**PROPOSAL FORM FOR AN ACADEMIC PROGRAMME**

**Science**

Approved for 2023-2027

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# 1. General information

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| **1.1. Curriculum title** | **Science** |
| **1.2. Curriculum developing team:** | |  |  | | --- | --- | | **Leader university** | **Member universities** | | M. Utemissov West Kazakhstan University | M. Kozybayev North Kazakhstan University | |  | Pavlodar Pedagogical University | |  | Altynsarin Arkalyk Pedagogical Institute | |  | Kh. Dosmukhamedov Atyrau University | |  | Ye.A. Buketov Karaganda University | |  | A. Baitursynov Kostanay regional University | |  | Shakarim University of Semey | |  | Sh.Ualikhanov Kokshetau University | |
| **1.3. Type of curriculum**  (in accordance with the National Qualifications Framework | BACHELOR'S DEGREE  Level 6 |
| **1.4. Total academic credits** | 240 academic credits |
| **1.5. Study mode** | full-time |
| **1.6. Expected program duration** | 4 years |
| **1.7. Short curriculum description** Curriculum goals and objectives | This Educational Programme (EP) "*Science*" 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) "*Science*" is a teacher education programme for pre-service teachers who wish to specialize in teaching natural science subjects in educational establishments (schools, colleges, high schools). EP consists of a pedagogical component 60 academic credits (incl. pedagogical practice), a compulsory component 56 academic credits, and a subject component 124 academic credits (incl. a final attestation of 8 academic credits).  Subject component consists of 3 modules: "Natural scientific picture of the world", "Applied and integrated sciences", "Research in the nature sciences".  EP “*Science”* is integrated, including the basics of biology, chemistry, physics, geography, mathematics, computer science, and ecology. It is aimed at building natural science competences and providing continuity of research skills in elementary and middle school. Pre-service teachers graduating from the EP are able to teach “*Natural science*” subject in 1-6 grades, and conduct elective courses on STEM, as well as manage STEM centers, STEM labs and STEAM projects.  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) | |

# 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.

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| **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**  1. 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. 2. 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. 3. 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**  1. 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. 2. 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**  1. 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. 2. 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. 3. 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 Outcomes** |
| * **Competence area for Cognitive skills development**  1. Pre-service teachers demonstrate strong academic and practical knowledge of physics (natural science); 2. Pre-service teachers have knowledge of the forms and methods of scientific knowledge, different ways of mastering the world around them, understand the role of science in society’s development; 3. Pre-service teachers understand scientific principles and the logic of school physics course’s development.  * **Competence area for Practical and research skills’ development**  1. Pre-service teachers have theoretical knowledges required to analyze problem situation, structure of the problem, algorithms for solving physical problems; 2. Pre-service teachers are able to conduct scientific research in chosen field of experimental and (or) theoretical physical research with the help of modern instrumentation and information technologies, taking into account domestic and foreign experience; 3. Pre-service teachers are able to apply modern methods of processing, analysis and synthesis of physical information in chosen field of physical research; 4. Pre-service teachers are able to use theoretical foundations of planning physical research in practice.  * **Competence area for Development of interdisciplinary interactions**  1. Pre-service teachers know and are able to apply basic mathematical concepts and operations in solving physical problems; 2. Pre-service teachers are able to implement analytical and technological solutions in experimental and theoretical physics; 3. Pre-service teachers are able to conduct integrated lessons with STEM learning elements; 4. Pre-service teachers are able to work in interdisciplinary teams and have the skills to apply scientific knowledge to solve social problems; 5. Pre-service teachers are able to use a variety of learning technologies and apply them in their diversity and appropriateness. |
| **3.3 Compulsory component: Competence Areas/ Learning Outcomes** |
| * **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**  1. 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. 2. 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. 3. 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**  1. 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. 2. 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. 3. 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. 4. 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

