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MINISTRY OF SCIENCE AND HIGHER EDUCATION OF THE REPUBLIC OF KAZAKHSTAN

Non -profit Limited Company M.Auezov South Kazakhstan University

«AUEZOV UNIVERSITY 1943»

APPROVED
Chairman of the Board - Rector
D.Zh. Ahmed-Zaky
2026.

# EDUCATION PROGRAMME

## 7M01535 - STEM education

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| Registration number | 7M01500290 |
| Code and classification of the field of education | 7M01 Pedagogical Sciences |
| Code and classification of training areas | 7M015 Teacher training in natural science subjects |
| Group of educational programs | M012 Teacher training in computer science |
| Typeof EP | new |
| ISCE level | 7 |
| NQF level | 2 |
| SQF of education level | 7 |
| Language of learning | Kazakh, Russian |
| Typical duration of study | 2 years |
| Form of study | Scientific and pedagogical |
| The complexity of the EP, not less | 120 credits |
| Distinctive features of EP | - |
| University Partner ( JEP ) | - |
| University Partner ( TDEP ) | - |
| Social Partner ( DE ) | - |

Shymkent, 2026

**Drafters:**

| Name | Position | Sign |
|---|---|---|
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| Nurmukhanbetova G.K. | Director of LLP «KazTilDamu» | |

The educational program has been updated taking into account the new model of inclusive education and agreed with the City department of employment and social protection.

Deputy Head of the Department of Employment and Social Protection of Shymkent _____ K.Kaldykarayev

The EP was considered at a meeting of the Academic Quality Committee of the Natural Sciences Pedagogy of the Higher School, Minutes № 6 «23» 02 2026y.

Chairman of the Committee _____ A.Z.Tursynbayev

The EP was considered and recommended for approval at Educational-methodical meeting of M. Auezov SKU
Minutes № 4 «27» 02 2026y.

Chairman of the UMS _____ E.I. Imangalyev

The EP was approved by the decision of the Academic Council of the University
Minutes № 14 «26» 03 2026y.

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## 1 CONCEPT OF THE EDUCATIONAL PROGRAM

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| **University Mission** | Generation of new competencies, training of a leader who translates research and entrepreneurial thinking and culture |
| **University Values** | • Openness–open to change, innovation and cooperation.<br>• Creativity – generates ideas, develops them and turns them into values.<br>• Academic freedom – free to choose, develop and act.<br>• Partnership – creates trust and support in a relationship where everyone wins.<br>• Social responsibility – ready to fulfill obligations, make decisions and be responsible for their results. |
| **Graduate Model** | • Deep subject knowledge, their application and continuous expansion in professional activity.<br>• Information and digital literacy and mobility in rapidly changing conditions.<br>• Research skills, creativity and emotional intelligence.<br>• Entrepreneurship, independence and responsibility for their activities and well-being.<br>• Global and national citizenship, tolerance to cultures and languages. |
| **Uniqueness of the educational program** | • Orientation to the regional labor market and social order through the formation of professional competencies of graduates, adjusted to meet the requirements of stakeholders.<br>• Focusing on practice and paying close attention to the development of critical thinking and skills, the formation of a wide range of skills that allow them to be functionally literate and competitive in any life situation and in demand on the labor market. |
| **Academic Integrity and Ethics Policy** | The University has taken measures to preserve academic integrity and academic freedom, protect against any intolerance and discrimination:<br>- Rules of Academic Integrity (Order No.212-OD dated 10.10.2022);<br>- Anti-Corruption Standard (Order No. 221-OD dated 07.12.2021);<br>- The Code of Ethics (Order No. 212-OD dated 10.10.2022); |
| **Regulatory and legal framework for the development of EP** | 1.Law of the Republic of Kazakhstan "On Education";<br>2. Model rules for the activities of educational organizations implementing educational programs of higher and (or) postgraduate education, approved by order of the Ministry of Education and Science of the Republic of Kazakhstan dated October 30, 2018 No. 595 with amendments and additions dated December 29, 2021. No. 614<br>3. Standard rules for admission to training in educational organizations implementing educational programs of higher and postgraduate education, approved by order of the Ministry of Education and Science of the Republic of Kazakhstan dated October 31, 2018 No. 600 with amendments and additions dated 06/02/2023. No. 252<br>4. State mandatory standards for higher and postgraduate education, approved by Order No. 2 of the Ministry of Education and Science dated July 20, 2022, with amendments and additions dated March 4, 2025, as amended by Order No. 90 of the Ministry of Education and Science of the Republic of Kazakhstan.<br>5. Rules for organizing the educational process in credit technology of education, approved by order of the Ministry of Education and Science of the Republic of Kazakhstan dated April 20, 2011 No. 152; with changes and additions from 09/23/2022. No. 79<br>6. Qualification reference book for positions of managers, specialists and |

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| | other employees, approved by order of the Minister of Labor and Social Protection of the Population of the Republic of Kazakhstan dated December 30, 2020 No. 553.<br>7. Methodological recommendations for introducing ECTS principles into the educational process and expanding academic freedom. Appendix to the order of the Minister of Science and Higher Education. of the Republic of Kazakhstan dated February 12, 2024 No. 57<br>8. Guidelines for the development of educational programs for higher and postgraduate education, Appendix 1 to the order of the Director of the National Center for the Development of Higher Education of the Ministry of Education and Science of the Republic of Kazakhstan dated May 4, 2023 No. 601 n/k |
| **Organization of the educational process** | • Implementation of the principles of the Bologna Process<br>• Student-centered learning<br>• Availability<br>• Inclusivity |
| **Quality assurance of the Educational program** | • Internal quality assurance system<br>• Involvement of stakeholders in the development of the Educational Program and its evaluation<br>• Systematic monitoring<br>• Actualization of the content (updating) |
| **Requirements for applicants** | It is established according to the Model Rules for admission to training in educational organizations, implementing educational programs of higher and postgraduate education, Order of the Ministry of Education and Science of the Republic of Kazakhstan No. 600 dated 31.10.2018 |
| **Conditions for the implementation of educational programs (EP) for persons with disabilities and special educational needs(SSN)** | For students with SEN (special educational needs) and persons with disabilities (PSI), tactile PVC tiles, specially equipped toilets, a mnemonic diagram, and shower bars have been installed in educational buildings and student dormitories. Special parking spaces have been created. Crawler lift installed. There are desks for people with limited mobility (PLM), signs indicating the direction of movement, ramps. In the educational buildings (main building, building No. 8) there are 2 rooms with six working places adapted for users with disorders of the musculoskeletal system (DMS).For visually impaired users, the SARA™ CE Machine (2 pcs.) is available for scanning and reading books. The library website is adapted for the visually impaired. There is a special NVDA audio program with a service. The JIC website http://lib.ukgu.kz/ is open 24/7.<br>An individual differentiated approach is provided for all types of classes and in the organization of the educational process. |

