines
Module	**Natural sciences, 60 academic credits**
Academic credits	5
Course Description/ competencies	The purpose of this course is to improve the following areas of subject competence:

	• Competence area for Cognitive skills development (1) • Competence area for Development of practical and research skills (6) • Competence area for Interdisciplinary interactions development (9) During the course, pre-service teachers form a comprehensive understanding of the functioning of the human being as a biological object. They examine the features of the structure and functioning of organ systems, considering ontogenetic and phylogenetic features.
Learning outcomes	**Pre-service teachers who demonstrate competence can:** • describe the features of topography and patterns of the structure of the human body at the micro- and macroscopic levels; • understand the relationship of the structure of organs with the functions performed; • systematize knowledge about the structure and function of organs and systems of the human body, their interrelation and mechanisms of regulation; • navigate the structure of the human body, find and determine the location and projection of organs and their parts on the surface of the body; • evaluate the structural and functional parameters of human body development; • design and conduct experiments to study the work of organs and organ systems; • apply anatomical and physiological knowledge in life, including as a prevention of various diseases.
Course title	**Human anatomy**
Component	Subject component, Optional component
Cycle	Major disciplines
Module	**Natural sciences, 60 academic credits**
Academic credits	5
Course Description/ competencies	The purpose of this course is to improve the following areas of subject competence: • Competence area for Cognitive skills development (1, 3) • Competence area for Development of practical and research skills (6) • Competence area for Interdisciplinary interactions development (9, 10) Pre-service teachers build their understanding of the basic laws of the structure and function of the body, as well as individual organs and systems of a person. They are able to use correct terminology and develop their skills in working with laboratory devices.
Learning outcomes	**Pre-service teachers who demonstrate competence can:** • understand the general laws of the structure of the human

	body, the structural and functional relationships of parts of the body; • use conceptual apparatus and specialized terminology; • determine the location and relative position of organs in the body; • analyze information about the topography, structure of the human body, its systems, organs and tissues and their main functions; • describe morphological changes in the studied macroscopic preparations; • design and conduct simple experiments to study the work of individual organs and organ systems at school; • observe ethical standards when performing experiments.
Course title	**Patterns of inheritance and variability**
Component	Subject component, Optional component
Cycle	Major disciplines
Module	**Natural sciences, 60 academic credits**
ECTS	6
Course Description/ competencies	The purpose of this course is to improve the following areas of subject competence: • Competence area for Cognitive skills development (3) • Competence area for Development of practical and research skills (5, 6) • Competence area for Interdisciplinary interactions development (10, 11) Pre-service teachers investigate the patterns of inheritance of traits, chromosomal theory of heredity, non-nuclear inheritance, natural and induced mutation process, fundamentals of genetic engineering, developmental genetics, population and evolutionary genetics, genetic foundations of breeding, and features of human genetics. Pre-service teachers determine the relationship between the influence of genotype and environmental factors on the development of organisms. Pre-service teachers also consider heritability in the population, and the influence of various factors on the genetic structure of the population.
Competence outcomes	**Pre-service teachers who demonstrate competence can:** • distinguish inheritance patterns in intraspecific and distant hybridization; • solve genetic problems of inheritance of traits and interpret the results obtained; • explain the role of environmental and hereditary factors in variability; • use modern research methods and information and communication technologies to model crosses; • analyze the types of inheritance of breeding traits, types of genetic variability arising under the influence of mutagenic factors;

	• explain the role of heredity and variability in the evolution of life on the planet, the main provisions of the chromosomal theory of heredity and the mechanism of inheritance of human diseases; • solve genetic problems of inheritance of traits and interpret the results obtained.
Course title	**Genetics and the basis of breeding**
Component	Subject component, Optional component
Cycle	Major disciplines
Module	**Natural sciences, 60 academic credits**
Academic credits	6
Course Description/ competencies	The purpose of this course is to improve the following areas of subject competence: • Competence area for Cognitive skills development (3) • Competence area for Development of practical and research skills (5, 6) • Competence area for Interdisciplinary interactions development (10, 11) Genetics includes ideas and methods that play an important role in medicine, agriculture, microbiological industry, as well as in genetic engineering. Pre-service teachers investigate the cytological foundations of heredity, the laws of heredity, and variability of traits at all levels of the organization of living matter. They also analyze the types of inheritance of breeding traits, the role of heredity, and the environment in the formation of the phenotype. Pre-service teachers consider the issues of modification and mutational variability, polyploidy, and distant hybridization. Pre-service teachers also analyze the patterns of transmission and realization of genetic information. Pre-service teachers examine the basics of breeding, genetic engineering, and methods of molecular genetic analysis.
Learning outcomes	**Pre-service teachers who demonstrate competence can:** • analyze the types of inheritance of traits; • use genetic terms and conventions appropriately, contributing to an understanding of the nature, process, and results of the study; • apply in practice methods of hybridological, cytological and population analysis to solve genetic problems for all types of inheritance; • design and conduct genetic experiments; • process and analyze the measurement results of quantitative features; • distinguish the role of heredity and variability in the evolution of life on the planet, the main provisions of the chromosomal theory of heredity and the mechanism of inheritance of human diseases; • distinguish the causes and consequences of mutations for the

	vital activity of living organisms and the evolution of life on the planet; • combine the concepts of genetic processes in plants and animals; • perform calculations to determine the percentage of crossing between genes and design genetic maps for genes; • determine the genotypic structure of populations and the frequency of alleles and genotypes by phenotypic frequencies in populations; • distinguish the types of heredity (nuclear – chromosomal and extra–nuclear - cytoplasmic) and their causes; • determine the influence of factors on the type of variability; • make schemes of crosses according to the form accepted in genetics; • draw conclusions about the importance of induced mutations in the selection of microorganisms, plants and animals; • apply the knowledge and methods of genetics to solve the problems of breeding organisms; • model and design an intraspecific crossing experiment.

Research in chemistry and biology, 16 academic credits
The module allows you to master the skills of identifying a problem, conducting experiments, solving research problems, selecting and analyzing information, and summarizing the results of activities. Develops, implements, evaluates educational processes, develops the ability to take into account the diversity of students in the learning process and maintain their well-being. The student receives knowledge on determining the purpose, relevance, and significance of research, learns the principles of writing scientific texts and publicly presenting research results. The module's disciplines cover the global and local context for ensuring the safety of life, the competent use of modern technologies and methods of STEM education, and sustainable development.

Course title	**Teaching structural and substantive sections of chemistry at school**
Component	Subject component, University component
Cycle	Major disciplines
Module	**Research in chemistry and biology, 16 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	**Organization of students' project activities in chemistry**
Component	Subject component, University component
Cycle	Major disciplines
Module	**Research in chemistry and biology, 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 experimental research activities (5,9) • Competence area for applied and integrated sciences (12) During the course, pre-service teachers develop their abilities in managing and organizing project activities of students. They use their research skills in conducting educational projects in scheduled and extracurricular activities in chemistry using the opportunities of the educational environment. They also utilize the interaction with the other school subjects in the educational process generalizing a more advanced pedagogical experience. Pre-service teachers develop their 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.
Course title	**Methodology of biological research**