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| 4.1. Structure of the pedagogical component |
| The extent of the Pedagogical Component shall be 60 academic credits, including teaching practice. This component is common for all curricula in initial teacher education. The Pedagogical Component has been jointly created by all the involved universities in a collaborative design process. The component is flexible and leaves space for individual universities to implement it according to their specific situation and needs.  The overall structure of the pedagogical studies component:   |  |  | | --- | --- | | **Module name and main disciplines** | **Academic credits** | | **SUPPORTING LEARNERS AS INDIVIDUALS** | **17** | | Psychology in Education and Concepts of Interaction and Communication | 4 | | Educational Science and Key Theories of Learning | 3 | | Age and Physiological Features of the Development of Children | 3 | | Inclusive Educational Environment | 3 | | Teaching Planning and Individualization of Learning | 4 | | **TEACHING AND ASSESSMENT FOR LEARNING** | **9** | | Teaching Methods and Technologies | 5 | | Assessment and Development | 4 | | **TEACHER AS A REFLECTIVE PRACTITIONER** | **9** | | Pedagogical Research | 4 | | Research, Development and Innovation | 5 | | **TEACHER AS A FACILITATOR OF LEARNING (PEDAGOGICAL PRACTICE)** | **25** | | Introduction to the teaching profession (1st year pedagogical practice) | 2 | | Psychological and pedagogical assessment (2nd year pedagogical practice) | 2 | | Pedagogical approaches (3rd year pedagogical practice) | 6 | | Research and innovation in education (4th year pedagogical practice) | 15 | | **Total academic credits** | **60** |   The modules, courses, their learning outcomes, and relation to competence areas in more detail:   |  | | --- | | **Supporting learners as individuals 17 Academic credits** | | This module provides an overview of psychological theories, concepts, and models which help to understand the pupils’ individual needs and individual differences in learning. The module provides the pre-service teachers with competences to acknowledge individualization of learning and the diversity of learners in teaching. The module highlights the importance of enhancing learner well-being through creating and maintaining a psychologically safe educational environment. |  |  |  | | --- | --- | | Course title | **Psychology in Education and Concepts of Interaction and Communication** | | Component | Pedagogical component | | Cycle | Core disciplines | | Module | Supporting learners as individuals 17 Academic credits | | Academic credits | 4 | | Course / competence description | The purpose of this course is to improve the following areas of pedagogical competence:   * Competence area for pedagogy and didactics (1) * Competence area for interaction (3, 4)   Pre-service teachers are familiar with the modern psychological theories and models, as well as personality functioning and individual properties. They can apply the knowledge in their teaching in diverse educational contexts. Pre-service teachers support positive development of learners by fostering dialogue, interaction, and communication in the educational process. They are able to communicate, interact, and collaborate with pupils’ families as well as in various other partnership networks and create new relationships suitable for the development of their own pedagogical activity. | | Learning outcomes | **Pre-service teachers who demonstrate competence can:**   * understand the basic concepts and terms of educational psychology, and the main practical applications of psychological knowledge; * understand the patterns, facts, and phenomena of cognitive and personal development of a person in the processes of education and upbringing; * apply an integrated approach to design, implementation, evaluation, and development of educational environments; * understand the concept of continuous learning as a part of the process of cognitive and personal development of a person. * apply basic communication and interaction concepts and theories at the individual, community, and network levels; * select the methods of communication and interaction that are most appropriate to facilitate learning in various forms (offline, online, blended, hybrid); * recognize the patterns of group dynamics and act in ways that promote community development and well-being. |  |  |  | | --- | --- | | Course title | **Educational Science and Key Theories of Learning** | | Component | Pedagogical component | | Cycle | Core disciplines | | Module | Supporting learners as individuals 17 Academic credits | | Academic credits | 3 | | Course / competence description | The purpose of this course is to improve the following areas of pedagogical competence:   * Competence area for pedagogy and didactics (1, 2)   Pre-service teachers explore the basics of educational science such as the conceptions of man leading to various learning theories and pedagogical models. Based on their understanding of the theoretical concepts, pre-service teachers are able to make appropriate pedagogical choices for various learning situations. | | Learning outcomes | **Pre-service teachers who demonstrate competence can:**   * distinguish between concepts of human and their importance for understanding learning and the design of an educational process; * differentiate between learning theories and their importance for understanding learning and the design of an educational process; * apply learning theories and pedagogical models suitable for versatile learning processes. |  |  |  | | --- | --- | | Course title | **Age and Physiological Features of the Development of Children** | | Component | Pedagogical component | | Cycle | Core disciplines | | Module | Supporting learners as individuals 17 Academic credits | | Academic credits | 3 | | Course/ competence description | The purpose of this course is to improve the following areas of pedagogical competence:   * Competence area for pedagogy and didactics (2)   Pre-service teachers are familiar with the formation of psyche, its functioning, and the patterns of development. Pre-service teachers can observe the development of their students, and accordingly, plan and implement age-appropriate learning processes considering individual needs of students. Pre-service teachers act creatively and appropriately in different situations and support learning and well-being of the learners. | | Learning outcomes | **Pre-service teachers who demonstrate competence can:**   * recognize the individual starting points of different students, their learning potential and specific support needs; * consider the individual needs of their students for specific support, guidance, teaching and assessment; * introduce various methodological solutions for inclusion and for providing specific support. |  |  |  | | --- | --- | | Course title | **Inclusive Educational Environment** | | Component | Pedagogical component | | Cycle | Core disciplines | | Module | Supporting learners as individuals 17 Academic credits | | Academic credits | 3 | | Course / competence description | The purpose of this course is to improve the following areas of pedagogical competence:   * Competence area for pedagogy and didactics (2) * Competence area for teachers´ work environment (6, 7)   Pre-service teachers have the ability to consider the diversity of learners and identify their individual needs in the learning / teaching process. Pre-service teachers support students’ learning and inclusion in the educational process by using suitable ICT, teaching and assistive technologies. Pre-service teachers maintain students’ well-being from psychological and ethical perspective in collaboration with the community (teachers, students, parents/guardians) considering the context of students’ life and learning. | | Learning outcomes | **Pre-service teachers who demonstrate competence can:**   * identify the individual educational needs that affect participation and learning in a diverse group of students; * use ICT and assistive technologies to support students’ learning and inclusion in the educational process. * teach values and attitudes beneficial to collaboration and inclusivity; * support collaboration in the community (teachers, students, parents/guardians). |  |  |  | | --- | --- | | Course title | **Teaching Planning and Individualization of Learning** | | Component | Pedagogical component | | Cycle | Core disciplines | | Module | Supporting learners as individuals 17 Academic credits | | Academic credits | 4 | | Course / competence description | The purpose of this course is to improve the following areas of pedagogical competence:   * Competence area for pedagogy and didactics (1, 2)   Pre-service teachers are familiar with the curriculum in their area of teaching and the guiding pedagogical principles and cross-cutting development themes of a specific level of education, such as entrepreneurship and sustainable development. Pre-service teachers possess the necessary skills of individualization of teaching, considering the diversity of students and their inclusion to the learning process, as well as the use of teaching technologies, based on pedagogical and independent research. | | Learning outcomes | **Pre-service teachers who demonstrate competence can:**   * understand the main principles and requirements of the curriculum in their area of teaching and apply them in planning and conducting educational activities; * identify factors and conditions that affect students’ learning; * apply in practice the principles of inclusion as well as individualized teaching and guidance (adapting curricula, developing differentiated lessons) by considering the needs of the students and support the development of their personality and self-esteem, including career guidance. |  |  | | --- | | **Teaching and assessment for learning 9 Academic credits** | | This module provides the teacher students with competencies to carry out interactive and student-centered teaching and assessment aligned with learning objectives. The module highlights the use of digital tools and technologies and the ability to update and apply teaching technologies in the context of ongoing changes in the society and the educational environment. This module supports the pre-service teachers’ competence to communicate and collaborate in various partnership networks to enhance own pedagogical activity. |  |  |  | | --- | --- | | Course title | **Teaching Methods and Technologies** | | Component | Pedagogical component | | Cycle | Core 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 | Core disciplines | | Module | Teacher as a reflective practitioner 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 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 | Core disciplines | | Module | Teacher as a reflective practitioner 9 Academic credits | | Academic credits | 5 | | Course / competence description | The purpose of this course is to improve the following areas of pedagogical competence:   * Competence area for professional development (8, 9) * Competence area for interaction (5)   To stay up-to-date and be able to continuously develop themselves and their work, pre-service teachers acquire new research-based knowledge and conduct practice-based research in an ethical manner in various networks concerning the development of education and teacher profession, innovative approaches to learning, as well as learning and guidance of students. Pre-service teachers adopt development-oriented mindset and are able to develop, update and apply innovative teaching approaches and technologies in the context of ongoing changes in society and the educational environment.  Pre-service teachers design a small-scale research project to familiarize themselves with research-based development of their work as teachers. They identify their research topic/questions, conduct the literature review and design the methodology for the data collection and analysis, including ethical aspects of research. After the course, pre-service teachers are able to develop and update their pedagogical activities based on ethically conducted research and development and carry out or participate in research projects. They are also able to present their research and development results using various professional forms and channels. | | Learning outcomes | **Pre-service teachers who demonstrate competence can:**   * evaluate their own professional activities and work environment to find areas for improvement; * apply a research-based approach to their professional activities and carry out independent research work; * consider and apply ethical aspects of research procedures; * apply critical thinking in data collection and utilization for the development of initial teacher education; * participate in scientific design research and / or develop cooperation between universities and stakeholders; * document their own research activities and present the results using various forms of communication. |  |  |  | | --- | --- | | **Teacher as a facilitator of learning (Pedagogical practice) 25 Academic credits** | | | This module focuses on the transformation of theoretical knowledge into practical skills through two pedagogical practice periods/courses, as well as the formation of a teacher’s professional identity that meets the requirements of teaching profession today and in the future. During the module, pre-service teachers also establish practice-based research skills promoting the continuous process of professional growth.  Pedagogical practice is organized in four periods/courses, one per study year, and each having their specific learning outcomes where the competences of pre-service teachers are progressively deepened from orientation and observation to designing educational processes and conducting own lessons, and developing own work environment through practice-based research activities.  All practice periods have some prerequisites and pre-service teachers must have completed a certain amount of subject and/or pedagogical studies before they can conduct their pedagogical practice, the number of credits may vary between the faculties and/or educational programmes. |  |  |  | | --- | --- | | Course title | **Introduction to the teaching profession (1st year pedagogical practice)** | | Component | Pedagogical component | | Cycle | Core disciplines | | Module | Teacher as a facilitator of learning 25 Academic credits | | Academic credits | 2 | | Course / competence description | The purpose of this course is to improve the following areas of pedagogical competence:   * competence area for pedagogy and didactics​ (1, 2) * competence area for interaction (3, 4, 5) * competence area for teachers´ work environment (6, 7) * competence area for professional development (8, 9, 10)   Pre-service teachers familiarize themselves with the educational process and the context of the educational institution and its adaptation to the conditions of future professional activity.  