## 2 PASSPORT of the educational program

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| **Purpose of the EP** | Training of competitive, competent masters of pedagogical Sciences of pedagogical direction, who are able to use in their professional activities the knowledge, skills and abilities obtained in the educational process in mathematics and computer science to solve pedagogical problems at all levels of education through information and communication technologies. |
| **Tasks of the EP** | - to provide conditions for the development of a high intellectual level of development, the acquisition of logical and critical thinking skills of scientific and organizational work in scientific and pedagogical activities;<br>- development of the ability to use system theoretical and practical knowledge on the methodology of teaching mathematics and computer science in professional activities in solving scientific, managerial and educational tasks and making operational decisions in problem situations;<br>- development of self-service skills to ensure the possibility of rapid employment in the specialty or continuing education in the doctoral program and ensure continuous professional development of professional activities;<br>- formation of graduates ' competitiveness in the field of education, training of highly qualified and consistently popular undergraduates in scientific and pedagogical areas for the domestic and international labor market. |
| **Harmonization of EP** | • 7th level of the National Qualifications Framework of the Republic of Kazakhstan;<br>• Dublin descriptors of the 7th level of qualification;<br>• 2 cycle of a Framework for Qualification of the European Higher Education Area);<br>• 7 th Level of European Qualification Framework for Life long Learning). |
| **Connection of the EP with the professional sphere** | 1. Professional standard Teacher (Abrogated by the Order of the Minister of Education of the Republic of Kazakhstan dated 06/03/2025 No. 133) approved by the Order of the Acting Minister of Education of the Republic of Kazakhstan dated December 15, 2022, No. 500.<br>2. The professional standard for teachers in educational organizations was approved by Order of the Minister of Education of the Republic of Kazakhstan dated February 24, 2025, No. 31.<br>3. The Professional Standard "Teacher" was approved by Order No. 591 of the Minister of Science and Higher Education of the Republic of Kazakhstan dated November 20, 2023. |
| **Name of the degree awarded** | After successful completion of this OP, the graduate is awarded the Master's of Pedagogical Sciences of "7M01535 – Stem Education" in the educational program |
| **List of qualifications and positions** | Masters in the educational program "7M01535 – Stem education" by Order of the Ministry of Labor and Social Protection of the Republic of Kazakhstan dated May 21, 2012 No. 201-o-m and Order of the Minister of Education and Science of the Republic of Kazakhstan dated July 13, 2009 No. 338 "On approval of standard qualification characteristics of positions of teaching staff and persons equivalent to them" by Order of the Minister of Education and Science of the Republic of Kazakhstan No. 241 dated |

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| | June 9, 2011 and No. 512 dated December 27, 2013 in accordance with the qualification requirements (in scientific research institutions, design and engineering organizations) according to the qualification directory of persons may hold the position of a teacher or researcher at higher educational institutions. |
| **Field of professional activity** | - higher education;<br>- research in the field of computer science and natural sciences;<br>- methods of teaching computer science and research in the field of the digital environment;<br>- Stem is an area of research in the field of information and communication technology. |
| **Objects of professional activity** | Objects of professional activity of graduates:<br>- educational organizations (universities, educational institutions);<br>- state educational bodies;<br>- centers of educational services;<br>- training and research centers;<br>- various forms of ownership that use the methods of mathematics and computer science in their work.<br>- research institutions and centers for informatization of education;<br>- organization of educational systems of various forms of ownership, using computer technology in their work. |
| **Subjects of professional activity** | - The system of theoretical knowledge in mathematics and computer science;<br>- Theoretical and methodological bases of scientific research in pedagogy;<br>- Research methodology in the field of mathematical and computer education;<br>- A system of methods for implementing research results in practical training;<br>- Mechanisms for commercialization of research results;<br>- a system of practical skills for the development of scientific and methodological complexes, author's courses;<br>- system of higher education pedagogy;<br>- systems of educational psychology;<br>- pedagogical management system;<br>- development of educational and methodical materials;<br>- application of norms, rules, forms, methods and tools of international cooperation in the professional sphere;<br>- Methods of teaching mathematics and computer science in secondary and special education institutions;<br>- The system of research of the educational process and its value-oriented orientations, content, methods, forms and results;<br>- Research system in the field of computer science, applied mathematics, pedagogy, psychology and teaching methods;<br>-innovation and information-analytical services;<br>- Technological process of design, implementation and maintenance of software, mathematical, information software. |
| **Types of professional activity** | - education;<br>- upbringing;<br>- management;<br>- research and development;<br>- social; |

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| **Learning outcomes** | **LO1** Communicate within the framework of the established specialized terminology in the field of STEM technologies, to carry out joint work in the educational, scientific, professional and socio-cultural spheres of communication.<br>**LO2** To analyze the main ideological and methodological problems, including interdisciplinary ones, arising in science at the present stage of its development, to evaluate various facts and phenomena based on the provisions and categories of the philosophy of science.<br>**LO3** Evaluate the development and effective use of personnel in the organization, possess socio-psychological technologies for managing mass behavior.<br>**LO4** To develop educational and methodological complexes of disciplines, taking into account the integration of education, science and innovation.<br>**LO5** To carry out the educational process, professionally conduct training sessions taking into account the principles of student-centered learning and assessment, actively using practice-oriented STEM methods and technologies to develop students' life skills.<br>**LO6** Plan and conduct research together with colleagues to improve educational practice in the field of natural and pedagogical sciences.<br>**LO7** Apply the STEM approach and the capabilities of augmented reality technology in the development of new curricula for widespread implementation in the educational process.<br>**LO8** To develop electronic training courses on robotics and programming, using software and designing robots, using the R programming language for processing big data.<br>**LO9** To participate in research work using the methodology of scientific research and obtain new scientific, applied results as part of an independent and scientific team. |