Component	Subject component, Optional component
Cycle	Major disciplines
Module	**Research in chemistry and biology, 16 academic credits**
Academic credits	5
Course Description/ competencies	The purpose of this course is to improve the following areas of pedagogical and subject competence: • Competence area in Pedagogy and Didactics (2) • Competences in conducting scientific research (4,5,7) • Competences in the science application (8,11, 12) Pre-service teachers analyze the methodology of organizing scientific research in the field of biology, the stages of research, the variety of research methods in biology, the methods of processing data, and the ways of presenting the results. The course is aimed at developing pre-service teachers' skills in working with scientific equipment and conducting theoretical and applied research.
Learning outcomes	**Pre-service teachers who demonstrate competence can:** • use methods of conducting biological research in their professional and research activities; • work with scientific and laboratory equipment, use them during research; • determine and formulate a research hypothesis, draw up an experiment plan, select methods, and on the basis of this conduct theoretical and applied research in the field of biology; • organize and conduct experimental work with biological objects, processing and presenting the results of this work; • teach research methods in various types of learning environments.
Course title	**Research and project activities in biological education**
Component	Subject component, Optional component
Cycle	Major disciplines
Module	**Research in chemistry and biology, 16 academic credits**
Academic credits	5
Course Description/ competencies	The purpose of this course is to improve the following areas of pedagogical and subject competence: • Competence area in Pedagogy and Didactics (2) • Competence area for interaction (3,4) • Competence area for professional development (8,9) • Competences in conducting scientific research (4,7) • Competences in the science application (8,11, 12) Pre-service teachers analyze the methodology of project activity in education, the method of projects in a modern school, the practice of educational design, the organization and stages of project activity of students, as well as the collaboration between a teacher and students. The discipline is aimed at developing pre-

	service teachers' skills within the framework of research and project activities.
Learning outcomes	**Pre-service teachers who demonstrate competence can:** • set goals and define tasks in the organization of scientific and project research; • carry out information-analytical and information-bibliographic work with the involvement of modern information technologies; • creatively find solutions for new problems and situations; • mentor students during research project; • competently present the results of research and project activities.

Fundamentals of biochemistry, 20 academic credits
The module is aimed at the formation of interdisciplinary competencies of students and involves the study of subjects at the intersection of biology, chemistry, physics, computer science and mathematics. The competencies acquired within the module allow students to form an educational environment taking into account the diversity of students and use interdisciplinary connections as a means of strengthening the unity of learning and education of students in the study of various sections of chemistry and biology.

Course title	**Art of Chemical Synthesis**
Component	Subject component, Optional component
Cycle	Major disciplines
Module	**Fundamentals of biochemistry, 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 (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	**Molecular Biology**
Component	Subject component, University component
Cycle	Major disciplines
Module	**Fundamentals of biochemistry, 20 academic credits**
Academic credits	5
Course Description/ competencies	The purpose of this course is to improve the following areas of subject competence: • Competence area for Cognitive skills development (2, 3) • Competence area for Development of practical and research skills (5) • Competence area for Interdisciplinary interactions development (10, 11) Pre-service teacher analyze the molecular organization of viruses, the structure, properties and functions of biopolymers, the molecular organization of the genome of prokaryotes and eukaryotes, the structure of pro- and eukaryotic genes, and the mechanisms of their implementation using modern and classical research methods. Pre-service teachers form an understanding of the mechanisms of storage, reproduction, transmission, and realization of genetic information at the level of biomolecules. Pre-service teachers investigate the molecular basis of genetic recombination, the structure, processing and functions of various types of RNA, and protein-nucleic interactions. They also examine the molecular mechanisms of cell cycle regulation, carcinogenesis and programmed cell death, as well as basic principles of application of modern molecular genetic methods and technologies in science and medicine.
Learning outcomes	**Pre-service teachers who demonstrate competence can:** • distinguish the features of the structures, properties and functions of biopolymers; • put into practice modern molecular genetic methods and technologies of laboratory research at the molecular level; • identify the mechanisms of gene expression, ways of regulating their action, replication, recombination and DNA repair; • solve problems on the molecular mechanisms of inheritance and variability and simulate the processes of matrix synthesis; • use special reference material, and electronic genetic databases; • understand the structural and functional organization of hereditary material at the gene, chromosomal and genomic levels; • analyze the relationship between the structure of genes and the mechanisms of their implementation; • determine the relationship of life-defining processes occurring in the cell at the molecular level;

	• evaluate the application of molecular genetic methods and technologies in science and medicine; • use modern and classical methods for conducting scientific research.
Course title	**Microbiology with the basics of biotechnology**
Component	Subject component, Optional component
Cycle	Major disciplines
Module	**Fundamentals of biochemistry, 20 academic credits**
Academic credits	5
Course Description/ competencies	The purpose of this course is to improve the following areas of subject competence: • Competence area for Cognitive skills development (2) • Competence area for Development of practical and research skills (5, 6, 7) • Competence area for Interdisciplinary interactions development (9, 11, 13) During the course, pre-service teachers examine morphology, physiology, biochemistry, genetics and systematics of microorganisms. They also investigate the principles of using bacterial, yeast, animal and plant cell cultures, metabolism and biosynthetic capabilities in genetic engineering and biotechnological production by using knowledge of chemistry and physics. After the course, pre-service teachers have a good basic knowledge of the prospects for the development of biotechnology: the methods of obtaining recombinant DNA and DNA cloning, the use of plasmids, the stages of microclonal reproduction, and the use of enzymes in various fields.
Learning outcomes	**Pre-service teachers who demonstrate competence can:** • compare morpho-physiology, biochemistry, genetics of microorganisms with the use of modern molecular genetic methods; • use disinfection and sterilization methods when working with biotechnological objects, and preparing nutrient media and coloring by using the Gram method to identify microorganisms; • check the parameters of growth and development of microbial cultures, and correctly identify microorganisms by cultural and morphological characteristics; • evaluate the use of living organisms in biotechnological production: production of microbial protein, enzyme preparation, biogas, bioethanol; • practice the skills of cultivation and cloning of living organisms, experimentation of microclonal reproduction, microscopy of preparations of cells of living organisms; • analyze the ethical issues of the use of GMOs, the principles of genetic engineering manipulations, and the importance of molecular genetic approaches in taxonomy,

	medicine and criminology; • investigate the influence of various factors (temperature, pH, nutrient content) on the growth and development of microorganisms, the use of enzymes (pectinase, protease, etc.), the influence of antiseptic and disinfectants; • design experiments for obtaining a cumulative and pure culture of microorganisms, obtaining callus tissues by microclonal reproduction; • conduct a safe experiment to study the microflora of water, air, and dairy products; • organize small projects: formulation of hypotheses and conclusions, planning, assessment of strengths and weaknesses, preparation of a report; • collect, process and interpret research data on design and laboratory work; • use scientific language, subject terminology and conventions appropriately.
Course title	**Applied biology with the basics of soil science**
Component	Subject component, Optional component
Cycle	Major disciplines
Module	**Fundamentals of biochemistry, 20 academic credits**
Academic credits	5
Course Description/ competencies	The purpose of this course is to improve the following areas of subject competence: • Competence area for Cognitive skills development (2) • Competence area for Development of practical and research skills (5, 6, 7) • Competence area for Interdisciplinary interactions development (9, 11, 13) During the course, pre-service teachers examine the topics of soil science, agrochemistry, and crop production: the process of soil formation, soil morphology, structure and properties of soil, tillage, chemistry of agriculture, and cultivated plants. The course consists of lectures and laboratory classes, during which pre-service teachers develo their skills in working with laboratory equipment, materials, tools in the organization of educational and research activities. They also develop their interdisciplinary competencies during laboratory work and small scientific projects.
Learning outcomes	**Pre-service teachers who demonstrate competence can:** • classify soil by mechanical composition; • analyze the relationship of soil science with biological, chemical and other sciences; • conduct safe experiments to study the influence of various factors on soil formation, the influence of living organisms on soil formation; • identify morphological, biological and economic features