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 teachers** **who demonstrate competence can:**   * understand the regulatory and legislative framework of the education system of the Republic of Kazakhstan, and the documents regulating educational institutions; * distinguish the main documents for maintaining school records (work plans of the educational institution, Kundelik electronic diary, short-term, medium-term and long-term lesson planning, etc.); * comprehend the theoretical and applied aspects of pedagogy and educational psychology in the educational process at school considering social, age, psychophysical and individual characteristics of students, as well as their special educational needs. |  |  |  | | --- | --- | | Course title | **Psychological and pedagogical assessment (2nd year pedagogical practice)** | | Component | Pedagogical component | | Cycle | Core disciplines | | Module | Teacher as a facilitator of learning 25 Academic credits | | Academic credits | 2 | | Course / competence description | The purpose of this course is to improve the following areas of pedagogical competence:   * competence area for pedagogy and didactics​ (1, 2) * competence area for interaction (3, 4, 5) * competence area for teachers´ work environment (6, 7) * competence area for professional development (8, 9, 10)   Pre-service teachers familiarize themselves with the features of the integral pedagogical process of an educational institution and the formation of analytical-reflexive, research, design, and other skills in the field of psychological and pedagogical support of the educational process.  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 teachers** **who 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 teachers** **who demonstrate competence can:**   * + design and organize independently a constructive and inclusive educational process to test hypothesis, make pedagogical experimentations and/or collect data according to their research plan;   + apply innovative teaching and learning strategies, and methods and tools for designing, conducting and assessing an educational process and/or extracurricular activities based on long-term, medium-term, short-term lesson / lesson plans, and educational and out-of-class activities in the subject;   + analyze the results of their experimentations and/or data collected and draw conclusions;   + document their research activities and present the results in a professional manner using various forms of communication;   + evaluate their professional activities in relation to the activities of the organization and through experimentations and practice-based research create ideas for improvement of their work and their work environment. | |
| 4.2 Structure of the subject component |
| |  |  | | --- | --- | | **Module name and main disciplines** | **Academic credits** | | **NATURAL SCIENTIFIC PICTURE OF THE WORLD** | **42** | | **University Component** | **25** | | Biology and biodiversity of living organisms | 10 | | Environmental Chemistry | 6 | | Physics for Science and Engineering | 9 | | **Optional Component** | **17** | | Science of nature | 6 | | General geography | | Applied Mathematics | 5 | | Mathematical statistics | | Programming in the natural sciences | 6 | | Basics of algorithmization and programming | | **APPLIED AND INTEGRATED SCIENCES** | **36** | | **University Component** | **11** | | Systematization of natural science knowledge | 5 | | Modeling of processes of animate and inanimate nature | 6 | | **Optional Component** | **25** | | Substances and materials | 5 | | Science, technology and society | | Energy and motion | 5 | | Biophysics and bioinformatics | | Green technology | 5 | | Nootechnology | | GIS in geographical research | 5 | | Geoinformation modeling of natural resources | | Educational mechatronics and robotics | 5 | | Introduction to Robotics | | **RESEARCH AND PEDAGOGY IN NATURE SCIENCES** | **38** | | **University Component** | **15** | | Methods of teaching science disciplines | 6 | | Conceptual learning of natural science | 5 | | Educational (field) practice in biology and the methodology of its implementation | 2 | | Educational (field) practice in geography and the methodology of its implementation at school | 2 | | **Optional Component** | **23** | | Study of STEM Teaching Practices | 6 | | Designing of STEM - education | | Research and project activities in nature sciences | 6 | | Experimental biology | | Methods of experimental research | 6 | | Organization of scientific activities | | Academic writing | 5 | | Content-Language Integrated Learning in Nature Science | | **FINAL ATTESTATION** | **8** | | **Total academic credits** | **124** | |
| |  | | --- | | **Natural science picture of the world 40 academic credits** | | The moduleprovides pre-service teachers with advanced knowledge, abilities, skills in the field of natural sciences, allows them to understand the diversity of the world, the relationship and causes of natural phenomena and the processes occurring in animate and inanimate nature. The module includes fundamental disciplines of natural sciences, forming complete understanding of pre-service teachers in natural-science picture of the world. The module also supports the professional development of pre-service teachers in a variety of learning environments, shaping their sound scientific knowledge in the subject-specific area. |  |  |  | | --- | --- | | Course title | **Biology and Biodiversity of Living Organisms** | | Component | Subject component, University component | | Cycle | Major disciplines | | Module | Natural science picture of the world 40 academic credits | | Academic credits | 10 | | Course/ Competence description | The purpose of this course is to improve the following areas of subject competences:   * Competence area for Cognitive skills development (1) * Competence area for Practical and research skills’ development (5,6) * Competence area for Development of interdisciplinary interactions (9,10)     During the course pre-service teachers gain knowledge of natural-science disciplines of the general biological cycle. They obtain basic knowledge, abilities and skills in biology of living organisms, and study basic laws and concepts of biodiversity, theoretical principles of biological systematics, ecological features of different systematic groups’ representatives, and their role in biosphere. Pre-service teachers form biological knowledge as a component of complete scientific picture of the world | | Learning outcomes | **Pre-service teachers demonstrating competence can:**   * have basic knowledge of major laws and modern achievements of botany, zoology, physiology, anthropology; * substantiate the role of evolutionary idea in biological worldview; * have practical skills in classifying biodiversity of living organisms; * describe specific features of organization of different groups of living organisms; * calculate biodiversity indices and develop biodiversity models; * apply knowledge of the principles of cellular organization of biological objects, biophysical and biochemical foundations, membrane processes and molecular mechanisms of life activity; * analyze and evaluate different hypotheses about the essence, origin of life and humans; * synthesize acquired knowledge and skills to plan and conduct research on objects and physiological processes of plants, animals, and humans; * apply in practice basic professional knowledge in biology. |      |  |  | | --- | --- | | Course title | **Environmental Chemistry** | | Component | Subject component, University component | | Cycle | Major disciplines | | Module | Natural science picture of the world 40 academic credits | | Academic credits | 5 | | Course/ Competence description | The purpose of this course is to improve the following areas of subject competences:   * Competence area for Cognitive skills development (1,2,3) * Competence area for Practical and research skills’ development (5,7) * Competence area for Development of interdisciplinary interactions (10, 11)   During the course pre-service teachers obtain knowledge of basic principles of environmental chemistry and their actions in local and global scales. During study process pre-service teachers discuss and predict the effects of environment pollution, apply knowledge in physics, chemistry, Earth sciences and biology areas to scientifically substantiate the processes, occurring in the environment. Pre-service teachers analyze the main physical and chemical processes, occurring with participation of pollutants in atmosphere, hydrosphere and soil, form a civic position and are responsible for their decisions and actions in the context of sustainable development. | | Learning outcomes | **Pre-service teachers demonstrating competence can:**   * discuss the role of scientific knowledges’ development in solving the problems of modern society; * form environmental literacy, through the application of knowledge in areas related to measures for the prevention and elimination of damage to nature caused by industrial and economic activities; * document sources of information using an accepted citation style; * form own moral and civic position in the context of sustainable development; * predict possible ways of migration and transformation of chemical compounds in environmental objects and their impact on ecosystems; * assess anthropogenic changes in environmental objects. |      |  |  | | --- | --- | | Course title | **Physics for Science and Engineering** | | Component | Subject component, University component | | Cycle | Major disciplines | | Module | Natural science picture of the world 40 academic credits | | Academic credits | 10 | | Course/ Competence description | The purpose of this course is to improve the following areas of subject competences:   * Competence area for Cognitive skills development (1,2,3) * Competence area for Practical and research skills’ development (5,7) * Competence area for Development of interdisciplinary interactions (10, 11)   The course provides pre-service teachers a practical study of nature laws, properties and structure of matter, and the laws of its motion. The course is the basis for a large number of general engineering and special disciplines, stipulated by the programmes of higher educational institutions. The course provides pre-service teachers basic knowledge of fundamental physical laws through practical experiments paying special attention to the essence of the laws themselves and the phenomena they describe. | | Learning outcomes | **Pre-service teachers demonstrating competence can:**   * explain the meaning of major physical concepts and laws; * understand the theories, determining the structure of matter; * analyze the laws underlying modern physical research methods; * describe contributions of great scientists to the formation of the modern natural-science picture of the world; * use knowledge of physical laws and theories to explain the structure of matter, forces and interactions in nature, the origin of fields; * explain the applied significance of the most important achievements in physics for: the development of energy, transport, communications, medicine, environmental protection; |      |  |  | | --- | --- | | Course title | **Science of nature** | | Component | Subject component, Optional component | | Cycle | Major disciplines | | Module | Natural science picture of the world 40 academic credits | | Academic credits | 5 | | Course/ Competence description | The purpose of this course is to improve the following areas of subject competences:   * Competence area for Cognitive skills development (1,2,3) * Competence area for Practical and research skills’ development (5,7) * Competence area for Development of interdisciplinary interactions (10, 11,13)   The course promotes integrity of pre-service teachers' natural science attitudes and perceptions. During the course pre-service teachers examine fundamental laws, regularities, theories and concepts, principles, and major achievements of natural sciences. Pre-service teachers are able to understand the integrity of natural scientific picture of the world, to evaluate and analyze the laws of nature and to promote their practical use for human benefit. | | Learning outcomes | **Pre-service teachers demonstrating competence can:**   * explain the fundamental, natural laws, concepts, principles, and processes of nature in spatial and temporal development; * identify cause-and-effect relations between phenomena and processes occurring in geographical envelope; * classify the laws of nature, taking into account the knowledge of natural sciences (physics, chemistry, biology, geography, ecology) * use the achievements of natural science in the light of human interest; * assess and analyze [main regularities](https://www.multitran.com/m.exe?s=main+regularities&l1=1&l2=2) of natural sciences. |  |  |  | | --- | --- | | Course title | **General geography** | | Component | Subject component, Optional component | | Cycle | Major disciplines | | Module | Natural science picture of the world 40 academic credits | | Academic credits | 5 | | Course/ Competence description | The purpose of this course is to improve the following areas of subject competences:   * Competence area for Cognitive skills development (1,2,3) * Competence area for Practical and research skills’ development (5,7) * Competence area for Development of interdisciplinary interactions (10, 11)   The course facilitates pre-service teachers' acquisition of scientific knowledge in the field of physical geography and ecology. Pre-service teachers examine general laws of structure, functioning and development of the geographical envelope in unity and interaction with the surrounding space at different levels of its organization. Pre-service teachers understand main regularities of Earth’s nature and interconnection of natural phenomena, distinguish the laws of evolution, integrity, rhythm, substance and energy cycles in geographical envelope as well as assess Earth’s spheres and their combination on the biota, taking into account environmental conditions. | | Learning outcomes | **Pre-service teachers demonstrating competence can:**   * demonstrate fundamental knowledge and understanding in the study of the Earth's geographical envelope; * classify the main regularities of the Earth's nature, the laws of evolution in the geographical shell; * systematize knowledge of geographical objects, processes and phenomena using up-to-date scientific data; * model geographic, environmental phenomena and processes in the environment; * analyze the results of the interaction of natural components at different levels of its organization. |  |  |  | | --- | --- | | Course title | **Applied Mathematics** | | Component | Subject component, Optional component | | Cycle | Major disciplines | | Module | Natural science picture of the world 40 academic credits | | Academic credits | 5 | | Course/ Competence description | The purpose of this course is to improve the following areas of subject competences:   * Competence area for Cognitive skills development (1,2,3) * Competence area for Practical and research skills’ development (5,7) * Competence area for Development of interdisciplinary interactions (10, 11)   During the course, pre-service teachers learn the mathematical apparatus allowing to build mathematical models in the field of natural sciences, the formation of mathematical culture, critical thinking, and the disclosure of the specificity of mathematics as a way of knowledge of the world. Pre-service teachers learn the principles of mathematical modeling and form their basic skills in analytical activity. | | Learning outcomes | **Pre-service teachers demonstrating competence can:**   * solve applied problems by means of mathematical methods; * apply mathematical apparatus for building kinetic models of biological processes; * choose the method of mathematical model construction * analyze collected statistical data, compare facts, give a general description of the facts, and explain the patterns identified using statistical methods |  |  |  | | --- | --- | | Course title | **Mathematical statistics** | | Component | Subject component, Optional component | | Cycle | Major disciplines | | Module | Natural science picture of the world 40 academic credits | | Academic credits | 5 | | Course/ Competence description | The purpose of this course is to improve the following areas of subject competences:   * Competence area for Cognitive skills development (1,2,3) * Competence area for Practical and research skills’ development (5,7) * Competence area for Development of interdisciplinary interactions (10, 11)   The purpose of the course is to provide pre-service teachers with theoretical knowledge and practical skills in the basics of probability theory and mathematical statistics as the basic mathematical apparatus for building models of random phenomena. Pre-service teachers learn the methods of mathematical modeling and analysis of such phenomena. | | Learning outcomes | **Pre-service teachers demonstrating competence can:**   * Apply standard methods and models to solve probability and statistical problems * Use calculation formulas, tables, graphs when solving statistical problems * apply modern applied software packages for multivariate statistical analysis. |  |  |  | | --- | --- | | Course title | **Programming in natural sciences** | | Component | Subject component, Optional component | | Cycle | Major disciplines | | Module | Natural science picture of the world 40 academic credits | | Academic credits | 6 | | Course/ Competence description | The purpose of this course is to improve the following areas of subject competences:   * Competence area for Cognitive skills development (1,2,3) * Competence area for Practical and research skills’ development (5,7) * Competence area for Development of interdisciplinary interactions (10, 11,13)   During the course, pre-service teachers form their ability to master the methods of using software tools to solve practical problems. They also gain knowledge and skills in programming with a high-level language, as well as independent acquisition with the help of information technology. | | Learning outcomes | **Pre-service teachers demonstrating competence can:**   * use technologies and methods for developing algorithms and programs; * use syntax and rules of high-level language, basic techniques of using software tools; * use existing application software packages; * operate with basic programming methods and technologies; * create an algorithm for solving problems in the form of a block diagram and write it using one of the programming languages. |  |  |  | | --- | --- | | Course title | **Basics of algorithmization and programming** | | Component | Subject component, Optional component | | Cycle | Major disciplines | | Module | Natural science picture of the world 40 academic credits | | Academic credits | 6 | | Course/ Competence description | The purpose of this course is to improve the following areas of subject competences:   * Competence area for Cognitive skills development (1,2,3) * Competence area for Practical and research skills’ development (5,7) * Competence area for Development of interdisciplinary interactions (10, 11,13)   During the course, pre-service teachers get acquainted with the basic principles of algorithmization, and form their practical skills in the field of procedural and object programming methods. During the course, pre-service teachers also acquire skills in the design and programming of computer applications. | | Learning outcomes | **Pre-service teachers demonstrating competence can:**   * develop applied software products using modern development tools and programming languages with the use of modern information technologies; * develop algorithms for solving applied tasks on the basis of typical algorithm structures * Use programs for graphic representation of algorithms. Work in a programming environment. * Implement constructed algorithms in the form of programs in a specific programming language. |  |  | | --- | | **Applied and integrated sciences 36 academic credits** | | The module provides pre-service teachers with understanding of the principles of systematization of diversity of objects and processes in nature. Pre-service teachers learn such disciplines as biology, chemistry, physics, computer science and mathematics, and geography which allows them to explain applied significance of the most important achievements in the field of natural sciences, propose hypotheses and ways of proofing them, and draw conclusions based on experimental data using IT-technology. Pre-service teachers obtain competences that allow them to form an educational environment taking into account the diversity of learners and to use interdisciplinary relationships as a means of strengthening the unity of learning during the study of different sections of natural science. |  |  |  | | --- | --- | | Course title | **Systematization of natural science knowledge** | | Component | Subject component, University component | | Cycle | Major disciplines | | Module | Applied and integrated sciences 36 academic credits | | Academic credits | 5 | | Course/ Competence description | The purpose of this course is to improve the following areas of subject competences:   * Competence area for Cognitive skills development (3) * Competence area for Practical and research skills’ development (5,6) * Competence area for Development of interdisciplinary interactions (10, 11,13)   The course is necessary for pre-service teachers to systematize physical, chemical, biological knowledge, including modern information about the structure of scientific knowledge of its levels, forms and methods, as well as analysis of the regularities and priority of its development, taking into account the practical needs of society. Pre-service teachers develop a deep understanding of the relationship of the system of common, for a cycle of natural science disciplines, laws, concepts, theories, as well as the systematic inclusion of the content of the related disciplines, forming their the readiness of the future teacher to find ways to implement interdisciplinary links in school. Pre-service teachers learn to implement methodological analysis of fundamental concepts, define the system of scientific knowledge, and construct models reflecting the principles of organization of living matter. They also learn to identify the relationship "nature-human-society", solve problems of interdisciplinary content, and work on interdisciplinary projects allowing pre-service teachers to acquire practical skills in systematic methodological formation of the scientific worldview. | | Learning outcomes | **Pre-service teachers demonstrating competence can:**   * work with natural science information, master search techniques, * identify the semantic basis and assess the reliability of information * make hypotheses and suggest ways to test them; * draw conclusions from experimental data in science; * explain the applications of science and discuss major advances in science; * reveal cause-and-effect relationships between natural objects and phenomena; * systematize and summarize interdisciplinary knowledge, connect with the development of technology and new advances in science; * construct structural and logical schemes on the disciplines of the natural science cycle; * model objects and phenomena of the material world. |      |  |  | | --- | --- | | Course title | **Modeling processes of animate and inanimate nature** | | Component | Subject component, University component | | Cycle | Major disciplines | | Module | Applied and integrated sciences 36 academic credits | | Academic credits | 6 | | Course/ Competence description | The purpose of this course is to improve the following areas of subject competences:   * Competence area for Cognitive skills development (3) * Competence area for Practical and research skills’ development (5,6,7) * Competence area for Development of interdisciplinary interactions (10, 11)   During the course, pre-service teachers examine the use of modeling of natural processes and phenomena to study the relationships between components of living and nonliving nature. They also conduct computer modeling of various systems using interdisciplinary research methodology (STEAM-technology). During the course, pre-service teachers develop their skills in providing a qualitative description of the problem into a quantitative one, and interdisciplinary competences for setting and solving new problems. | | Learning outcomes | **Pre-service teachers demonstrating competence can:**   * apply positive and negative feedback mechanisms, identify the consequences of processes in living and non-living nature to understand complex systems * have practical skills in using various models to describe complex systems * model processes in non-living nature (mountain formation, weathering, circulation of substances in nature, etc.) * model the transport of nutrients in living organisms, the process of interrelations in the food chain, the process of respiration, digestion and excretion in living organisms * demonstrate skills in modeling plant and animal cells, organs and organ systems * competently conduct a computer experiment, and analyze the results of modeling; * correctly determine the functional dependencies between the variables for each solution variant and system inputs, construct a graph of the computer study; |  |  |  | | --- | --- | | Course title | **Substances and materials** | | Component | Subject component, Optional component | | Cycle | Major disciplines | | Module | Applied and integrated sciences 36 academic credits | | Academic credits | 5 | | Course/ Competence description | The purpose of this course is to improve the following areas of subject competences:   * Competence area for Cognitive skills development (3) * Competence area for Practical and research skills’ development (5,6,7) * Competence area for Development of interdisciplinary interactions (10, 11, 13)   During the course, pre-service teachers conduct integrated study of the diversity, formation and production of substances and materials found in life. They also build their understanding and systematization of data on the structure and properties of substances to study physical and chemical phenomena in nature, and to assess the impact of substances on the environment. | | Learning outcomes | **Pre-service teachers demonstrating competence can:**   * determine the regularities of formation and production of substances in the living and nonliving nature * analyze the advantages and disadvantages of natural and artificial materials * demonstrate practical skills of work with experimental and calculated data in the study of various substances and materials occurring in nature and produced artificially. |      |  |  | | --- | --- | | Course title | **Science, Technology, and Society** | | Component | Subject component, Optional component | | Cycle | Major disciplines | | Module | Applied and integrated sciences 36 academic credits | | Academic credits | 5 | | Course/ Competence description | The purpose of this course is to improve the following areas of subject competences:   * Competence area for Cognitive skills development (3) * Competence area for Practical and research skills’ development (5,7,8) * Competence area for Development of interdisciplinary interactions (10, 11)   During the course, pre-service teachers explore the interaction between science, technology and social, cultural, political and economic contexts. This interdisciplinary course engages pre-service teachers in confronting realities in society including required topics on the misuse of natural resources, climate change, and the ecological environment caused by science and new technologies. Pre-service teachers also analyze personal, societal, and global aspects of lives in lecture and with practical exercises. As a result of the course, pre-service teachers are able to demonstrate ethical decision-making in the modernization of scientific and technological progress. | | Learning outcomes | **Pre-service teachers demonstrating competence can:**   * identify and understand the value of healthy lifestyle for the overall and sustainable development of society and environment; * evaluate the impact of science and technology on society and the environment, and their role in public infrastructure * analyze the importance of science and technology for environmental preservation and development of the Kazakhstani nation and the entire world * offer innovative and creative solutions to contemporary problems, guided by ethical standards * participate in research on the impact of social media and the information age on life. |  |  |  | | --- | --- | | Course title | **Energy and motion** | | Component | Subject component, Optional component | | Cycle | Major disciplines | | Module | Applied and integrated sciences 36 academic credits | | Academic credits | 5 | | Course/ Competence description | The purpose of this course is to improve the following areas of subject competences:   * Competence area for Cognitive skills development (3) * Competence area for Practical and research skills’ development (5,6,7) * Competence area for Development of interdisciplinary interactions (8,9,10)   During the course, pre-service teachers conduct in-depth study of types of energy and motion, patterns of energy interconversion in living and nonliving nature, and energy of motion. They analyze the sources of energy considering motion as the basis of energy. They also conduct small projects to study the influence of various factors on the processes of release and absorption of energy, and the mechanisms of energy transformation. | | Learning outcomes | **Pre-service teachers demonstrating competence can:**   * demonstrate basic knowledge of energy concepts and processes to study energy transformation in animate and inanimate nature * use the system science knowledge in studying the energy of motion * analyze the mechanisms of energy generation and transformation, laws of motion * apply digital technologies in modeling the musculoskeletal system. |      |  |  | | --- | --- | | Course