**3 COMPETENCES OF THE GRADUATE OF EP**

| **SOFT SKILLS (Behavioral skills and personality qualities)** | |
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| SS 1. Competence in managing one's own literacy | SS1.1. Strive for professional and personal growth throughout life.<br>SS 1.2. Constantly update own knowledge within the chosen trajectory and in an interdisciplinary environment, carry out further learning with a high degree of independence and self-regulation.<br>SS 1.3. To be capable of reflection, an objective assessment of one's achievements, an awareness of the need to form new competencies and continue education in doctoral studies. |
| SS 2. Language competence | SS2.1. The ability of possessing a sufficient level of communication in the professional field in the state, Russian and foreign languages for negotiating and business correspondence.<br>SS 2.2. The ability of mastering the skills of mediation and intercultural understanding. |
| SS 3. Mathematical Competence and Competence in the field of Science | SS3.1. The ability to interpret the methods of mathematical analysis and modeling for solving applied problems in the field of study.<br>SS3.2. The ability to plan the setting of scientific experiments, integrate and implement the results of scientific research in the professional field.<br>SS 3.3. The ability to analyze and comprehend modern methods of pedagogical and psychological science and apply them in pedagogical |

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| | activity. |
| SS 4. Digital competence, technological literacy | SS 4.1. The ability to confidently use modern information and digital technologies, artificial intelligence systems for work, leisure and communications.<br>SS 4.2. Proficiency in the use, recovery, evaluation, storage, production, presentation and exchange of information in a wide range of digital devices.<br>SS 4.3. Ability to confidently use global information resources and apply technological literacy in research and computational and analytical activities. |
| SS 5. Personal, social and academic competencies | SS 5.1. Possession of the norms of business ethics, social and ethical values and focus on them in professional activities.<br>SS 5.2. Formation of a personality capable of mobility in the modern world, critical thinking and physical self-improvement.<br>SS 5.3. Ability to work in a team, correctly, clearly and reasonably defend one's position during discussions and make decisions of a professional nature.<br>SS 5.4. Ability to adequately navigate in various social spheres of activity and in conditions of uncertainty.<br>SS 5.5. Ability to find compromises, correlate own opinion with the opinion of the team. |
| SS 6. Entrepreneurial competence | SS 6.1. The manifestation of leadership qualities and the ability to have a positive impact on others, to lead a team.<br>SS 6.2. The ability to create conditions for the development of creative and entrepreneurial skills of the team.<br>SS 6.3. The ability to work in a mode of uncertainty and rapidly changing task conditions, make decisions, respond to changing working conditions, allocate resources and manage your time.<br>SS 6.4. Ability to work with consumer needs. |
| SS 7. Cultural awareness and ability to express yourself | SS7.1. The ability to show worldview, civil and moral positions.<br>SS7.2. The ability to be tolerant of the traditions and culture of the peoples of the world, to have high spiritual qualities. |
| **HARD SKILLS** | |
| PC1 scientific research | PC1.1 The ability to creatively use knowledge of fundamental and applied sections of biology in scientific and technological activities using the latest domestic and foreign experience. |
| PC2 scientific and innovative | PC2.1 The ability to apply the methodological foundations of design, implementation of field and laboratory, biological, physiological and medical research, use modern equipment, computer systems in accordance with the direction of the master's program. |
| PC3 organizational and managerial | PC3.1 The ability to plan and carry out activities to assess the state and protection of the environment, to organize activities for the PC3.2 Assessment and restoration of biological resources;<br>PC3.3 To organize scientific seminars and conferences;<br>the ability to use the skills of preparation and design of scientific and technical documentation, scientific reports, reports and articles. |
| PC4 pedagogical and educational | PC4.1 The ability to methodically competently make plans for lectures and practical training in the sections of academic disciplines and publicly present the theoretical and practical sections of academic disciplines in accordance with the approved teaching AIDS;<br>PC4.2 To possess the skills and abilities of designing and implementing a holistic pedagogical process, to be able to positive |

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| | thinking, attached to the system of national values, committed to ethical values, prone to humanism and optimism. |
| PC5 innovation and design | PC5.1. The ability to use innovative solutions in the development of new technologies, the ability to assess innovative business risks in the implementation of new solutions in the field of technology development for various fields of activity;<br>PC5.2. The ability to develop plans and programs for the organization of innovative activities of research teams. |

### 3.1 Matrix mapping of learning outcomes at the EP in general, generated by the competence modules

| | LO1 | LO2 | LO3 | LO4 | LO5 | LO6 | LO7 | LO8 |
|---|---|---|---|---|---|---|---|---|
| **SS1** | + | + | | + | | | + | |
| **SS2** | | + | + | + | + | + | | + |
| **SS3** | + | | + | + | + | + | + | |
| **SS4** | | + | + | | | | + | + |
| **SS5** | | + | + | + | | | + | + |
| **SS6** | | + | + | + | | + | | |
| **SS7** | + | | + | + | | + | | |
| **PC 1** | | + | | + | | | + | |
| **PC 2** | + | + | | | + | + | | + |
| **PC 3** | | | + | + | | + | + | |
| **PC 4** | | | | + | + | | | + |
| **PC 5** | + | | | | + | | + | |

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

| Module name | ЦИКЛ | ВК/КВ | Component Name | Brief course description (in 30-50 word) | Number of credits | Formed PO (codes) | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | RO1 | RO2 | RO3 | RO4 | RO5 | RO6 | RO7 | RO8 | RO9 |
| Module of Scientific and Pedagogical Training | BD | HsC | History and Philosophy of Science | **Purpose:** the acquisition of knowledge by students, the development of skills necessary for the successful implementation of research activities on the basis of the philosophical and methodological culture of scientific knowledge, including ideas about the ways of organization and functioning of science, the general laws of its development, rational methods and norms for achieving knowledge, socio-cultural conditionality of scientific and technical creativity. **Content:** History and philosophy of pedagogical sciences. New European science in culture and civilization, the emergence of science, its historical dynamics, the structure of scientific knowledge, philosophical problems of a specific sciences. Communication technologies of the XXI century in the field of intercultural communication. Understand and integrate philosophical | 4 | | ✓ | | | | | | | |

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| | | | | problems of the development of modern global civilization, modern topical methodological and philosophical problems of the pedagogy and linguistics. | | | | | | | | | | |
| | BD | HsC | Foreign Language (Professional) | **Purpose:** further development of foreign language communicative competence (speech, language, socio-cultural, compensatory, educational and cognitive), the development of professional skills in translating texts of professional subjects from a foreign language into Kazakh, the formation of the ability to analyze scientific texts in the specialty.<br>**Content:** Basic concepts and terms of mathematics and informatics. The content of the mathematics and computer science course in English. Methods of abstracting and translating literature in the specialty. Analysis of texts in English. Examples of the use of English in professional activities. Levels B2,C1 are presented in the form of a pragmatic professional orientation for professional and academic purposes at an advanced level: scientific information base, interpretation of scientific information, argumentation, beliefs, scientific polemics, academic writing. The use of innovative methods and technologies, and the involvement | 4 | ✓ | | | | | | | | | |