	of cultivated plants; • assess the soil-ecological and bioecological condition of the territory of Kazakhstan; • practice the skills of cultivating soil microorganisms, microscoping preparations of cells of living organisms; • design experiments to determine the composition and properties of the soil (physical, physico-mechanical, rheological); • investigate the use of organic and mineral fertilizers in crop production; • plan and carry out projects: formulation of hypotheses and conclusions, assessment of strengths and weaknesses, preparation of a report; • collect, process and interpret research data on design and laboratory work; • use scientific language, subject terminology and conventions appropriately.
Course title	**Biophysics and bioinformatics**
Component	Subject component, Optional component
Cycle	Major disciplines
Module	**Fundamentals of biochemistry, 20 academic credits**
Academic credits	5
Course Description/ competencies	The purpose of this course is to improve the following areas of subject competence: • Competence area for Cognitive skills development (2) • Competence area for Development of practical and research skills (5, 7) • Competence area for Interdisciplinary interactions development (9, 10, 11) The course focuses on the use of theoretical knowledge and practical skills in biology in integration with physics and computer science, applying basic knowledge in the field of molecular biology and genomics, as well as the basics of statistics and mathematics. During lectures, practical and laboratory classes, pre-service teachers analyze the impact of natural phenomena (photobiological, electrical, sound, etc.) on living organisms, the principles of structured bioinformatics to reveal the essence of biological phenomena, a database search algorithm (BLAST), and the basics of gene mapping. During the course, pre-service teachers develop their interdisciplinary competencies (BTEAM) to solve creative tasks as well as their practical skills in biological physics in solving problems of biomedicine, and biomechanics. The course promotes the development of pre-service teachers' practical skills in working with databases of biological data (DNA, RNA, proteins), and modeling biological processes. Pre-service teachers can write a good scientific report and use biophysical and bioinformatic methods to solve research

	issues, working independently and in groups. At the end of the course, pre-service teachers defend the project and the scientific report, and pass the exam.
Learning outcomes	**Pre-service teachers who demonstrate competence can:** • describe the application of biomechanical processes in robotics and medicine; • analyze the physical foundations of the study of heart automatics using an electrocardiogram, the functioning of muscle tissue (electrophysiology); • evaluate the thermodynamic feature of biological systems and electrical processes in living organisms, problems of stability and evolution of biological systems; • investigate the effects of electromagnetic and sound waves on the organism of living beings; • simulate photobiological processes, ultrastructure of the cell and cell membrane, etc.; • explain how information is transferred from genes to proteins in living organisms; • describe the technology of the neurocomputer interface, the system of information exchange between the brain and the computer; • apply modern methods of obtaining, analyzing, storing, organizing and visualizing biological data; • evaluate the advantages and disadvantages of using computer systems and tools for solving biological problems; • use of the most important databases and software (for example, OMIM, PubMed, UniProt, Cosmic, BioMart) for the extraction, analysis and interpretation of data at the level of DNA, RNA and protein; • perform BLAST-search, alignment of DNA and protein sequences; • critically interpret the results, visualize the protein and evaluate the differences created by sequence variations; • create computer modeling of the genome (gene mapping), and phylogenetic trees on databases of biodata.
Course title	**Scientific foundations of natural science**
Component	Subject component, Optional component
Cycle	Major disciplines
Module	**Fundamentals of biochemistry, 20 academic credits**
Academic credits	5
Course Description/ competencies	The purpose of this course is to improve the following areas of subject competence: • Competence area for Cognitive skills development (2) • Competence area for Development of practical and research skills (5) • Competence area for Interdisciplinary interactions development (9)

	The course forms pre-service teachers' knowledge about the modern natural-scientific world view and the methods of natural sciences. They also develop their skills in applying the acquired knowledge to explain the phenomena of the surrounding world, and the perception of natural-scientific information.
Learning outcomes	**Pre-service teachers who demonstrate competence can:** • understand the natural science method of cognition, the main ideas and achievements of natural science, determining influence on the development of technology; • navigate modern scientific concepts and information of natural science; • understand the applied significance of the most important achievements in the field of natural sciences; • critically analyze the phenomena, perception and interpretation of natural science; • apply natural science knowledge in their professional activities.

Pedagogical methods of teaching chemistry and biology, 7 academic credits
The module contributes to the development and improvement of the ability to analyze, systematize the methods and content of teaching chemistry and biology, generalize, summarize the knowledge gained to work with educational and didactic materials in chemistry / biology, equipment and technical means available in the school chemistry and biology classroom, including digital technologies. The training also promotes the use of experimental computational methods to solve various experiment-oriented tasks of a nature. The module provides further development and improvement of academic writing competencies for the application of acquired knowledge and skills in the field of professional and pedagogical research and interdisciplinary and linguistic competencies.

Course title	**Chemistry laboratory and risk management**
Component	Subject component, University component
Cycle	Major disciplines
Module	**Pedagogical methods of teaching chemistry and biology, 7 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	**STEM education in biology**
Component	Subject component, Optional component
Cycle	Major disciplines
Module	**Pedagogical methods of teaching chemistry and biology, 7 academic credits**
Academic credits	5
Course Description/ competencies	The purpose of this course is to improve the following areas of pedagogical and subject competence: • Competence area in Pedagogy and Didactics (1,2) • Competence area for professional development (8,9) • Conceptual and theoretical knowledge competences (3) • Competences in conducting scientific research (7,8) • Competences in the science application (10, 13) During the course, pre-service teachers practice pedagogical methods and technologies based on the activation and intensification of students' educational activities, diagnostics, and assessment in biology teaching using STEM approach. Pre-service teachers master the subject content through projects in which scientific knowledge and design, information technology and mathematical calculations are naturally integrated. Pre-service teachers explore the methodology of the organization of STEM learning, discuss the stages, apply various research methods in the practice of teaching STEM learning, and design STEM research. Pre-service teachers form their skills in integrating research into teaching practice in various types of learning environments.
Learning outcomes	**Pre-service teachers who demonstrate competence can:** • carry out the selection of pedagogical STEM–learning technologies and effectively implement them in the practice of teaching school academic disciplines in the classroom and in extracurricular activities; • design STEM learning, considering the diversity of students; • apply various methods and technologies of pedagogical diagnostics used in evaluation of the quality of results and content of the educational process; • perform consistent, planned actions to improve the practice of teaching and STEM learning;

	• develop their research skills, direct them to improve the quality of education and their functional literacy; • develop a plan for the implementation of research on the practice of teaching STEM learning; • conduct systematic evaluation of the results during STEM training; • evaluate the strengths and weaknesses of STEM education.
Course title	**Digital technologies in biology**
Component	Subject component, Optional component
Cycle	Major disciplines
Module	**Pedagogical methods of teaching chemistry and biology, 7 academic credits**
Academic credits	5
Course Description/ competencies	The purpose of this course is to improve the following areas of pedagogical and subject competence: • Competence area in Pedagogy and Didactics (2) • Competence area for professional development (8,9) • Competences in conducting scientific research (7) • Competences in the science application (8,10, 12) Pre-service teachers investigate the possibilities of using digital equipment and software in the educational process in biology, and plan effective ways of teaching using IT technologies, including in distance learning. They also create digital educational resources in biology.
Learning outcomes	**Pre-service teachers who demonstrate competence can:** • use various forms of interactive electronic educational content; • use IT technologies in the organization of project activities; • structure, integrate and present information in teaching activities, considering life and educational context of students; • plan effective teaching using IT technologies; • develop digital educational resources on biology.
Course title	**Design of STEM education**
Component	Subject component, Optional component
Cycle	Major disciplines
Module	**Pedagogical methods of teaching chemistry and biology, 7 academic credits**
Academic credits	5
Course Description/ competencies	The purpose of this course is to improve the following areas of pedagogical and subject competence: Competence area in Pedagogy and Didactics (2) Competence area for professional development (8,9)

	Competences in conducting scientific research (7) Competences in the science application (8,10, 12) Pre-service teachers analyze the design features of STEM learning based on the applied nature of the real world challenges, learning through problem solving and critical thinking, and the integration of different content into the educational process. The course builds pre-service teachers' abilities to use new technological opportunities in biology, as well as to design and adapt STEM education considering the diversity of students.
Learning outcomes	**Pre-service teachers who demonstrate competence can:** link science and STEM subjects with real life challenges or situations; identify practice-oriented problem situations; build project/phenomena-based learning processes in which students make observations, identify problems and find solutions independently and with their peers; conduct experimental research with mathematical and IT modeling; design STEM lessons for students' academic and extracurricular activities in an inclusive environment.