title | **Biophysics and Bioinformatics** | | Component | Subject component, Optional component | | Cycle | Major disciplines | | Module | Applied and integrated sciences 36 academic credits | | Academic credits | 5 | | Course/ Competence description | The purpose of this course is to improve the following areas of subject competences:   * Competence area for Cognitive skills development (2) * Competence area for Practical and research skills’ development (5,6,7) * Competence area for Development of interdisciplinary interactions (8, 10, 11, 13)   During the course, pre-service teachers focus on the use of theoretical knowledge and practical skills in biology in integration with physics and computer science. During practical and laboratory classes pre-service teachers analyze the impact of natural phenomena (photobiological, electrical, sound, etc.) on living organisms, and learn the principles of bioinformatics to reveal the essence of biological phenomena. While studying this course, pre-service teachers form their interdisciplinary competences (BTEAM) for creative problem solving, as well as develop their practical skills in working with databases of biological data (DNA, RNA, proteins). | | Learning outcomes | **Pre-service teachers demonstrating competence can:**   * analyze the physical basis for studying biological systems * assess the influence of electromagnetic and sound waves on living organisms * apply the principles of BTEAM-technology in the study of photobiological processes, cell ultrastructure and cell membrane, etc. * use modern methods for obtaining, analyzing, storing, organizing and visualizing biological data * analyze advantages and disadvantages of using computational systems and tools for solving biological problems * demonstrate skills in using the most important databases and software to extract, analyze, and interpret data at the DNA, RNA, and protein levels; |  |  |  | | --- | --- | | Course title | **Green technology** | | Component | Subject component, Optional component | | Cycle | Major disciplines | | Module | Applied and integrated sciences 36 academic credits | | Academic credits | 5 | | Course/ Competence description | The purpose of this course is to improve the following areas of subject competences:   * Competence area for Cognitive skills development (3) * Competence area for Practical and research skills’ development (5,6) * Competence area for Development of interdisciplinary interactions (10, 11, 13)   This course is closely related to applied ecology and green economics. Pre-service teachers gain knowledge of the application of technologies aimed at the conservation of nature in the environmental, economic, technological and innovative spheres. Pre-service teachers justify the adoption of measures that solve the issues of waste recycling and compare different methods of alternative energy sources as well as propose effective measures to increase the productivity of natural resources and ecosystem approach to the planning of economic activities. They also develop investment programmes to restore key ecosystems based on clusters of new technologies, integrated closed-loop production systems, or innovative approaches in the "third industrial revolution," and propose alternative energy technologies. | | Learning outcomes | **Pre-service teachers demonstrating competence can:**   * teach school students to propose measures that contribute to sustainable development; * justify proposals for preventing the depletion of resources; * encourage school students to participate in the implementation of green infrastructure; * prepare school students to justify water and land reclamation methods using modern technologies; * characterize renewable energy sources and analyze innovations that replace old ways of producing energy that are detrimental to the environment; * involve school students in development of measures on reduction the negative impact on environment by reducing waste, increasing energy efficiency, etc. |      |  |  | | --- | --- | | Course title | **Nootechnology** | | Component | Subject component, Optional component | | Cycle | Major disciplines | | Module | Applied and integrated sciences 36 academic credits | | Academic credits | 5 | | Course/ Competence description | The purpose of this course is to improve the following areas of subject competences:   * Competence area for Cognitive skills development (3) * Competence area for Practical and research skills’ development (5,6) * Competence area for Development of interdisciplinary interactions (10, 11, 13)   Nootechnology course is based on the modern direction of ecology - noosphere and modern technologies to ensure safe life for mankind. Pre-service teachers gain knowledge of industrial, information and communication, agrarian innovative environmental technologies aimed at providing all mankind with products and products in the right quantities without damage to the biosphere. Pre-service teachers compare and propose elements of smart home technology aimed at the efficiency and economy of resource consumption, the use of energy-efficient methods. They also justify the use of methods for recycling waste and reuse of waste raw materials, aimed at creating effective ways to clean up natural resources. | | Learning outcomes | **Pre-service teachers demonstrating competence can:**   * give an idea of the major sources of technogenic impact on the environment; * involve school students into discussions of the application of technologies related to the functioning of living organisms: biomedical technology, biosafety and bioethics, biomaterial science, biosensor systems; * teach school students how to use new devices and equipment when creating a smart home: central control controller, climate system, light control and energy consumer switching systems, security and safety systems including smart vacuum cleaner, smart tray, smart ventilation, smart lock, etc; * teach school students how to propose methods of solving problems with air emissions or soil pollution, waste disposal based on environmentally friendly and waste-free technologies, and how to create new materials from biological waste; * justify the minimization of anthropogenic impact on nature with the introduction of new energy-saving technologies. |      |  |  | | --- | --- | | Course title | **GIS in geographical research** | | Component | Subject component, Optional component | | Cycle | Major disciplines | | Module | Applied and integrated sciences 36 academic credits | | Academic credits | 5 | | Course/ Competence description | The purpose of this course is to improve the following areas of subject competences:   * Competence area for Cognitive skills development (3) * Competence area for Practical and research skills’ development (4,5,6,7) * Competence area for Development of interdisciplinary interactions (10, 11)   During the course, pre-service teachers examine modern computer programs and GIS to obtain new information and knowledge in order to solve applied problems. Pre-service teachers learn to use modern GIS in geography research. They are able to design, present, defend and disseminate the results of research activities and become proficient in various computer programs for conducting geographic research, and develop their skills in writing research papers. | | Learning outcomes | **Pre-service teachers demonstrating competence can:**   * describe digital topographic and thematic information for its spatial analysis; * apply various spatial data in practice using geographic information methods and technologies; * gain experience in visualizing, compiling and designing electronic geographic maps; * perform experiments in predicting and modeling various geographic processes under study; * process spatial component data to calculate metrics, build "relief" of any phenomenon, etc. |      |  |  | | --- | --- | | Course title | **Geoinformation modeling of natural resources** | | Component | Subject component, Optional component | | Cycle | Major disciplines | | Module | Applied and integrated sciences 36 academic credits | | Academic credits | 5 | | Course/ Competence description | The purpose of this course is to improve the following areas of subject competences:   * Competence area for Cognitive skills development (3) * Competence area for Practical and research skills’ development (4,5,6,7) * Competence area for Development of interdisciplinary interactions (10, 11)   Pre-service teachers study the role of geographic information modeling in providing effective management and planning of regional nature management. They also examine the issues of actualization of geoinformation modeling for regional nature management planning. Pre-service teachers are able to describe the scientific directions of research geoinformation modeling, natural resource and geoinformation model of the region, and to study and analyze the composition and relationships of different objects and phenomena by creating digital map products | | Learning outcomes | **Pre-service teachers demonstrating competence can:**   * analyze natural resource data integrated from various sources in the region; * structure geoinformation models as a tool for integrating heterogeneous data on natural resources; * create an information basis for analysis and evaluation of the current state of natural resources of the region and planning their future use; * model and give an expert assessment of indicators of the state of natural resources in the region. |      |  |  | | --- | --- | | Course title | **Educational mechatronics and robotics** | | Component | Subject component, Optional component | | Cycle | Major disciplines | | Module | Applied and integrated sciences 36 academic credits | | Academic credits | 5 | | Course/ Competence description | The purpose of this course is to improve the following areas of subject competences:   * Competence area for Cognitive skills development (1,2,3) * Competence area for Practical and research skills’ development (5,7) * Competence area for Development of interdisciplinary interactions (11,12)   During the course, pre-service teachers learn to use mechatronic and robotics control systems that aim to plan and generate commands to change position, implement movements with given kinematic characteristics and generate commands to perform actions with defined forces. Pre-service teachers develop their knowledge in modern control technologies using artificial intelligence methods. They also apply techniques of parallel programming, multiprogramming and multitasking, as well as learn to justify the advantages and applications of industrial robots. | | Learning outcomes | **Pre-service teachers demonstrating competence can:**   * describe application areas of mechatronic and robotic systems; * understand the principals of their construction and terminology in mechatronics and robotics; * select necessary types of robotics and mechatronic systems; * determine control methods and systems for robotics and mechatronics; * evaluate mechatronic and robotics systems for suitability of solving particular problem; * apply the results of the discipline in professional activities. |      |  |  | | --- | --- | | Course title | **Introduction to Robotics** | | Component | Subject component, Optional component | | Cycle | Major disciplines | | Module | Applied and integrated sciences 36 academic credits | | Academic credits | 5 | | Course/ Competence description | The purpose of this course is to improve the following areas of subject competences:   * Conceptual-theoretical knowledge competencies (1,2,3) * Science application competencies (5,7) * Competencies in scientific research (11,12)   During the course, pre-service teachers study the methods and techniques for creating robots in various fields and the principles of building robotic systems. Pre-service teachers are equipped with the knowledge to build robots to perform specific functions and tasks. They draw analogies between robots and living things according to the senses, movements of living things and sensors, mounts, motors, and other components of robots. They also design and assemble robots that independently perform operations similar to those performed by living organisms. | | Learning outcomes | **Pre-service teachers demonstrating competence can:**   * identify areas of use for robots in different domains, * compare the principles embedded in the work involving robot components with different states of living organisms and the environment, such as touch, distance, color, sound, humidity, temperature, motion, etc. * design, program, and explore robots, * control the robot programmatically, using algorithms for automatic activities, * through creating their own projects, trace the benefits of using robots in real life. |  |  | | --- | | **RESEARCH AND PEDAGOGY IN NATURE SCIENCES 36 academic credits** | | The module provides pre-service teachers with skills in problem determination, information selection, setting up experiments, solving research problems, analyzing and summarizing the results of activities. Pre-service teachers develop the ability to design, implement, and evaluate learning processes, to consider the diversity of learners and to support their well-being. Pre-service teachers obtain knowledge in determining the purpose, relevance, significance of research, and master the principles of writing scientific texts and public presentation of the results of research. Pre-service teachers also learn about global and local context for life safety, competent use of modern technologies and methods of STEM-learning as well as sustainable development. |  |  |  | | --- | --- | | Course title | **Methods of teaching science disciplines** | | Component | Subject component, University component | | Cycle | Major disciplines | | Module | Research in nature sciences 36 academic credits | | Academic credits | 6 | | Course/ Competence description | The purpose of this course is to improve the following areas of subject competences:   * Competence area for Cognitive skills development (3) * Competence area for Practical and research skills’ development (6,7) * Competence area for Development of interdisciplinary interactions (9,12)   The course is necessary for pre-service teachers to organize the educational process and contains information about the goals and content of science education, methods, means and forms of organization of teaching "Natural Science" in primary and secondary schools. Pre-service teachers learn to consider different approaches to the implementation of goals, and reveal the ideas of forming a valuable attitude towards the surrounding world in the process of person-centered learning. Modern technologies and methods on the basis of activation and intensification of educational activity of students, pedagogical diagnostics, planning, evaluation and reflection in the learning process allows pre-service teachers to acquire skills in managing the functional development of students and creating a system of effective interaction with them. | | Learning outcomes | **Pre-service teachers