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| | | | | of modern means (Internet resources). Demonstration of knowledge of language material in any related discipline | | | | | | | | | | |
| | BD | HsC | Psychology of Management | **Purpose:** formation of knowledge about the psychological content and structure of management activities, psychological characteristics of the personality of the head and psychological patterns of joint activity of people to achieve organizational goals, formation of practical skills of psychological support of management activities in various fields of education. **Content:** Management psychology as a field of scientific knowledge. Basic concepts and laws in management psychology. The main methods of psychological influence. The role of a psychologist in the organization and system of management relations. Features of conducting psychological research in organizations of various forms of ownership. The head as a subject of management activity. Leadership and leadership. Leadership style. Psychological support of management activities. Structural organization of management activities. Psychological management methods. Psychology of business relations. Psychological conditions of effective | 3 | | | ✓ | | | | | | |

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| | | | | psychological interaction. Management of organizational conflicts. | | | | | | | | | | |
| | BD | HsC | Pedagogy and psychology of higher school | **The purpose of the course** is to develop undergraduates' skills and abilities to effectively organize professional and pedagogical activities at a university based on modern psychological and pedagogical knowledge<br>**Course content:** Modern paradigms of higher education. History, trends and strategies of higher education development in Kazakhstan. The subject, tasks, and categories of higher school pedagogy and psychology. Methodological foundations of higher school pedagogy and psychology. Professional competence of a university teacher. The communicative competencies of a university teacher. Higher school didactics. Psychological features of student age.The university learning process and its patterns. The content of education at the university. Forms of organization of the educational process at the university. Technologies of organization and implementation of the educational process at the university. Features of the credit training system. Methods and methods of teaching. | 5 | | | | ✓ | | | | | |
| Metodical | PD | HsC | AI for | **Purpose:** Teaching undergraduates the | 5 | | | | | ✓ | | | | |

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|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Fundamentals of Teaching | | | solving STEM problems | basics of artificial intelligence and its application possibilities in STEM fields, developing skills in designing and using intelligent systems.<br>**Content:** Basic concepts and history of artificial intelligence. Fundamentals of machine learning and neural networks. Methods of data processing and analysis. Practical application of AI algorithms in STEM fields: robotics, bioinformatics, ecology, engineering. Principles of intelligent systems design. Ethics and safety issues. Prospects for the development of AI technologies. | | | | | | | | | | |
| | BD | HsC | Pedagogical practice | Knowledge and understanding of the methodological foundations of modern education, the dialectical connection of pedagogical theory and school practice. To be able to present their new scientific results in the form of well-founded conclusions, to draw up the results of work in the form of reports, to draw up the research results in the form of articles, reports, to analyze the essence of the main modern methods and technologies of school education | 4 | | | | | ✓ | | | | |
| STEM education | BD | EC | Modern STEM learning Practices in Computer Science | **Purpose:** Teaching undergraduates modern methods and technologies of teaching computer science in the framework of STEM education, improving practical skills using innovative teaching tools. | 4 | | | | | | ✓ | | | |

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| | | | | **Content:** STEM is an educational concept and its role in computer science. New pedagogical technologies and teaching methods. Fundamentals of robotics, programming, artificial intelligence and data science. The use of virtual and augmented reality in education. Organization and evaluation of STEM projects. The best practices in Kazakhstan and world practice. Development of creative and critical thinking in computer science. | | | | | | | | | | |
| | BD | EC | Natural Sciences and STEM | **Purpose:** Mastering the ways for undergraduates to integrate the basics of natural sciences (physics, chemistry, biology, geography) within the framework of STEM education, developing skills in teaching disciplines through project and practical activities. **Content:** The content and interrelation of natural sciences. STEM-the theoretical foundations of education. The importance and methods of integration training. Development of engineering and scientific thinking. Laboratory work and project assignments in the natural sciences. Integrated lesson templates with robotics, programming and mathematics. Educational resources and textbooks on STEM. | 4 | | | | | | ✓ | | | |

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| | BD | EC | Methods of Teaching Robotics in Education | **Purpose:** to teach the basic concepts of robotics in future professional activity, to give an overview of the main definitions and their content, capabilities and to form the necessary qualifications and skills.<br>**Content:** Fundamentals of robotics, fields of application, types of robotics. History and prospects of robotics. International robotics competitions. Intellectual robotic systems, technologies related to the development and use of robots. Management and work with computer systems of sensory feedback and information processing. | 6 | | | | | | | | ✓ | |
| | BD | EC | Methods and technologies of STEM Education | **Purpose:** training of professionals interested in research work in STEM laboratories, trained to work with modern technologies of modern equipment and innovative programs, ready to master new knowledge about new technologies.<br>**Content:** STEM-theoretical foundations of education. Conducting STEM education. STEM learning opportunities. STEM technology methodology. The demand for STEM technology. STEM learning opportunities. STEM-ways of organizing the educational process. The use of AI in STEM education. | 6 | | | | | | | ✓ | | |

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| | | | | Development of STEM education in Kazakhstan. Directions of STEM education. International and domestic experience in organizing research work of students in STEM areas. International cooperation in the field of STEM education development. | | | | | | | | | | |
| | PD | | Research practice | To know and understand the definition of an object, the patterns of development of research discipline. Justification of the relevance of the chosen topic of the dissertation, a description of the current state of the problem under study, the selection of the main literature used as the basis of the theoretical basis of the study, the collection of specific materials for the dissertation. Formation of conclusions, modeling, processing and interpretation of the results. | 6 | | | | | | | | | ✓ |
| Tachnology of realization of programmatic facilities | PD | EC | Introduction to STEM | **Purpose:** to give an idea of the concepts and current issues of STEM education at the national and global levels.<br>**Content:** General understanding of STEM. STEM education. Relevance, purpose and objectives of STEM education. Principles and advantages of STEM education. Areas of application of STEM technology. STEM Skills: definition and examples. International and Kazakhstani experience in the | 4 | | | | | | | ✓ | | |