FINAL ATTESTATION 8 academic credits	**ҚОРЫТЫНД**
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)***	Түлекті қоры бағдарламасы Аттестаттауды қалыптасу ден дайындығын б **Қорытынды** ***дипломдық ж*** ***жоба, арт-ж***

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

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**

History of Kazakhstan 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
Philosophy 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**
Sociology 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
Political studies 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
Cultural studies 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
Psychology 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.	2

The communicative side of communication. Social and psychological conflict. Patterns of behavior in conflict. Effective communication techniques		
Instrumental and communication module	**25**	
Russian /Kazakh language 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	
Foreign language 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	
Information and communication technologies 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**	
Physical education 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**	
Economics, Fundamentals of Entrepreneurship and business 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	

Fundamentals of Anti-corruption Culture In the process of studying, the causes, prerequisites, main methods and forms of combating corruption are considered. The course examines the problems of forming an anti-corruption culture in modern society, analyzes social, economic, legal, moral and ethical methods and forms of countering corruption.	5
Ecology and Life Safety The discipline forms knowledge of environmental laws and the ability to assess the state of the environment and the degree of human exposure to dangerous factors, teaches to apply aspects of rational nature management. In the course of mastering the course, the student acquires the skills of collecting data on environmental problems using digital technologies, critical analysis of them, independent decision-making, forms the ability to work in a team in compliance with environmental principles.	5
Research methods 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
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
6B01562 –Химия-биология (IP) /6B01562 Kimya-biyoloji (IP) / 6B01562 –Химия-биология (IP) /6B01562 – Chemistry-biology (IP)

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) Міндетті компонент МК/ Zorunlu bileşen ZB/ Обязательный компонент ОК/ Required component RC 56 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								
Аспаптық және коммуникациялық модуль/ Enstrümantasyon ve iletişim modülü / Инструментальный и коммуникационный модуль/ Instrumental and communication module	**25**									
Қазақ (орыс) тілі/Kazak (Rus) Dili /Казахский (русский) язык/Kazakh(Russian) Language	10	5	5							Қазақ (орыс) тілі A1- пре - жоқ, пост A2/ B1- пре A2, пост- B2/ C1 пре B2, C1-пост жоқ
Шетел тілі/Yabancı dil/Иностранный язык/ForeignLanguage	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 білім және салауатты өмір салты модулі/ Sosyal Eğitim ve Sağlıklı Yaşam Modülü /Модуль социальных знаний и здорового образа жизни/ Module of social-knowledge and healthy lifestyle	**8**									
Әлеуметтік-саясаттану білім модулі (әлеуметтану, саясаттану, мәдениеттану,	8				2					

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)					2					
					2					
					2					
Денсаулықты нығайту модулі/ Sağlığın teşviki modülü /Модуль укрепления здоровья / Health Promotion module	**8**									
Дене шынықтыру/Beden Eğitimi/Физическая культура/PhysicalCulture	8	2	2	2	2					
Таңдау компоненті (ТК)/ Seçmeli bileşen SB/Компонент по выбору КВ/ Component of Choice CC										
Қоғамдық даму негіздері/ Sosyal gelişimin temelleri /Основы общественного развития/The basis of social development	**5**									
Экология және өмір қауіпсіздігі/Ekoloji ve yaşam güvenliği/Экология и безопасность жизнедеятельности/Ecology and Life Safety	5			5						
Сыбайлас жемқорлыққа қарсы мәдениет негіздері/Rüşvetle Mücadele Esasları/Основы антикоррупционной культуры/Fundamentals of Anti-Corruption Culture										
Ғылыми зерттеу әдістері / Bilimsel araştırma yöntemleri/ Методы научного исследования/ Methods of scientific research										
Экономика, кәсіпкерлік және бизнес негіздері /Ekonomi, girişimcilik ve iş temelleri/Экономика, Основы Предпринимательства и бизнеса/Economics, FundamentalsofEntrepreneurshipandBusiness										
Базалық және бейіндеуші пәндер циклі/ 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 қолдау / 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, взаимодействие и коммуникация в образовании / 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 (Kaynaştırma) Eğitim Ortamları / Инклюзивная образовательная среда / Inclusive Educational	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 оқу үдерісіндегі 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										
Оқыту 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 рефлексирующий 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	6						6			Пре: психологиялық-педагогикалық практика Пост: өндірістік-

Uygulama, 3. sınıf)										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 – 131 акад.кр./akademikkredit/ academ.credits Жоғары оқу орны компоненті ЖК/ Üniversite Seçmeli/Вузовский компонент ВК/University Component UC -83 акад.кр./akademikkredit/ academ.credits Таңдау компоненті (ТК)/ Seçmeli bileşen SB/ Компонент по выбору КВ/ Component of Choice CC - 48 акад.кр./ akademik kredit/ academ.credits)										
Модуль – Түркі дүниесі/ Modül – Türk Dünyası/ Модуль – Тюркский мир/ Module – Turkic World	**16**									
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	5								Пре: жоқ Пост: Түрік (Қазақ) тілі – (Деңгей 2-A2, C1)
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		5							Пре: Түрік (Қазақ) тілі – (Деңгей 1-A1, B2) Пост: жоқ
Ататүрік принциптері/Atatürk İlkeleri/ПринципыАтатюрка/PrinciplesofAtaturk	3			3						
Түркі мемлекеттер тарихы/Türk memleketleri tarihi/История тюркских государств/TurkicStateshistory										
Ясауитану/YesevilikBilgisi/Ясавиведение/YassawiStudy	3				3					
ПӘНДІК КОМПОНЕНТ/ KONU BİLEŞENİ / ПРЕДМЕТНЫЙ КОМПОНЕНТ/ SUBJECT COMPONENT -112 академиялық кредит										
Модуль –Химия-биологияға кіріспе/ Kimya ve biyolojiye giriş /Введение в химию и биологию /Introduction to chemistry and biology	**11**									
Бейорганикалық химия İnorganik kimya Неорганическая химия Inorganic chemistry	6	6								Пре:- Пост: Атом құрылысы және периодтылық
Жалпы химия Genel Kimya Общая химия General chemistry										
Химияға кіріспе Kimyaya Giriş Введение в химию Introduction to Chemistry										
Цитология, гистология және эмбриология/Sitoloji, Histoloji ve	5	5								Пре: -

Embriyoloji/Цитология, гистология и эмбриология/Cytology, histology and embryology										Пост: Генетика және селекция негіздері
Модуль- Жаратылыстану ғылымдары/ Doğa Bilimleri/ Естественные науки/ Natural sciences	**60**									
Атом құрылысы және периодтылық Atomik yapı ve periyodiklik Строение атома и периодичность Atomic structures and periodicity	5		5							Пре: Бейорганикалық химия Пост: Аналитикалық химия
Өсімдік ағзасының құрылымы мен қызметі/ Bitki organizmasının yapısı ve işlevleri/ Строение и функции растительных организмов /Structure and functions of plant organisms	6			6						Пре: Цитология, гистология және эмбриология Пост: Тұқым қуалаушылық және өзгергіштік заңдылықтары
Аналитикалық химия Analitik Kimya Аналитическая химия Analytical Chemistry	7			7						Пре: Бейорганикалық химия Пост: Физикалық химия
Жануарлардың құрылымы мен қызметі Hayvanların yapısı ve işlevleri Строение и функции животных Structure and functions of animals	6				6					Пре: Цитология, гистология және эмбриология Пост: Тұқым қуалаушылық және өзгергіштік заңдылықтары
Академиялық жазылым Akademik abonelik Академическое письмо Academic letter	3				3					Пре:- Пост:
Көміртек және оның қосылыстарының химиясы Karbon ve bileşiklerinin kimyası Химия углерода и его соединений Chemistry of carbon and its compounds	7					7				Пре:- Атом құрылысы және периодтылық Пост: Биоорганикалық химия
Физикалық химия Fiziksel Kimya Физическая химия Physical chemistry	5					5				Пре: Аналитикалық химия Пост: Химиядан есептер шығару