demonstrating competence can:**   * select pedagogical technologies suitable for primary and secondary schools; * provide a safe educational environment, motivate students' learning and cognitive activities, set goals that promote students' development regardless of their background, abilities and character, and constantly look for pedagogical ways to achieve them; * plan and conduct lessons and analyze their effectiveness; * plan and conduct laboratory experiments, experiments, project-research activities; * explain fundamental material, revealing interdisciplinary connections; * structure information according to the way it is presented; * navigate the choice and active use of ICT for teaching and learning; * objectively evaluate students' knowledge using different forms and methods of control; * apply different methods and technologies of pedagogical diagnostics used in monitoring the quality of results and content of the educational process; * build a network of relationships with other participants in the learning process at school; |      |  |  | | --- | --- | | Course title | **Conceptual learning of natural science** | | Component | Subject component, University component | | Cycle | Major disciplines | | Module | Research in nature sciences 36 academic credits | | Academic credits | 5 | | Course/ Competence description | The purpose of this course is to improve the following areas of subject competences:   * Competence area for Practical and research skills’ development (5,7) * Competence area for Development of interdisciplinary interactions (10,12,13)   During the course, pre-service teachers explore the methodology and techniques for implementing a new interdisciplinary stream of biological knowledge in a school-based continuing biology education system. Through conceptual learning pre-service teachers learn to compare and contrast groups or categories that contain concept-relevant functions with groups or categories that do not contain concept-relevant functions. Pre-service teachers learn to classify objects, events, or ideas based on the understanding that each object, event, or idea has a set of common relevant characteristics. By building the learning process on the basis of contextual learning technology makes it possible to bring the content and process of pre-service teachers' learning activities as close as possible to their future profession. Pre-service teachers plan, conduct and analyze lessons, use different teaching technologies, form an overall perception of the world (not fragmentary) by integrating knowledge from different cycles of academic disciplines. | | Learning outcomes | **Pre-service teachers demonstrating competence can:**   * systematize and analyze knowledge from particular scientific disciplines in natural science; * provide a meaningful and contextual reflection of the professional activity of a specialist in the forms of learning activities of students; * establish links between the subjects of the humanities and natural sciences; * apply interdisciplinary sets of didactic teaching tools during the teaching process; * use different teaching approaches and technologies (BTEAM, CLIL, distance, ICT, etc.); * combine a variety of forms and methods of teaching, taking into account didactic principles and psychological requirements for the organization of learning activities; * plan and analyze lessons and create relationships network with other participants during the learning process at school; * Use the modularity of the construction of the system and its adaptability to the specific conditions of education and the student population; * Ensure the increasing complexity of learning content and, accordingly, forms of contextual learning from the beginning to the end of the holistic learning process. |  |  |  | | --- | --- | | Course title | **Educational (field) practice in biology and the methodology of its implementation** | | Component | Subject component, University component | | Cycle | Major disciplines | | Module | Research in nature sciences 36 academic credits | | Academic credits | 2 | | Course/ Competence description | The purpose of this course is to improve the following areas of subject competences:   * Competence area for Cognitive skills development (3) * Competence area for Practical and research skills’ development (5,6,7) * Competence area for Development of interdisciplinary interactions (8,9)   During the course, pre-service teachers form their research approach to teaching by working with living organisms in the natural environment, collecting material for research papers, strengthening the practical skills of botany and zoology in practice, as well as applying the material learned in class and extracurricular work with students. | | Learning outcomes | **Pre-service teachers demonstrating competence can:**   * identify the most typical animals of the local flora and fauna; * perform observations of living organisms and record them in a field diary; * perform research work at school, in the schoolyard and in the laboratory; * arranging extracurricular activities for the preservation of flora and fauna; * plan, develop an excursion route, conduct the excursion according to the given topic; * present the results of field and laboratory biological research. |  |  |  | | --- | --- | | Course title | **Educational (field) practice in geography and the methodology of its implementation at school** | | Component | Subject component, University component | | Cycle | Major disciplines | | Module | Research in nature sciences 36 academic credits | | Academic credits | 2 | | Course/ Competence description | The purpose of this course is to improve the following areas of subject competences:   * Competence area for Cognitive skills development (3) * Competence area for Practical and research skills’ development (5,6,7) * Competence area for Development of interdisciplinary interactions (8,9)   During the training practice on the basis of the interaction of theoretical and practical training, pre-service teachers develop their professional preparation as future teachers of natural sciences. The process of training practice contributes to the development of pre-service teachers’ individual pedagogical style designing a further route of pedagogical activity of teaching. During practice, pre-service teachers develop their understanding of the activities as future teachers, and their upcoming professional responsibilities. | | Learning outcomes | **Pre-service teachers demonstrating competence can:**   * formulate specific goals and tasks of the lesson and set general programme of school students’ joint activities; * plan learning material in accordance with the purpose and type of a particular lesson; * analyze the results of conducted and visited lessons; * select and apply optimal forms and methods of teaching geography and extracurricular work; * apply in learning process practical skills obtained during practical training. |  |  |  | | --- | --- | | Course title | **Study of STEM Teaching Practices** | | Component | Subject component, Optional component | | Cycle | Major disciplines | | Module | Research in nature sciences 36 academic credits | | Academic credits | 6 | | Course/ Competence description | The purpose of this course is to improve the following areas of subject competences:   * Competence area for Practical and research skills’ development (5,6) * Competence area for Development of interdisciplinary interactions (9,11)   Pre-service teachers learn the methodology of organization, stages, variety of research methods in STEM (Science, Technology, Engineering, Mathematics) teaching practice, as well as methods of research data processing and ways of presentation of research results. The course develops pre-service teachers' research skills and forms skills in integrating research into teaching practice. | | Learning outcomes | **Pre-service teachers demonstrating competence can:**   * perform sequential, planned activities to improve teaching practices and STEM learning; * use research features on teaching practices and school student’s observation process; * develop their research skills and direct them towards improving the quality of education and functional literacy of school students by using various digital resources; * develop a plan for the implementation of the research of STEM -learning teaching practices; * conduct systematic monitoring of the results obtained during STEM -learning. * identify effective ways to develop students' research skills, intellectual and creative abilities, critical thinking, teamwork skills, perception and interpretation of natural science information. |  |  |  | | --- | --- | | Course title | **Designing of STEM - education** | | Component | Subject component, Optional component | | Cycle | Major disciplines | | Module | Research in nature sciences 36 academic credits | | Academic credits | 6 | | Course/ Competence description | The purpose of this course is to improve the following areas of subject competences:   * Competence area for Practical and research skills’ development (4,5) * Competence area for Development of interdisciplinary interactions (10,11,12)   Pre-service teachers learn specifics of STEM (Science, Technology, Engineering, Mathematics) design, an applied learning approach to real-world problems, learning through problem solving and critical thinking, and integrating different content while actively incorporating new technological capabilities, including new learning technologies, into the educational process, such as Project-Based Learning (PBL), which promotes a deeper understanding of the material being studied and the application of the knowledge gained in practice. | | Learning outcomes | **Pre-service teachers demonstrating competence can:**   * link science and STEM subjects with real-life problems and situations; * analyze and cite scientific and methodological literature in science and pedagogy; * build project-based learning in which pre-service teachers make observations, identify problems and find solutions independently and with their peers; * experimental investigations with mathematical and IT simulations; * use art design and aesthetics when appropriate and applicable; * use wide range of skills such as reading, clear and persuasive writing, using math correctly to analyze data, and more; * look for non-standard solutions to problems, think creatively and outside the box; * design STEM lessons, create relationships network with all participants of learning process in educational field of “Natural Science”. |  |  |  | | --- | --- | | Course title | **Research and project activities in nature sciences** | | Component | Subject component, Optional component | | Cycle | Major disciplines | | Module | Research in nature sciences 36 academic credits | | Academic credits | 5 | | Course/ Competence description | The purpose of this course is to improve the following areas of subject competences:   * Competence area for Cognitive skills development (2,3) * Competence area for Practical and research skills’ development (4,5,6,7) * Competence area for Development of interdisciplinary interactions (8,9,11)   Pre-service teachers study the methodology of project activities in science education, method of projects in a modern school, practice of educational design, organization and stages of project activities of school students, and joint work of a teacher and school students. The course develops pre-service teachers’ work skills within the framework of research and project activities in the field of natural sciences. | | Learning outcomes | **Pre-service teachers demonstrating competence can:**   * put forward and confirm hypotheses in practice, carry out research activities and present substantiated conclusions of hypothesis testing; * carry out information and analytical and information and bibliographic work using modern information technologies in project activities; * organize research in the natural sciences and apply it in one's pedagogical activities; * use research skills and the project method in the educational and extracurricular activities of schoolchildren; * develop teaching material for project implementation in practice; * provide scientific guidance to students in project activities; * apply critical thinking, make non-standard decisions, find new methods and approaches to solve problems and situations. |      |  |  | | --- | --- | | Course title | **Experimental Biology** | | Component | Subject component, Optional component | | Cycle | Major disciplines | | Module | Research in nature sciences 36 academic credits | | Academic credits | 6 | | Course/ Competence description | The aim of this course is to increase the following areas of subject-specific competences:   * Competence area for Cognitive skills development (2,3) * Competence area for Practical and research skills’ development (4,5,6,7) * Competence area for Development of interdisciplinary interactions (8,9,11)   Pre-service teachers learn the principles and structure of the organization of scientific activity, the Fundamentals of Experimental Biology, the methodology of scientific cognition, techniques of setting goals and research tasks. The course develops pre-service teachers’ skills in experimental research, processing and analysis of the results. | | Learning outcomes | **Pre-service teachers demonstrating competence can:**   * apply research results in pedagogical and professional activities; * understand and solve problems in new or unfamiliar situations in contexts and within broader (or interdisciplinary) areas related to the field of study; * adapt modern science achievements to educational process; * collect, process, and interpret research data; * formalize results of research work into various forms of scientific production; * use quantity and quality methods for scientific research * arrange discussion with evidence from theoretical and experimental research. |  |  |  | | --- | --- | | Course title | **Methods of experimental research** | | Component | Subject component, Optional component | | Cycle | Major disciplines | | Module | Research in nature sciences 36 academic credits | | Academic credits | 6 | | Course/ Competence description | The purpose of this course is to improve the following areas of subject competences:   * Competence area for Cognitive skills development (2,3) * Competence area for Practical and research skills’ development (4,5,6,7) * Competence area for Development of interdisciplinary interactions (8,9,11)   Pre-service teachers study modern methods of planning, organization and conducting of experiments and processing of the results. During the course pre-service teachers learn methodology and methods of scientific research and their application in practice, the rules of research planning, features of data processing, logic in constructing the work, summarizing, and formulating conclusions. | | Learning outcomes | **Pre-service teachers demonstrating competence can:**   * be fluent in trends of modern science, identify current research topics; * have skills to determine