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| | | | | implementation of STEM education. . Kazakhstan's experience in implementing STEM education. The experience of foreign countries in the field of STEM education. The use of STEM technology in preschool education. The introduction of elements of STEM education in elementary schools. Teaching natural sciences using STEM technology. STEM education through modern programs. STEM education using 3D modeling. STEM and robotics. | | | | | | | | | | |
| | PD | EC | SMART Education | **Purpose:** to increase the level of professional competencies of future teachers in the implementation of SMART learning in the educational process in order to personalize and optimize learning outcomes and instill skills in the application of modern teaching methods.<br>**Content:** SMART-educational technology, goals and objectives. The role of SMART technologies in the modern educational process. SMART is an educational methodology. The concept of "Smart education". The meanings of Smart concepts. The experience of using Smart technologies in the educational process. The experience of using SMART technologies in the process of teaching | 4 | | | | | | | ✓ | | |

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| | | | | the subject "Computer Science". The use of SMART learning in the educational process. Mobile learning. Smart textbook and Smart teacher. Smart tutorials. Modern problems of Smart technologies. The impact of Smart technologies on education and society. Smart technologies in higher education. Smart society. | | | | | | | | | | | |
| | PD | EC | Use of Statistical Methods when processing Result of Pedagogical Experimants | **Purpose:** To teach undergraduates to process pedagogical experiment data using statistical methods, to develop the ability to correctly analyze and interpret the results. **Content:** Statistical bases of pedagogical experiment. Data collection and organization. Descriptive statistics: arithmetic mean, median, mode, variance, standard deviation. Hypothesis testing methods: t-test, F-test, $\chi 2$-test. Correlation and regression analysis. Data visualization methods. Compilation of statistical conclusions and scientific presentation of the results. | 4 | | | | | | | | | | ✓ |
| | PD | EC | Mathematical Methods of Processing Results of Pedagogical Experiments | **Purpose:** Mastering mathematical and statistical methods used by undergraduates in processing the results of pedagogical research and experiments, developing the ability to analyze and interpret the data obtained. **Content:** Features and structure of the pedagogical experiment. Methods of | 4 | | | | | | | | | | ✓ |

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|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | collecting and organizing statistical data. Data description statistics: mean, variance, standard deviation. Hypothesis testing methods: t-test, t2-test, correlation and regression analysis. Mathematical modeling and data visualization. Scientific processing and analysis of pedagogical research results. | | | | | | | | | | |
| | PD | EC | Online Educational Platforms | **Purpose:** Mastering the types and features of online educational platforms by undergraduates, developing skills in effective organization of the educational process using their functionality.<br>**Content:** General characteristics of online educational platforms. Popular platforms (Moodle, Coursera, Khan Academy, EdX, etc.). Structure and functionality of platforms. Create and manage online courses. Interaction between students and teachers. Evaluation and feedback systems. Advantages and problems of distance learning. Platform integration and usage experience. | 5 | | | | | | ✓ | | | |
| | PD | EC | Digital Technologies in Education | **Purpose:** Master's students master the basics of using digital technologies in the educational process, develop skills to improve the quality of education through the effective use of modern digital tools.<br>**Content:** Types of digital technologies and their role in education. Electronic | 5 | | | | | | ✓ | | | |

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|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | textbooks and virtual resources. Online learning platforms and tools. Methods of using information and communication technologies (ICT). Creation and use of multimedia content. Digital literacy and security. Distance learning and hybrid educational formats. | | | | | | | | | | |
| | PD | EC | Digital teacher | **Purpose:** development of information culture in modern education, creation of a digital learning environment, experimental development of new electronic educational products, acceleration and simplification of the educational process; broadening the horizons of students, opening the possibility of obtaining new knowledge. **Content:** The main directions and trends in the development of digital education in modern society. State policy in the field of digitalization of the education system. Artificial intelligence in education. The paradigm of digital education. Digital pedagogy in the educational space and its place in the system of science. Basic concepts and categories of digital pedagogy. The formation of digital pedagogy as a new direction of pedagogical science. Personal development in digital pedagogy. Digital pedagogy in the context of personal self-education. | 6 | | | | | | | ✓ | | |

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| | | | | Methodological knowledge in the field of quantitative learning theory. Didactics of digital learning. Independent work of students in digital pedagogy. E-learning tools as a resource for organizing the educational process in digital pedagogy.The role and functions of a teacher in digital pedagogy and modern requirements for his competencies. | | | | | | | | | | |
| | PD | EC | Working with Mobile Apps | **Purpose:** formation of knowledge about the basic device of the Android platform and the capabilities that this platform provides for the development of mobile systems; obtaining practical skills in creating user interfaces, services, and using information repositories within the framework of this platform.<br>**Content:** Learning Android OS. Installing and configuring the Android Studio IDE. Basic programming questions Basic programming questions of mobile applications. Working with the layout editor in the Android Studio IDE. Creating a parent layout, setting internal and external margins. Creating applications that implement working with controls.Working with activities in the development of mobile applications. Implementation of data transfer mechanisms between activities. | 6 | | | | | | | ✓ | | |

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|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Conducting unit testing of developed applications using Mockito and Hamcrest libraries. | | | | | | | | | | |
| Subject-Oriented | BD | EC | Leadership and Teamwork | **Purpose:** Improving the quality of organizational and teamwork by teaching students leadership theories and methods, developing effective team building and management skills. **Contents:** Basic concepts and types of leadership. Leadership styles and their impact on the team. Stages of team building and development. Intra-group communication and motivation. Methods of conflict management and resolution. Methods of strengthening cooperation and partnership. Group decision-making and responsibility. Practical exercises and case studies. | 4 | | | | | | ✓ | | | |
| | BD | EC | Project Management | **Purpose:** Master's students master the theoretical foundations, methods and tools of project management, develop skills in effective planning, organization and control of projects. **Content:** Project definition and design cycles. Stages of project management: planning, execution, control and completion. Time, budget, and resource management. Methods of risk identification and management. Create and manage a project team. Project management tools (Gantt charts, critical path method, etc.). Agile and Waterfall | 4 | | | | | | ✓ | | | |

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|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | methodologies. Project quality assurance and evaluation. | | | | | | | | | | |
| | PD | EC | Cloud Technologies | **Purpose:** Master's students master the basics of cloud technologies, activities and application opportunities in areas such as education, business, manufacturing, and the development of skills in the effective use of cloud services.<br>**Content:** Basic concepts and architecture of cloud computing. Types of cloud services: IaaS, PaaS, SaaS. Cloud platform and infrastructure. Advantages and security aspects of cloud technologies. The use of cloud technologies in the field of education. Cloud-based data storage and processing. Management and integration of cloud services. | 6 | | | | | | | ✓ | | |
| | PD | EC | Digitalization of Education | **Purpose:** Master's students will master the theoretical and practical foundations of digitalization in education, develop automation skills and effectively organize educational processes using modern information technologies.<br>**Content:** The concept and stages of development of digitalization of education. Digital platforms and systems (LMS, electronic libraries, databases). Organization of the educational process based on information technology. Pedagogical | 6 | | | | | | | ✓ | | |