Биохимия/Biyokimya/Биохимия/Biochemistry Биоорганикалық химия/Biyoorganik Kimya/ Биоорганическая химия/Bioorganic chemistry	5					5				Пре: Көміртек және оның қосылыстарының химиясы Пост: Генетика және селекция негіздері
Адам биологиясы/ İnsan biyolojisi/Биология человек/Human biology Адам анатомиясы/ İnsanAnatomisi/ Анатомия человека/ Humananatomy	5					5				Пре: Цитология, гистология және эмбриология Пост: Тұқым қуалаушылық және өзгергіштік заңдылықтары
Химиядан есептер шығару Kimya problemlerinin çözümü Решение задач по химии Solving problems in chemistry	5						5			Пре: Бейорганикалық химия Пост:-
Тұқым қуалаушылық және өзгергіштік заңдылықтары/Kalıtım ve değişkenlikkalıpları/Закономерности наследственности изменчивости/ Patternsofinheritanceandvariability Генетика және селекция негіздері/ Genetikveseçimintemelleri/ Генетикаиосновыселекции/Genetics and the basis of breeding	6						6			Пре:Цитология, гистология және эмбриология Пост: Молекулалық биология
Модуль -Химия-биологиядағы зерттеулер / Kimya ve biyoloji alanında çalışmalar / Исследования по химии и биологии / Studies in chemistry and biology	**16**									
Биологиялық зерттеулерді жүргізу әдістемесі/Biyolojik araştırma metodolojisi/Методика проведения биологических исследований/Methodology of biological research Биологиялық білім берудегі зерттеу және жобалау қызметі/ Biyolojik eğitimde araştırma ve proje faaliyetleri/ Исследовательская и проектная деятельность в биологическом образовании/Research and project activities in biological education	5						5			Пре:- Пост: Биологиядағы цифрлық технологиялар
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			Пре: Мұғалім кәсібіне кіріспе Пост: Химия бойынша оқушылардың жобалық қызметін ұйымдастыру
Химия бойынша оқушылардың жобалық қызметін ұйымдастыру Kimya öğrencilerinin proje faaliyetlerinin organizasyonu Организация проектной деятельности учащихся по химии	5							5		Пре: Мектепте химияның құрылымдық-мазмұндық бөлімдерін

Organization of students' project activities in chemistry										оқыту Пост: Химия зертханасы және тәуекелдерді басқару
Модуль-Биохимия негіздері/Biyokimyanın temelleri Основы биохимии/Fundamentals of biochemistry	**20**									
Химиялық синтездеу өнері Kimyasal Sentez Sanatı Искусство химического синтеза Art of Chemical Synthesis	5							5		Пре: Көміртек және оның қосылыстарының химиясы Пост: Химия зертханасы және тәуекелдерді басқару
Молекулалық биология/ Moleküler Biyoloji/ Молекулярная биология/ Molecular Biology	5							5		Пре: Биохимия Пост:-
Микробиология биотехнология негіздерімен/ Biyoteknolojinin temelleri ile mikrobiyoloji/ Микробиология с основами биотехнологии/Microbiology with the basics of biotechnology	5							5		Пре: Молекулалық биология Пост:
Қолданбалы биология топырақтану негіздерімен/ Toprak biliminin temelleri ile uygulamalı biyoloji/ Прикладная биология с основами почвоведения/Applied biology with the basics of soil science										
Биофизика және биоинформатика/ Biyofizik ve Biyoinformatik/ Биофизика и биоинформатика/Biophysics and bioinformatics	5							5		Пре:- Пост:-
Жаратылыстанудың ғылыми негіздері/ Doğa biliminin bilimsel temelleri/Научные основы естествознания/Scientific foundations of natural science										
Модуль – Химия-биологияны оқытудың педагогикалық тәсілі/ Kimya ve biyoloji öğretiminin pedagojik yöntemi/Педагогический метод преподавания химии и биологии /Pedagogical method of teaching chemistry and biology	**7**									
Биологиядағы STEM-білім/STEM-Biyolojideeğitim/ STEM-образование в биологии/STEM education in biology	5								5	Пре:- Педагогикалық технология Пост:-
Биологиядағы цифрлық технологиялар/Biyolojidedijitalteknolojiler/Цифровые технологии в биологии/Digital technologies in biology										
STEM оқытуды жобалау/STEM eğitiminintasarımı/ Проектирование STEM-обучения/Design of STEM education										
Химия зертханасы және тәуекелдерді басқару Kimya Laboratuvarı ve Risk Yönetimi Лаборатория химии и управление рисками	2								2	Пре: Химия бойынша оқушылардың жобалық қызметін ұйымдастыру

Chemistry laboratory and risk management										Пост:-
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**								**8**	
Жалпы барлығы/ Genel Toplam /Общий итог/ General:	**254**	**33**	**32**	**35**	**33**	**29**	**32**	**30**	**30**	

Matrices for LO and disciplines included in the EP register 6B01562 –Химия-биология, /6B01562 –Химия-биология /6B01562 –Chemistry- Biology

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 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 the methods of scientific research and academic writing when planning pedagogical research and setting up a chemical/biological experiment, using language competencies, digital resources, 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/ biology 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

	ECTS	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/Ecology and Life Safety	5	+	+						
Сыбайлас жемқорлыққа қарсы мәдениет негіздері/Rüşvetle Mücadele Esasları/Основы антикоррупционной культуры/Fundamentals of Anti-Corruption Culture		+							
Ғылыми зерттеу әдістері / Bilimsel araştırma yöntemleri/ Методы научного исследования/ Methods of scientific research					+			+	
Экономика, кәсіпкерлік және бизнес негіздері /Ekonomi, girişimcilik ve iş temelleri/Экономика, Основы Предпринимательства и бизнеса/Economics, FundamentalsofEntrepreneurshipandBusiness		+							
Білім берудегі психология және өзара әрекеттесу мен коммуникация тұжырымдамалары /Eğitimde Psikoloji ve Etkileşim-İletişim Kavramları / Психология, взаимодействие и коммуникация в образовании / Psychology in Education and Concepts of Interaction and Communication	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				+				
Инклюзивті білім беру ортасы / Kapsayıcı (Kaynaştırma) Eğitim Ortamları / Инклюзивная образовательная среда / Inclusive Educational	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 оқу үдерісіндегі дербес оқыту / Öğretimin Planlaması ve Bireyselleştirilmesi / Планирование преподавания и индивидуализация обучения/ Teaching Planning and Individualization of Learning	4		+					+	
Оқыту әдістері мен технологиялары / Öğretim Yöntem ve Teknikleri / Методы и технологии преподавания / Teaching Methods and Technologies /	5		+						+
Бағалау және дамыту / Değerlendirme ve Geliştirme / Оценивание и развитие / Assessment and Development	4		+					+	+
Педагогикалық зерттеулер / Pedagojik Araştırmalar / Педагогические исследования / Pedagogical Research	4		+	+	+				
Зерттеулер, даму және инновациялар / Araştırma, Geliştirme ve Yenilikçilik /	5		+	+	+				

Исследования, развитие и инновации / Research, Development and Innovation									
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 pedagojik uygulama , 2. sınıf)/ Психолого-педагогическое оценивание (психолого-педагогическая практика, 2 курс) / Psychological and pedagogical assessment (2nd year psychological and pedagogical practice)	2	+	+						
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	+	+	+			+		
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				+				
Ататүрік принциптері/Atatürk İlkeleri/ПринципыАтатюрка/PrinciplesofAtaturk	3	+							
Түркі мемлекеттер тарихы/Türk memleketleri tarihi/История тюркских государств/TurkicStateshistory		+							
Ясауитану/YesevilikBilgisi/Ясавиведение/YassawiStudy	3	+							
Бейорганикалық химия İnorganik kimya Неорганическая химия Inorganic chemistry	6					+	+		+
Жалпы химия Genel Kimya Общая химия General chemistry						+	+		+