and formulate a hypothesis, plan an experiment, select research methods and on this basis conduct theoretical and applied research in the field of natural sciences; * organize and perform experimental work with objects of animate and inanimate nature, processing and presentation of the results of this work; * have skills to select required analytical methods for solving applied research problems; * apply the results of pedagogical research of own experimental research in teaching and research activities. |      |  |  | | --- | --- | | Course title | **Organization of scientific activities** | | Component | Subject component, Optional component | | Cycle | Major disciplines | | Module | Research in nature sciences 36 academic credits | | Academic credits | 6 | | Course/ Competence description | The purpose of this course is to improve the following areas of subject competences:   * Competence area for Cognitive skills development (2,3) * Competence area for Practical and research skills’ development (4,5,6,7) * Competence area for Development of interdisciplinary interactions (8,9,11)   Pre-service teachers learn the principles and structure of organization of scientific activity, as well as the methods and methodology of pedagogical research to design and plan scientific research. The course develops pre-service teachers’ skills in experimental research, processing and analysis of results. | | Learning outcomes | **Pre-service teachers demonstrating competence can:**   * plan and conduct scientific research; * apply pedagogical research in practice; * be able to predict and solve the problems of the developed new educational system * apply professional knowledge in non-standard situations; * apply conclusions and recommendations of scientific achievements to the educational process in different educational environments; * carry out scientific supervision of students' research; * conduct conferences and online seminars to share experiences; * present the results of scientific research in the form of presentations, publications in scientific journals, theses, research report; * develop, information competence, methods of pedagogical research empirical and theoretical, summarize best practices, develop a plan for continuous self-education. |  |  |  | | --- | --- | | Course title | **Academic writing** | | Component | Subject component, Optional component | | Cycle | Major disciplines | | Module | Research in nature sciences 36 academic credits | | Academic credits | 5 | | Course/ Competence description | The purpose of this course is to improve the following areas of subject competences:   * Competence area for Practical and research skills’ development (4,5,7) * Competence area for Development of interdisciplinary interactions (13)   Pre-service teachers learn the characteristics of academic writing, how to properly write and format written types of work in accordance with the principles of academic integrity. The course develops pre-service teachers’ skills in writing, designing of all types of written work, in accordance with the existing requirements. | | Learning outcomes | **Pre-service teachers demonstrating competence can:**   * use the knowledge gained from the discipline for writing and completing all types of written work, in accordance with the requirements; * work with databases of scientific publications, bibliographic sources, make references to used sources; * use in their works citations and correctly format them in compliance with intellectual property rights; * create cross-cultural communities, * critically analyze, evaluate information on the results of scholarly research. |  |  |  | | --- | --- | | Course title | **Content-Language Integrated Learning in Nature Science** | | Component | Subject component, Optional component | | Cycle | Major disciplines | | Module | Research in nature sciences 36 academic credits | | Academic credits | 5 | | Course/ Competence description | The purpose of this course is to improve the following areas of subject competences:   * Competence area for Practical and research skills’ development (4,7) * Competence area for Development of interdisciplinary interactions (11,12,13)   Pre-service teachers learn basic approaches, techniques and forms used in integrated content-language teaching of biology. During the course, pre-service teachers develop their knowledge in biology, while improving language knowledge and skills. | | Learning outcomes | **Pre-service teachers demonstrating competence can:**   * use communicative and interactive tasks, promoting better understanding of biology studied in foreign language; * apply specialized terminology in a foreign language to pedagogical activities; * support students in understanding biology in a foreign language; * encourage students to use the foreign language correctly in speech; * use activities in the classroom that promote both the study of biology and the development of language skills; |  |  | | --- | | **FINAL ATTESTATION 8 academic credits** | | Final attestation of the graduate is mandatory and is carried out after mastering the educational programme in full. The aim of the attestation is to evaluate the level of maturity of general cultural and professional competences of the graduate, as well as their readiness to perform basic professional activities.  **Final attestation work *(Oral Exam, Written Exam, Diploma work, Research project, Development project, Organisational project, Strategic project, Art project)*** | |
| 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 ХХ 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. The communicative side of communication. Social and psychological conflict. Patterns of behavior in conflict. Effective communication techniques | 2 | | **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** | | *Basics of Economics and Law*  Social production. The essence, forms and structure of capital. Costs and income of production in a market economy. Business. Financial system. Resource saving. Cyclical economic development. Kazakhstan in the system of global economic relations. Market emergence. Role of the government in business development. The main provisions of the Constitution and current legislation of the Republic of Kazakhstan. System of public administration institutions and the sphere of their authority. Aims, methods of state regulation of economy. Role of public sector in economy. Financial law and finance. Mechanism of interaction between substantive and procedural law. | 5 | | *Basics of an anti-corruption culture*  Anti-corruption culture: a concept, structure, tasks and functions. Anti-corruption awareness and anti-corruption culture: content, role and functions. Formation of anti-corruption culture in foreign countries. Anticorruption culture: mechanisms and institutions for development. Role of a family in fostering an anti-corruption culture. National bases of an anti-corruption culture. Social control as a mechanism of counteracting corruption. Political parties and the mass media as tools for building an anti-corruption culture. Anti-corruption education and upbringing. Anti-corruption legislation and legal liability for corruption. The constitutional basis of anti-corruption. Legal liability for crimes of corruption. Building an anti-corruption culture in civil service and business. | 5 | | *Entrepreneurial skills*  Types of entrepreneurship. Business. Financial system. Time management and project management. Stress management. Negotiation skills. Public speaking skills. Business management skills. Teamwork and leadership skills. Customer service skills. Financial skills. Analytical and problem solving skills. Critical thinking skills. Strategic thinking and planning skills. Technical skills. Time management and organisational skills. Branding, marketing and networking skills. Business management skills. | 5 | | *Ecology and life safety*  Basic laws of functioning of living organisms, ecosystems of different organisational levels, biosphere as a whole, their sustainability. Interaction of biosphere components and ecological consequences of human economic activity, in particular under conditions of nature management intensification. Modern understanding of the concepts, strategies and practical goals of sustainable development in different countries and in the Republic of Kazakhstan. Life safety, its main provisions. Risks, emergencies. Risk analysis, risk management. Human security systems. Modern destabilizing factors. Social, religious, political, economic threats, threats in everyday life. System of security institutions and legal regulation of their activities. | 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** | |
| 4.4 Progression of the studies |
| |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | | Modules and courses | **BA degree, 4 academic years** | | | | | | | | | 1. year | | 2. year | | 3. year | | 4. year | | | 1 sem | 2 sem | 3 sem | 4 sem | 5 sem | 6 sem | 7 sem | 8 sem | | **PEDAGOGICAL COMPONENT** | | | | | | | | | | **SUPPORTING LEARNERS AS INDIVIDUALS – 17 academic credits** | | | | | | | | | | Psychology in Education and Concepts of Interaction and Communication 4 academic credits |  |  | 4 |  |  |  |  |  | | Educational Science and Key Theories of Learning 3 academic credits |  |  | 3 |  |  |  |  |  | | Inclusive Educational Environment 3 academic credits |  |  |  |  | 3 |  |  |  | | Age and Physiological Features of the Development of Children 3 academic credits |  | 3 |  |  |  |  |  |  | | Teaching Planning and Individualization of Learning 4 academic credits |  |  |  |  |  | 4 |  |  | | **TEACHING AND ASSESSMENT FOR LEARNING – 9 academic credits** | | | | | | | | | | Teaching Methods and Technologies 5 academic credits |  |  |  | 5 |  |  |  |  | | Assessment and Development 4 academic credits |  |  |  |  | 4 |  |  |  | | **TEACHER AS A REFLECTIVE PRACTITIONER – 9 academic credits** | | | | | | | | | | Pedagogical Research 4 academic credits |  |  | 4 |  |  |  |  |  | | Research, Development and Innovation 5 academic credits |  |  |  |  |  |  | 5 |  | | **TEACHER AS A FACILITATOR OF LEARNING (PEDAGOGICAL PRACTICE) – 25 academic credits** | | | | | | | | | | Introduction to the teaching profession (1st year pedagogical practice) 2 academic credits |  | 2 |  |  |  |  |  |  | | Psychological and pedagogical assessment (2nd year pedagogical practice) 2 academic credits |  |  |  | 2 |  |  |  |  | | Pedagogical approaches (3rd year pedagogical practice) 6 academic credits |  |  |  |  |  | 6 |  |  | | Research and innovation in education (4th year pedagogical practice) 15 academic credits |  |  |  |  |  |  |  | 15 | | **COMPULSORY COMPONENT** | | | | | | | | | | **HISTORICAL AND PHILOSOPHICAL COMPETENCIES – 10 academic credits** | | | | | | | | | | History of Kazakhstan 5 academic credits |  |  |  |  |  |  | 5 |  | | Philosophy 5 academic credits |  |  |  |  | 5 |  |  |  | | **SOCIO-POLITICAL KNOWLEDGE – 8 academic credits** | | | | | | | | | | Sociology 2 academic credits |  |  | 2 |  |  |  |  |  | | Political studies 2 academic credits |  |  | 2 |  |  |  |  |  | | Cultural studies 2 academic credits |  |  | 2 |  |  |  |  |  | | Psychology 2 academic credits |  |  | 2 |  |  |  |  |  | | **INSTRUMENTAL AND COMMUNICATION – 25 academic credits** | | | | | | | | | | Russian /Kazakh language 10 academic credits | 5 | 5 |  |  |  |  |  |  | | Foreign language 10 academic credits | 5 | 5 |  |  |  |  |  |  | | Information and communication technologies 5 academic credits | 5 |  |  |  |  |  |  |  | | **HEALTH PROMOTION – 8 academic credits** | | | | | | | | | | Physical education 8 academic credits | 2 | 2 | 2 | 2 |  |  |  |  | | **Optional Component – 5 academic credits** | | | | | | | | | | Basics of Economics and Law 5 academic credits |  |  | 5 |  |  |  |  |  | | Basics of an anti-corruption culture5 academic credits |  |  |  |  |  |  |  | | Entrepreneurial skills 5 academic credits |  |  |  |  |  |  |  | | Ecology and life safety 5 academic credits |  |  |  |  |  |  |  | | Research methods 5 academic credits |  |  |  |  |  |  |  | | **SUBJECT COMPONENT** | | | | | | | | | | Biology and biodiversity of living organisms 10 academic credits |  |  | 5 | 5 |  |  |  |  | | Environmental Chemistry 6 academic credits | 6 |  |  |  |  |  |  |  | | Physics for Science and Engineering 9 academic credits |  |  | 4 | 5 |  |  |  |  | | Science of nature 6 academic credits |  | 6 |  |  |  |  |  |  | | General geography 6 academic credits |  |  |  |  |  |  |  | | Applied Mathematics 5 academic credits |  |  | 5 |  |  |  |  |  | | Mathematical statistics 5 academic credits |  |  |  |  |  |  |  | | Programming in the natural sciences 6 academic credits |  |  |  |  |  |  |  | 6 | | Basics of algorithmization and programming 6 academic credits |  |  |  |  |  |  |  | | Systematization of natural science knowledge 5 academic credits |  |  |  |  | 5 |  |  |  | | Modeling of processes of animate and inanimate nature 6 academic credits |  |  |  |  |  |  | 6 |  | | Substances and materials 5 academic credits |  |  |  |  | 5 |  |  |  | | Science, technology and society 5 academic credits |  |  |  |  |  |  |  | | Energy and motion 5 academic credits |  |  |  |  |  | 5 |  |  | | Biophysics and bioinformatics 5 academic credits |  |  |  |  |  |  |  | | Green technology 5 academic credits |  |  | 5 |  |  |  |  |  | | Nootechnology 5 academic credits |  |  |  |  |  |  |  | | GIS in geographical research 5 academic credits |  |  |  |  | 5 |  |  |  | | Geoinformation modeling of natural resources 5 academic credits |  |  |  |  |  |  |  | | Educational mechatronics and robotics 5 academic credits |  |  |  |  |  | 5 |  |  | | Introduction to Robotics 5 academic credits |  |  |  |  |  |  |  | | Methods of teaching natural science discipline 6 academic credits |  |  |  |  |  |  | 6 |  | | Conceptual learning of natural science 5 academic credits |  |  |  |  |  | 5 |  |  | | Educational (field) practice in biology and the methodology of its implementation 2 academic credits |  |  |  | 2 |  |  |  |  | | Educational (field) practice in geography and the methodology of its implementation at school 2 academic credits |  | 2 |  |  |  |  |  |  | | Study of STEM Teaching Practices 6 academic credits |  |  |  |  |  |  | 6 |  | | Designing of STEM - education 6 academic credits |  |  |  |  |  |  |  | | Research and project activities in nature sciences 6 academic credits |  |  |  |  |  |  | 6 |  | | Experimental biology 6 academic credits |  |  |  |  |  |  |  | | Methods of experimental research 6 academic credits |  |  |  |  |  |  |  | 6 | | Organization of scientific activities research 6 academic credits |  |  |  |  |  |  |  | | Academic writing 5 academic credits |  |  |  |  |  | 5 |  |  | | Content-Language Integrated Learning in Nature Science 5 academic credits |  |  |  |  |  |  |  | | **FINAL ATTESTATION - 8 academic credits** | | | | | | | | | | **Final attestation** |  |  |  |  |  |  |  | 8 | | **Academic credits in total** | **30** | **30** | **30** | **30** | **30** | **30** | **30** | **30** | |
| 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