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|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | and administrative aspects of the introduction of digital technologies. Data collection, storage and analysis. Distance learning and online education. The impact of digitalization on the quality of education and development prospects. | | | | | | | | | | |
| Scientific and Pedagogical Informatics | PD | EC | Big Data | **Purpose:** mastering the theoretical and practical knowledge of undergraduates and using modern information technologies and software tools, acquiring skills that make it possible to manage time more effectively based on available resources and limitations in solving professional tasks.<br>Contents: Basic definitions, terms, and tasks of big data analysis. Modern software tools for big data analysis. Prerequisites for the formation of a big data trend.Big data tools. Big data analysis. Cognitive data analysis. Mathematical statistics. Visual display of data. Data MINING methods. The mathematical apparatus of DM. DM standards. Graph analysis methods. Tools for applied data analysis. Data warehouses. A distributed NoSQL database. Solving data production problems. Problems of classification and clustering. Big data: modern approaches to processing and storage. Technical difficulties of working with | 6 | | | | | | | | ✓ | |

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|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | big data. The role of big data in solving analytical and research tasks of professional activity. | | | | | | | | | | |
| | PD | EC | Machine Learning | **Purpose:** To develop practical skills by teaching undergraduates the basics of machine learning, basic algorithms and their application in real life.<br>**Content:** Definition of machine learning and development history. Fundamentals of machine learning. The principles of machine learning. Machine learning classes. Technical means of learning: Basic concepts of machine learning. Classification of machine learning tasks. Learning with a teacher: classification, setting the regression problem. The concept of retraining and generalizing abilities. Basic concepts: data, models, types of training. A logical machine learning model. Basic algorithms: linear regression, decision trees, clustering, neural networks. Evaluation criteria and methods for improving the model. The standard machine learning library. Ethical and security issues in machine learning. | 6 | | | | | | | | ✓ | |
| | PD | EC | Intelligent robotic systems | **Purpose:** Teaching undergraduates the theoretical foundations and principles of the functioning of intelligent robotics systems, developing skills in the application of artificial intelligence methods in robotics. | 6 | | | | | | | | ✓ | |

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|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | **Contents:** Definition and structure of intelligent robotic systems. Fundamentals of artificial intelligence and machine learning. Sensors and control systems. Principles of autonomous operation of robots. The use of neural networks and logical algorithms. Planning and navigation in intelligent robotics. Practical design and programming. Fields of application: industry, medicine, education, etc. | | | | | | | | | | |
| | PD | EC | Robotics in education | **Purpose:** Teaching undergraduates the basics of robotics, ways of its application in the educational process, the development of creative and engineering thinking abilities.<br>**Content:** Definition and basic concepts of robotics. The structure and main components of robots. Robotics platforms and tools (LEGO Mindstorms, Arduino, Raspberry Pi, etc.). Methods and technologies of robotics training. Practical design and programming. Organization of robotics classes. Prospects of robotics in the field of education. | 6 | | | | | | | | ✓ | |
| | PD | EC | Augmented Reality | **Purpose:** Development of practical skills of undergraduates by mastering the theoretical foundations, principles of operation, devices and applications of augmented reality (AR) technologies.<br>**Content:** Definition and history of | 6 | | | | | | | ✓ | | |

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|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | augmented reality. Hardware and software tools of AR technologies. Sensors and user interfaces. Methods of 3D modeling and input of virtual objects. AR applications: education, medicine, gaming industry, manufacturing. The basics of creating AR projects. Safety and ethical issues. The future and trends of augmented reality. | | | | | | | | | | |
| | PD | EC | Principles of Virtual and Augmented Reality | **Purpose:** formation of undergraduates' knowledge and skills in the field of virtual and augmented reality applications within the framework of digital technologies.<br>**Content:** Theoretical foundations of virtual and augmented reality technologies. The concept of augmented and virtual reality technologies. Opportunities, threats, and recommendations of virtual reality technologies. Visualization and interaction devices for immersive environments. Augmented reality applications. Virtual reality applications. High-performance virtual and augmented reality applications. Virtual reality technologies in education. The current state of the use of augmented and virtual reality in education. Methodological recommendations on the use of | 6 | | | | | | | ✓ | | |

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|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | augmented and virtual reality in the educational process. | | | | | | | | | | |
| Module of Scientific research work and Final Certification | | | Research Work of a Master Student, Including Passing an Internship and Completing a Master's Thesi | Knowledge and understanding of the goals and objectives of research practice, conducting bibliographic work on the topic of the dissertation, processing and analysis of the data. The ability to compare the results of their research with the data available in science, to provide a critical approach to the results of their research, to be ready for professional self-improvement and the development of creative potential and professional mastery. | 24 | | | | | | | | | ✓ |
| | | | Execution and Defense of Master`s Thesis | Knowledge and understanding of the final qualification work of graduates of the master's program as a document confirming the competency obtained in the learning process in accordance with the chosen specialty of training. The ability to defend a master's thesis at an open meeting of the SAC with the participation of the chairman of the commission and at least half of its composition. Knowledge and understanding of the order and regulation of the defense of the master's thesis. | 8 | | | | | | | | | ✓ |

## 5 SUMMARY TABLE SHOWING THE VOLUME OF CREDITS IN THE CONTEXT OF THE MODULES OF THE EDUCATIONAL PROGRAMME

| Trainingcourse | Semester | Number of modules to be mastered | Numberofsubjectsstudied | | | Numberofsubjectsstudied | | | | | Totalhours | Totalcredits KZ | Number | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | GC | VC | EC | Theoreticaltraining | Pedagogicalpractice | Research. practice | Research work of a master's degree student | Finalcertification | | | exam | differentiated credit |
| 1 | 1 | 5 | | 5 | 2 | 29 | | - | 1 | - | 900 | 30 | 6 | 2 |
| | 2 | 5 | | 1 | 4 | 23 | 4 | | 3 | - | 900 | 30 | 4 | 2 |
| 2 | 3 | 4 | | | 3 | 21 | | 7 | 2 | - | 900 | 30 | 3 | 2 |
| | 4 | 1 | | | 0 | 0 | | - | 18 | 12 | 900 | 30 | | 1 |
| total | | | | 6 | 9 | 73 | 4 | 7 | 24 | 12 | 3600 | 120 | 13 | 7 |