Химияға кіріспе Kimyaya Giriş Введение в химию Introduction to Chemistry						+	+		+
Цитология, гистология және эмбриология/Sitoloji, Histoloji ve Embriyoloji/Цитология, гистология и эмбриология/Cytology, histology and embryology	5					+	+		
Атом құрылысы және периодтылық Atomik yapı ve periyodiklik Строение атома и периодичность Atomic structures and periodicity	5					+			+
Өсімдік ағзасының құрылымы мен қызметі/ Bitki organizmasının yapısı ve işlevleri/ Строение и функции растительных организмов /Structure and functions of plant organisms	6					+	+		
Аналитикалық химия Analitik Kimya Аналитическая химия Analytical Chemistry	7					+	+	+	+
Жануарлардың құрылымы мен қызметі Hayvanların yapısı ve işlevleri Строение и функции животных Structure and functions of animals	6					+	+		
Академиялық жазылым Akademik abonelik Академическое письмо Academic letter	3			+	+				
Көміртек және оның қосылыстарының химиясы Karbon ve bileşiklerinin kimyası Химия углерода и его соединений Chemistry of carbon and its compounds	7					+	+		+
Физикалық химия Fiziksel Kimya Физическая химия Physical chemistry	5					+	+		+
Биохимия/Biyokimya/Биохимия/Biochemistry	5					+			+
Биоорганикалық химия/Biyoorganik Kimya/ Биоорганическая химия/Bioorganic chemistry						+			+
Адам биологиясы/ İnsan biyolojisi/Биология человек/Human biology	5					+	+		

Адам анатомиясы/ İnsanAnatomisi/ Анатомия человека/ Humananatomy						+	+		
Химиядан есептер шығару Kimya problemlerinin çözümü Решение задач по химии Solving problems in chemistry	5					+	+	+	
Тұқым қуалаушылық және өзгергіштік заңдылықтары/Kalıtım ve değişkenlikkalıpları/Закономерности наследственности изменчивости/ Patternsofinheritanceandvariability	6					+	+		+
Генетика және селекция негіздері/ Genetikveseçimintemelleri/ Генетикаиосновыселекции/Genetics and the basis of breeding						+	+		+
Биологиялық зерттеулерді жүргізу әдістемесі/Biyolojik araştırma metodolojisi/Методика проведения биологических исследований/Methodology of biological research	5								
Биологиялық білім берудегі зерттеу және жобалау қызметі/ Biyolojik eğitimde araştırma ve proje faaliyetleri/ Исследовательская и проектная деятельность в биологическом образовании/Research and project activities in biological education							+	+	+
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		+	+				+	
Химия бойынша оқушылардың жобалық қызметін ұйымдастыру Kimya öğrencilerinin proje faaliyetlerinin organizasyonu Организация проектной деятельности учащихся по химии Organization of students' project activities in chemistry	5		+	+	+			+	
Химиялық синтездеу өнері Kimyasal Sentez Sanatı Искусство химического синтеза Art of Chemical Synthesis	5					+	+		+
Молекулалық биология/ Moleküler Biyoloji/ Молекулярная биология/ Molecular Biology	5					+	+		
Микробиология биотехнология негіздерімен/ Biyoteknolojinin temelleri ile mikrobiyoloji/ Микробиология с основами биотехнологии/Microbiology with the basics of biotechnology	5	+				+			
Қолданбалы биология топырақтану негіздерімен/ Toprak biliminin temelleri ile uygulamalı biyoloji/ Прикладная биология с основами почвоведения/Applied biology with the basics of soil science		+				+			
Биофизика және биоинформатика/ Biyofizik ve Biyoinformatik/	5	+				+	+		

Биофизика и биоинформатика/Biophysics and bioinformatics									
Жаратылыстанудың ғылыми негіздері/ Doğa biliminin bilimsel temelleri/Научные основы естествознания/Scientific foundations of natural science		+				+	+		
Биологиядағы STEM-білім/STEM-Biyolojideeğitim/ STEM-образование в биологии/STEM education in biology	5				+			+	+
Биологиядағы цифрлық технологиялар/Biyolojidedijitalteknolojiler/Цифровые технологии в биологии/Digital technologies in biology					+			+	+
STEM оқытуды жобалау/STEM eğitiminintasarımı/ Проектирование STEM-обучения/Design of STEM education					+			+	+
Химия зертханасы және тәуекелдерді басқару Kimya Laboratuvarı ve Risk Yönetimi Лаборатория химии и управление рисками Chemistry laboratory and risk management	2			+		+	+		

	Кр саны	**Қазақша**	**Орысша**	**Ағылшынша**
Экология және өмір қауіпсіздігі/Ekoloji ve yaşam güvenliği/Экология и безопасность жизнедеятельности/Ecology and Life Safety	5			
Сыбайлас жемқорлыққа қарсы мәдениет негіздері/Rüşvetle Mücadele Esasları/Основы антикоррупционной культуры/Fundamentals of Anti-Corruption Culture				
Ғылыми зерттеу әдістері / Bilimsel araştırma yöntemleri/ Методы научного исследования/ Methods of scientific research				
Экономика, кәсіпкерлік және бизнес негіздері /Ekonomi, girişimcilik ve iş temelleri/Экономика, Основы Предпринимательства и бизнеса/Economics, FundamentalsofEntrepreneurshipandBusiness				
Білім берудегі психология және өзара әрекеттесу мен коммуникация тұжырымдамалары /Eğitimde Psikoloji ve Etkileşim-İletişim Kavramları / Психология, взаимодействие и коммуникация в образовании / Psychology in Education and Concepts of Interaction and Communication	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			
Инклюзивті білім беру ортасы / Kapsayıcı (Kaynaştırma) Eğitim Ortamları / Инклюзивная образовательная среда / Inclusive Educational	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 оқу үдерісіндегі дербес оқыту / Öğretimin Planlaması ve Bireyselleştirilmesi / Планирование преподавания и индивидуализация обучения/ Teaching Planning and Individualization of Learning	4			
Оқыту әдістері мен технологиялары / Öğretim Yöntem ve Teknikleri / Методы и технологии преподавания / Teaching Methods and Technologies /	5			
Бағалау және дамыту / Değerlendirme ve Geliştirme / Оценивание и развитие / Assessment and Development	4			
Педагогикалық зерттеулер / Pedagojik Araştırmalar / Педагогические исследования / Pedagogical Research	4			
Зерттеулер, даму және инновациялар / Araştırma, Geliştirme ve Yenilikçilik / Исследования, развитие и инновации / Research, Development and Innovation	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 pedagojik uygulama , 2. sınıf)/ Психолого-педагогическое оценивание (психолого-педагогическая практика, 2 курс) / Psychological and pedagogical assessment (2nd year psychological and pedagogical practice)	2			
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			
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			

Ататүрік принциптері/Atatürk İlkeleri/ПринципыАтатюрка/PrinciplesofAtaturk	3			
Түркі мемлекеттер тарихы/Türk memleketleri tarihi/История тюркских государств/TurkicStateshistory				
Ясауитану/YesevilikBilgisi/Ясавиведение/YassawiStudy	3			
Бейорганикалық химия İnorganik kimya Неорганическая химия Inorganic chemistry	6			
Жалпы химия Genel Kimya Общая химия General chemistry				
Химияға кіріспе Kimyaya Giriş Введение в химию Introduction to Chemistry				
Цитология, гистология және эмбриология/Sitoloji, Histoloji ve Embriyoloji/Цитология, гистология и эмбриология/Cytology, histology and embryology	5			
Атом құрылысы және периодтылық Atomik yapı ve periyodiklik Строение атома и периодичность Atomic structures and periodicity	5			
Өсімдік ағзасының құрылымы мен қызметі/ Bitki organizmasının yapısı ve işlevleri/ Строение и функции растительных организмов /Structure and functions of plant organisms	6			
Аналитикалық химия Analitik Kimya Аналитическая химия Analytical Chemistry	7			
Жануарлардың құрылымы мен қызметі Hayvanların yapısı ve işlevleri Строение и функции животных Structure and functions of animals	6			
Академиялық жазылым Akademik abonelik Академическое письмо Academic letter	3			
Көміртек және оның қосылыстарының химиясы	7			