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| 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

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| 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** | | А | 4.0 | 95-100 | Excellent | | А- | 3.67 | 90-94 | | В+ | 3.33 | 85-89 | Good | | В | 3.0 | 80-84 | | В- | 2.67 | 75-79 | | С+ | 2.33 | 70-74 | | С | 2.0 | 65-69 | Satisfactory | | С- | 1.67 | 60-64 | | D+ | 1.33 | 55-59 | | D | 1.0 | 50-54 | | FХ | 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

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| 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

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| 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

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| 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

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| - 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-centeredness 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.

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| 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. |

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

Teacher education can adopt the research-based approach in diverse ways, and it is important to consider what kind of forms fit the cultural context and practices. The ultimate goal of research-based teacher education is to support student teachers to become pedagogically-thinking, reflective and inquiry-oriented teachers with an inquiring attitude towards teaching. Teachers’ pedagogical thinking means the ability to analyse and conceptualise educational occasions and phenomena, to evaluate them as part of larger instructional processes and to make rational and theory-based decisions and justify their decisions and actions as teachers. Their readiness to consume as possibly also conduct research enhances their ability to meet the challenges of the future (Toom et al., 2010).

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

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

**Interdisciplinary learning**

*Content and Language Integrated Learning (CLIL)*

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

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

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

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

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

*STEM (Science, Technology, Engineering, Mathematics) education*

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

Active learning includes student centered active methods, such that project based education, and benefitting from diverse out of classroom learning environments and communities of learners and ICT. On the hand, Science education should also focus on competences with an emphasis on learning through science and shifting from STEM to STEAM (A = All) by linking science with other subjects and disciplines (Hazelkorn, Ellen & Ryan, Charly & Beernaert, Yves & Constantinou, Costas & Deca, Ligia & Grangeat, Michel & Karikorpi, Mervi & Lazoudis, Angelos & Pintó, Roser & Welzel-Breuer, Manuela (2015). Science Education for Responsible Citizenship. 10.2777/12626). In the ITE curricula in Kazakhstan, the A should include at least developing the English linguistic skills of teacher students (KAZ ITE D-3 Framework Report).

**Digitalisation in Education and Teachers’ Digital competence development**

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

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

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

**Inclusion in education and recognition of different learners**

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

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

**Teachers’ professional development and change management**

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

Development and growing as a teacher can be understood in different ways: 1) growing understanding of one’s content area, in order to become more familiar with what to teach; 2) getting more practical experience as a teacher, in order to become more familiar with how to teach; 3) building up a repertoire of teaching strategies, in order to become more skilful as a teacher; 4) finding out which teaching strategies work best for the teacher, in order to become more effective as a teacher, and 5) continually increasing understanding of what works for students, in order to become more effective in facilitating student learning (Åkerlind, 2007).

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

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

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