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

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| **Learning strategies** | Studentcentred Approach in Education: learner – teaching center / learning and an active participant in the learning and decision-making process.<br><br>Practice-oriented training: orientation to the development of practical skills. |
| **Teaching methods** | Conducting lectures, seminars, various types of practices:<br>• using innovative technologies:<br>problem-based learning;<br>case study;<br>work in a group and creative groups;<br>discussions and dialogues, intellectual games;<br>reflection methods,<br>Bloom's taxonomies;<br>presentations;<br>• rational and creative use of information sources:<br>multimedia training programs;<br>electronic textbooks;<br>digital resources.<br>Organization of independent work of undergraduates, individual consultations. |
| **Monitoring and evaluation of the achievability of learning outcomes** | Current control on each topic of the discipline, control of knowledge in classroom and extracurricular classes (according to syllabus). Assessment forms:<br>• survey in the classroom;<br>• testing on the topics of the discipline;<br>• control works;<br>• protection of independent work;<br>• discussions; |

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| | • trainings;<br>• colloquiums;<br>• abstract, etc .<br>Boundary control at least twice during one academic period within the framework of one academic discipline.<br>Intermediate certification is carried out in accordance with the working curriculum, academic calendar.<br>Forms of conducting:<br>• exam in the form of testing;<br>• oral examination;<br>• written exam;<br>• combined exam;<br>• project protection;<br>• protection of practice reports.<br>Final state certification. |

## 7 Educational and resource support for EP

| | |
|---|---|
| **Educational Information Center** | The structure of the Educational Information Center includes 6 subscriptions, 16 reading rooms, 2 electronic resource centers (ERC). The basis of the network infrastructure of the Educational and Information Center is 180 computers with Internet access, 110 workstations, 6 interactive whiteboards, 2 video doubles, 1 video conferencing system, 3 A-4 format scanners, JIC software - AIBS "IRBIS-64" under MS Windows (basic set of 6 modules), stand-alone server for uninterrupted operation in the IRBIS system.<br>The library fund is reflected in the electronic catalog available to users on the site http://lib.ukgu.kz on-line 24 hours 7 days a week.<br>Thematic databases of their own generation: "Almamater", "Proceedings of SKSU scientists", "Electronic archive" have been created. Online access from any device 24/7 via the external link http://articles.ukgu.kz/ru/pps.<br>Catalogs are processed electronically. EC consists of 9 databases: "Books", "Articles", "Periodicals", "Proceedings of the teaching staff of SKSU", "Rare Books", "Electronic Fund", "SKGU in Print", "Readers" and "SKU".<br>The EIC provides its users with 3 options for accessing its own electronic information resources: from the “Electronic Catalog” terminals in the catalog hall and in the EIC subdivisions; through the information network of the university for faculties and departments; remotely on the library website http://lib.ukgu.kz/.<br>Open access to international and republican resources: "SpringerLink", "Polpred", "Web of Science", "EBSCO", "Epigraph", to electronic versions of scientific journals in the public domain, "Zan", "RMEB", "Adebiet", Digital library "Aknurpress", "Smart-kitar", "Kitar.kz", etc.<br>For people with special needs and disabilities, the library website has been adapted to the work of visually impaired users |
| **Material and technical base** | The material and technical base of the Department of Informatics includes the following classrooms and computer classes:<br>- there are 3 computer classes for laboratory work, one of them with an interactive whiteboard; |

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|---|---|
| | - lecture halls;<br>- STEM center.<br>Practice bases for undergraduates:<br>1. South Kazakhstan State Pedagogical University.<br>2. M.Utebayev Higher College of New Technologies<br>3.KazTilDamu LLP |

## APPROVAL SHEET

On the Education Program 7M01535- «STEM Education»

Director of the Department of
Academic Affairs and Quality
of the Educational Proces _____ A.S. Naukenova

Director of DASc _____ Nazarbek U.B.

Appendix 1

**REVIEW**

on the educational program
«7M01535 - STEM Education»
developed in M. Auezov SKU, Shymkent

**1. Brief description of the enterprise and its business profile**

RSE M. Auezov South Kazakhstan University is a leading multidisciplinary university in the Turkestan region. In the structure of the university there is a Natural Science and Pedagogical Higher School, on the basis of which the proposed EP is supposed to be implemented. The department "Computer science" is determined responsible for the implementation of EP.

**2. The relevance and demand for EP**

The educational program "7M01535 – STEM education" is relevant and in demand in the context of the implementation of state programs of the Republic of Kazakhstan aimed at digitalization of education, development of engineering and technical potential and formation of functional literacy of students. The modern education system needs a new generation of teaching staff capable of integrating science, technology, engineering and mathematics into the educational process, applying interdisciplinary and design-research approaches, as well as using digital and educational technologies.

Graduates of the educational program have professional competencies in the field of STEM pedagogy, are able to design and implement training sessions, elective courses and educational projects using a STEM approach, digital laboratories, robotics, modeling and research activities. They carry out scientific, pedagogical and methodological activities, monitor educational outcomes, develop and implement innovative teaching methods that meet the modern requirements of the education system of the Republic of Kazakhstan and international educational trends.

**3. Learning outcomes and competencies, their relationship with the demands of the labor market**

The training results and competencies included in the EP, the provided theoretical knowledge, practical skills and professional skills fully meet the modern qualification requirements for specialized specialists of the master's qualification.

**4. Availability of components that develop practical skills**

Educational program "7M01535 – STEM education" includes practice-oriented academic disciplines, pedagogical and research practices aimed at developing professional pedagogical skills in the field of STEM education for undergraduates, including the design and implementation of STEM lessons and educational projects, the application of an interdisciplinary approach, digital educational technologies, research and engineering teaching methods, as well as the use of equipment STEM laboratories and modern educational resources in academic and extracurricular activities, this ensures that graduates are ready to work effectively in the education system of the Republic of Kazakhstan.

**5. The Contents: of the educational program (modules, disciplines)**

The proposed educational program contains all the necessary elements for the effective organization of the educational process – regulates the goals, expected results, content, conditions and

technologies for the implementation of the educational process, assessment of the quality of training a specialist with a master's degree. It includes a curriculum, work programs of training courses, modules and disciplines, related materials: programs of pedagogical, research practice, academic calendar, educational and methodological complexes of disciplines.