Karbon ve bileşiklerinin kimyası Химия углерода и его соединений Chemistry of carbon and its compounds				
Физикалық химия Fiziksel Kimya Физическая химия Physical chemistry	5			
Биохимия/Biyokimya/Биохимия/Biochemistry	5			
Биоорганикалық химия/Biyoorganik Kimya/ Биоорганическая химия/Bioorganic chemistry				
Адам биологиясы/ İnsan biyolojisi/Биология человек/Human biology	5			
Адам анатомиясы/ İnsanAnatomisi/ Анатомия человека/ Humananatomy				
Химиядан есептер шығару Kimya problemlerinin çözümü Решение задач по химии Solving problems in chemistry	5			
Тұқым қуалаушылық және өзгергіштік заңдылықтары/Kalıtım ve değişkenlikkalıpları/Закономерности наследственности изменчивости/ Patternsofinheritanceandvariability	6			
Генетика және селекция негіздері/ Genetikveseçimintemelleri/ Генетикаиосновыселекции/Genetics and the basis of breeding				
Биологиялық зерттеулерді жүргізу әдістемесі/Biyolojik araştırma metodolojisi/Методика проведения биологических исследований/Methodology of biological research	5			
Биологиялық білім берудегі зерттеу және жобалау қызметі/ Biyolojik eğitimde araştırma ve proje faaliyetleri/ Исследовательская и проектная деятельность в биологическом образовании/Research and project activities in biological education				
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			
Химия бойынша оқушылардың жобалық қызметін ұйымдастыру Kimya öğrencilerinin proje faaliyetlerinin organizasyonu Организация проектной деятельности учащихся по химии Organization of students' project activities in chemistry	5			
Химиялық синтездеу өнері Kimyasal Sentez Sanatı Искусство химического синтеза	5			

Art of Chemical Synthesis				
Молекулалық биология/ Moleküler Biyoloji/ Молекулярная биология/ Molecular Biology	5			
Микробиология биотехнология негіздерімен/ Biyoteknolojinin temelleri ile mikrobiyoloji/ Микробиология с основами биотехнологии/Microbiology with the basics of biotechnology	5			
Қолданбалы биология топырақтану негіздерімен/ Toprak biliminin temelleri ile uygulamalı biyoloji/ Прикладная биология с основами почвоведения/Applied biology with the basics of soil science				
Биофизика және биоинформатика/ Biyofizik ve Biyoinformatik/ Биофизика и биоинформатика/Biophysics and bioinformatics	5			
Жаратылыстанудың ғылыми негіздері/ Doğa biliminin bilimsel temelleri/Научные основы естествознания/Scientific foundations of natural science				
Биологиядағы STEM-білім/STEM-Biyolojideeğitim/ STEM-образование в биологии/STEM education in biology	5			
Биологиядағы цифрлық технологиялар/Biyolojidedijitalteknolojiler/Цифровые технологии в биологии/Digital technologies in biology				
STEM оқытуды жобалау/STEM eğitiminintasarımı/ Проектирование STEM-обучения/Design of STEM education				
Химия зертханасы және тәуекелдерді басқару Kimya Laboratuvarı ve Risk Yönetimi Лаборатория химии и управление рисками Chemistry laboratory and risk management	2			

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	
B-	2.67	75-79	
C+	2.33	70-74	
C	2.0	65-69	Satisfactory
C-	1.67	60-64	
D+	1.33	55-59	
D	1.0	50-54	
FX	0.5	25-49	Unsatisfactory
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 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-cente redness 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.

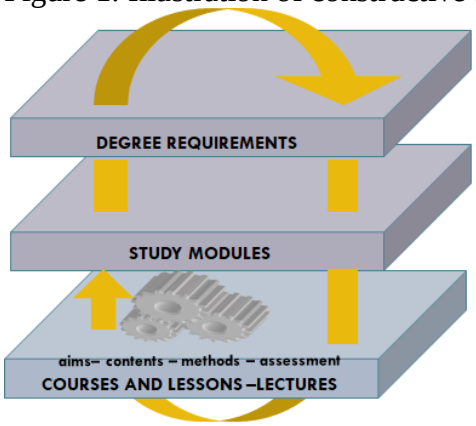
Constructive alignment

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).

Literature:

1. Beijaard, D., Meijer, P. C., & Verloop, N. (2004). Reconsidering research on teachers' professional identity. *Teaching and teacher education*, 20(2), p. 107-128.
2. Berry, A. (2004). Self study in teaching about teaching. In J. J. Loughran, M. L. Hamilton, V. K. LaBoskey, & T. Russell (Eds.), *International handbook of self-study of teaching and teacher education practices*. Dordrecht: Springer. 1295-1332.
3. Biggs, J. (1996). Enhancing Teaching through Constructive Alignment. *Higher Education*, 32, p. 347-364.
4. Biggs, J., & Tang, C. (2011). *Teaching for Quality Learning at University*. Maidenhead, UK: Open University Press.
5. Boud, D. & Falchikov, N. (2006): Aligning assessment with long-term learning. *Assessment & Evaluation in Higher Education*, 31(4), p. 399-413
6. Cao, Y., Postareff, L., Lindblom-Ylänne, S. & Toom, A. (2021). A survey research on Finnish teacher educators' research-teaching integration and its relationship with their approaches to teaching. *European Journal of Teacher Education*.
7. Cochran-Smith, M. (2005). Teacher Educators as Researchers: Multiple Perspectives. *Teaching and Teacher Education*, 21(2), p. 219–225.
8. Coyle, D. (2007). Content and Language Integrated Learning: Towards a Connected Research Agenda for CLIL Pedagogies. *International Journal of Bilingual Education and Bilingualism*, 10(5), p. 543–562.
9. Coyle, D. (2008). CLIL - a Pedagogical Approach From the European Perspective. In *Encyclopedia of Language and Education*, edited by N. Hornberger, p. 1200–1214. Boston: Springer US.

10. Coyle, D., Hood, P., & Marsh, D. (2010). *CLIL: Content and Language Integrated Learning*. Cambridge: Cambridge University Press.