The content of the curriculum fully corresponds to the direction of training specialists, is thought out and competently equipped with content. The academic disciplines included in the plan cover the entire range of topical issues and problems in the field of training, are fully capable of forming the necessary specialized knowledge, skills and abilities in the field of information technology.

The distribution of disciplines by academic periods is rationally and logically verified. All types of educational activities are provided for the preparation of highly qualified specialists with the skills of research work - theoretical training, pedagogical and research practice, writing and defending a dissertation. The planned volume and time resource for academic disciplines and types of training meet the qualification requirements for the level of graduates.

In accordance with the credit technology of education, the curriculum includes mandatory academic disciplines, as well as disciplines of the university component and an optional component. Compulsory disciplines provide the formation of general and professional competencies. The disciplines of the university component and the component of choice expand and deepen the training of students, contribute to obtaining additional competencies, knowledge and skills necessary to ensure the graduate's competitiveness with the requirements of the labor market.

**6. The quality of filling information about the disciplines**

The composition of educational modules covers all relevant areas of training specialists in the field of information technology. The Contents: of the table "Information about disciplines" of the educational program includes the following information: module name, cycle, type of discipline, name of the discipline and its brief description, number of credits, codes of learning outcomes, and also correspond to the adopted competence model of the graduate.

**7. Conclusion on the EP**

Based on the above, we can say that the goals and content of the proposed educational program meet the modern qualification requirements for the preparation of masters specializing in education under the educational program «7M01535 - STEM Education»

Expert,
Candidate of Technical Sciences, Associate Professor,
Head of the Department of "Informatics"
of the South Kazakhstan Pedagogical University
O.Zhanibekov University _____ L.A. Suleimenova

Appendix 2

**Expert conclusion**

on the educational program
«7M01535 - STEM Education»

**1. The relevance of the EP**

The educational program "7M01535-STEM education" is relevant in the context of modernization of the education system of the Republic of Kazakhstan, digitalization of the educational process and the implementation of the STEM approach at all levels of Education. The modern educational environment requires the training of teachers who can combine science, technology, engineering and mathematics, use interdisciplinary, design-research and digital teaching methods, as well as form critical, engineering and research thinking in students. The implementation of this educational program meets state priorities in the field of human capital development, training of a new generation of teachers and improving the quality of STEM education.

**2. Compliance of EP with formulated objectives, consistent with the mission of the university, the needs of employers and students**

The educational program "7M01535 – STEM education" was developed in accordance with the mission of the university, focused on the formation of innovative thinking, the development of a research culture and the training of competitive teaching staff. The goals, objectives and expected learning outcomes of the OP are aimed at training masters with professional competencies in the field of STEM pedagogy, capable of designing and implementing educational programs, training modules and projects using modern pedagogical and digital technologies.

The content of academic disciplines, practices and research work meets the requirements of employers focused on training qualified STEM teachers, and also meets the educational needs of undergraduates and current trends in the development of the education system of the Republic of Kazakhstan.

**3. Compliance with the National Framework of Qualifications of the Republic of Kazakhstan**

The objectives and Contents: of the EP correspond to level 7 of the National Qualifications Framework of the Republic of Kazakhstan.

**4. Reflection in the OP of learning outcomes and competencies based on Dublin descriptors laid down in professional standards / industry framework**

The OP is harmonized with the Dublin descriptors, the 2st cycle of the Qualifications Framework for the European Higher Education Area (A Framework for the European Higher Edication Area), and also the 7th level of the European Qualifications Framework for Lifelong Learning.

**5. Compliance with the classification of training areas with higher education**

The educational program corresponds to the direction 7M015 Training of teachers in natural science subjects of the classifier of training areas with higher education.

**6. The structure and Contents: of the EP, the application of the modular principle of their construction**

In accordance with the credit technology of education in the EP, a modular construction principle is laid. The curriculum includes disciplines of the university component and disciplines of the component of choice. The disciplines of the university component ensure the formation of general and professional competencies. Elective component disciplines broaden and deepen the training of students, contribute to obtaining additional competencies, knowledge and skills necessary to ensure the graduates' competitiveness with the requirements of the labor market.

The composition of educational modules covers all relevant areas of training highly qualified specialists in the field of information technologies that are competitive in the domestic and international labor markets.

**7. The presence in the OP of components to prepare for professional activities, developing key competencies, intellectual and academic skills, reflecting the changing requirements of society, including the implementation of the presidential program for mastering three languages: Kazakh, Russian and English.**

The Contents: of the EP corresponds to the focus of training, thought out and well-equipped with meaningful Contents: . The included academic disciplines cover the whole range of topical issues and problems and problems according to the profile of training, are fully able to form the necessary specialized knowledge, skills and abilities of information technologies, suggest mastering Kazakh, Russian and English languages.

**8. The logical sequence of disciplines and the reflection of the basic requirements in the curricula and training programs**

The distribution of disciplines by academic periods is rationally and logically verified. All types of educational activities are provided for the preparation of highly qualified specialists with the skills of research work - theoretical training, pedagogical and research practice, writing and defending a dissertation. The planned volume and time resource for academic disciplines and types of training meet the qualification requirements for the level of graduates.

The structural parts of the educational program are interrelated, continuous, aimed at achieving the planned comprehensive result and are disclosed in depth and in full.

Methodological equipment of the educational program contributes to the successful solution of tasks in key areas of training, education and development of undergraduates.

**9. Reflection in the EP of the system of accounting of the academic load of students and teachers in loans, its compliance with the parameters of the credit system of education.**

The content of the OP fully complies with the requirements of the credit technology of education, including in terms of accounting for the academic load of teachers and undergraduates in loans. 120 credits are provided.

**10. Presence in programs of industrial practice for fixing the theoretical material expressed in the academic load in credits**

The educational program provides for the following types of practices: pedagogical practice in the amount of 4 credits, research in the amount of 6 credits.

There are 24 credits for master's research work, including internship and dissertation, 8 credits for the design and defense of a master's thesis.

**11. Qualifications obtained as a result of the mastering of EP**

Upon mastering the OP, it is planned to assign the graduate the qualification of Master of Pedagogical Sciences according to the educational program «7M01535 - STEM Education».

**12. Recommendations**

In accordance with the above, it seems possible to assert that the goals and content of the OP meet the modern requirements for the preparation of masters specializing in mathematics and computer science.

It is recommended to accept the presented educational program for implementation.

Chairman of the Expert Committee,
Dean of the Graduate School of Natural Sciences and Pedagogy
of M. Auezov South Kazakhstan University — Madiyarov N.K.,

Members of the Expert Committee: — Musabekov A.T.

Abdraimov R.T.