11. Dalton-Puffer, C. (2008). Outcomes and Processes in Content and Language Integrated Learning (CLIL): Current Research From Europe. In *Future Perspectives for English Language Teaching*, edited by W. Delanoy, and L. Volkmann, p. 1–19. Heidelberg: Carl Winter.
12. Day, C., Elliot, B., & Kington, A. (2005). Reform, standards and teacher identity: Challenges of sustaining commitment. *Teaching and teacher Education*, 21(5), p. 563-577.
13. De Zarobe, Y. R. (2008). CLIL and Foreign Language Learning: A Longitudinal Study in the Basque Country. *International CLIL Research Journal*, 1(1), p. 60–73.
14. European Agency. *Profile of Inclusive Teachers.* https://www.european-agency.org/projects/te4i/profile-inclusive-teachers
15. Eurydice. 2006. *Content and Language Integrated Learning (CLIL) at School in Europe*. Brussels: Eurydice.
16. Fimyar, O., Yakavets, N., & Bridges, D. (2014). The contemporary policy agenda. In D.Bridges (Ed), Educational Reform and Internationalisation. The case of school reform in Kazakhstan (pp. 53-68). Peterborough, UK: Printondemand-worldwide.
17. Feinstein, N. W., Allen, S., & Jenkins, E. (2013). Outside the pipeline: Reimagining science education for nonscientists. *Science*, 340(6130), p. 314-317
18. Flores, M.A. (2018). Linking Teaching and Research in Initial Teacher Education: Knowledge Mobilisation and Research-informed Practice. *Journal of Education for Teaching*, 44 (5), p. 621–636.
19. Florian, L., & Black-Hawkins, K. (2011). Exploring inclusive pedagogy. *British Educational Research Journal*, 37(5), p. 813–828.
20. Fredrickson, B. L. (2001). The role of positive emotions in positive psychology: the broaden-and-build theory of positive emotions. *American psychologist*, 56(3), p. 218.
21. Garrison, D. R., & Kanuka, H. (2004). Blended learning: Uncovering its transformative potential in higher education. *The internet and higher education*, 7(2), p. 95-105.
22. Guskey, T.R. (1989). Attitude and perceptual change in teachers. , 13, p. 439-453.
23. Hazelkorn, E., Ryan, C., Beernaert, Y., Constantinou, C., Deca, L., Grangeat, M., Karikorpi, M., Lazoudis, A., Pintó, R. & Welzel-Breuer, M. (2015). *Science Education for Responsible Citizenship*. European Commission: Directorate-General for Research and Innovation, Science with and for Society.
24. Hökkä, P., Eteläpelto, A., & Rasku-Puttonen, H. (2012). The professional agency of teacher educators amid academic discourses. *Journal of Education for Teaching*, 38(1), p. 83-102.
25. IAC (2018). Analytical Report. Monitoring and assessment of implementation of a flexible form of management in universities. IAC.
26. Jones, S. (2003). Measuring the quality of higher education: linking teaching quality measures at the delivery level to administrative measures at the university level. *Quality in Higher Education*, 9(3), 223-229.
27. Koohang, A., Britz, J., & Seymour, T. (2006). Panel Discussion. Hybrid/blended learning: Advantages, Challenges, Design and Future Directions. *In Proceedings of the 2006 Informing science and IT education joint conference* (p. 155-157).
28. Krokfors, L., Kynäslahti, H., Stenberg, K., Toom, A., Maaranen, K., Jyrhämä, R., Byman, R. & Kansanen, P. (2011). Investigating Finnish Teacher Educators' Views on Research-based Teacher Education. *Teaching Education*, 22(1), p. 1–13.
29. López-Pérez, M. V., Pérez-López, M. C., & Rodríguez-Ariza, L. (2011). Blended learning in higher education: Students' perceptions and their relation to outcomes. *Computers & education*, 56(3), p. 818-826.

30. Lunenberg, M. (2010). Characteristics, scholarship and research of teacher educators. In P. Peterson, E. Baker, & B. McGaw (Eds.), *International encyclopedia of education* (p. 676-680). Oxford, UK: Elsevier.
31. McLaughlin, C., Winter, L., Kurakbayev, K., Kambatyrova, A., Torrano, D., Fimyar, O., Ramazanova, A. (2016). The Improvement of Secondary Education Curriculum of Kazakhstan in the Context of Modern Reforms (unpublished report). Astana: Nazarbayev University Graduate School of Education.
32. Marsh, D. (2012). *Content and Language Integrated Learning (CLIL). A Development Trajectory*. Cordoba: Servicio de Publicaciones de la Universidad de Córdoba.
33. Mehisto, P., Marsh, D. & Frigols, M. J. (2008). *Uncovering CLIL Content and Language Integrated Learning in Bilingual and Multilingual Education*. London: Macmillan.
34. Moore, T. J., Stohlmann, M. S., Wang, H. H., Tank, K. M., Glancy, A. W., & Roehrig, G. H. (2014). Implementation and integration of engineering in K-12 STEM education. In *Engineering in Pre-College Settings: Synthesizing Research, Policy, and Practices* (p. 35-60). West Lafayette: Purdue University Press.
35. OECD (2014). Reviews of National Policies for Education: Secondary Education in Kazakhstan. Retrieved from: http://dx.doi.org/10.1787/9789264205208-en
36. OECD (2020). *Raising the Quality of Initial Teacher Education and support for early career teachers in Kazakhstan*. OECD Education Policy Perspectives, No. 25, OECD Publishing, Paris.
37. "On Education" (2007) Law of the Republic of Kazakhstan; with amendments dated 27.12.2019.
38. On approval of the Lifelong Learning (continuing education) Concept (2021).Resolution No. 471 of the Government of the Republic of Kazakhstan dated 8 July 2021.
39. Osguthorpe, R. T., & Graham, C. R. (2003). Blended learning environments: Definitions and directions. *Quarterly review of distance education*, 4(3), p. 227-33.
40. Parpala, A., & Postareff, L., (2021). Supporting high-quality teaching in higher education through the HowUTeach self-reflection tool. *Ammattikasvatuksen aikakauskirja*, 4, 2021.
41. Postareff, L., Lindblom-Ylänne, S., & Nevgi, A. (2008). A follow-up study of the effect of pedagogical training on teaching in higher education. *Higher Education*, 56(1), p. 29-43.
42. Prosser, M., & Trigwell, K. (2014). Qualitative Variation in Approaches to University Teaching and Learning in Large First-Year Classes. *Higher Education*, 67, p. 783-795.
43. Pyhältö, K., Pietarinen, J., & Soini, T. (2012). Do comprehensive school teachers perceive themselves as active professional agents in school reforms? *Journal of Educational Change*, 13(1), p. 95-116.
44. Salamanca Statement. (1994). *The Salamanca statement and framework for action on special needs education*. Salamanca: UNESCO, Ministry of education and Science. https://www.european-agency.org/sites/default/files/salamanca-statement-and-framework.pdf
45. Saloviita, T. 2018. Attitudes of Teachers Towards Inclusive Education in Finland. https://www.tandfonline.com/doi/full/10.1080/00313831.2018.1541819
46. Sharplin, E., Ibrasheva, A., Shamatov, D., Rakisheva, A. (2020). Analysis of Teacher Education in Kazakhstan in Context of Modern International Practice. Bulletin of KazNU, Pedagogical Series, 64(3), pp. 12-27.
47. SESPE (State Educational Standard for Primary Education). (2015) Available from: http://nao.kz/loader/fromorg/2/22 Accessed: 29 November 2021.
48. Silova, I., and G. Steiner-Khamsi. (2008). How NGOs React: Globalization and Education Reform in the Caucasus, Central Asia, and Mongolia. Bloomfield, CT: Kumarian Press.
49. The Universal Declaration of Human Rights (1948). https://www.un.org/en/aboutus/universal-declaration-of-human-rights

50. Timperley, H. S., & Phillips, G. (2003). Changing and sustaining teachers' expectations through professional development in literacy. *Teaching and teacher education*, 19(6), p. 627-641.
51. Toom, A., Kynäslahti, H., Krokfors, L., Jyrhämä, R., Byman, R., Stenberg, K., Maaranen, K., & Kansanen, P. (2010). Experiences of a research-based approaches to teacher education: Suggestions for future policies. *European Journal of Education*, 45(2), p. 331-344.
52. Tran, N., Charbonneau, J., Benitez, V.V., David, M.A., Tran, G., & Lacroix, G. (2016). Tran et al conference ISBT 2010.
53. Tynjälä, P., Häkkinen, P., & Hämäläinen, R. (2014). TEL@ work: Toward integration of theory and practice. *British Journal of Educational Technology*, 45(6), p. 990-1000.
54. Yakavets, N., Bridges, D. & Shamatov, D. 2017. 'On constructs and the construction of teachers' professional knowledge in a post-Soviet context', Journal of Education for Teaching: International Research and Pedagogy. 1-22.
55. Visser-Wijnveen, G. J., Van Driel, J. H., Van Der Rijst, R.M., Verloop, N. & Visser, A. (2010). The Ideal Research-teaching Nexus in the Eyes of Academics: Building Profiles. *Higher Education Research & Development*, 29 (2), p. 195–210.
56. Voogt, J., Westbroek, H., Handelzalts, A., Walraven, A., McKenney, S., Pieters, J., & De Vries, B. (2011). Teacher learning in collaborative curriculum design. *Teaching and teacher education*, 27(8), p. 1235-1244.
57. Åkerlind, G. S. (2007). Constraints on academics' potential for developing as a teacher. *Studies in higher education*, 32(1), p. 21-37.