

M.AUEZOV SOUTH KAZAKHSTAN UNIVERSITY



EDUCATIONAL PROGRAM

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MINISTRY OF SCIENCES AND HIGHER EDUCATION OF THE REPUBLIC OF
KAZAKHSTAN

Non -profit Limited Company M.Auezov South Kazakhstan University



«APPROVED»

Chairman of the Board-Rector
D.Zh. Ahmed-Zaky
03 2026.

EDUCATION PROGRAMME

7M01534 - "Mathematics and Computer Science"

Registration number	7M01500272
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	M010 Teacher training in mathematics
Type of 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

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 or the Higher School, Minutes # 6 «23» 02 2026 y.

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 2026 y.

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 2026 y.

Drafters:

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1 CONCEPT OF THE PROGRAM

University Mission	We are focused on generating new competencies, training a leader who translates research thinking and culture.
University Values	• Openness - open to change, innovation and cooperation. • Creativity - generates ideas, develops them and turns them into values • Academic freedom - free to choose, develop and act. • Partnership - creates trust and support in a relationship where everyone wins. • Social responsibility - ready to fulfill obligations, make decisions and be responsible for their results.
Graduate Model	• Deep subject knowledge, their application and continuous expansion in professional activity. • Information and digital literacy and mobility in rapidly changing conditions. • Research skills, creativity and emotional intelligence. • Entrepreneurship, independence and responsibility for their activities and well-being. • Global and national citizenship, tolerance to cultures and languages.
The uniqueness of the educational program	The uniqueness of the 7M01534 Mathematics-Computer Science master's program lies in its pedagogical focus and integration of two fundamental disciplines (mathematics and computer science), which allows for the training of highly qualified, competitive, and competent educators capable of effectively teaching both disciplines at a modern level. Key features and uniqueness of the program • Integrated approach: The program combines in-depth study of the theoretical foundations of mathematics and applied aspects of computer science, including programming, databases, computer architecture and system software. This provides graduates with broad erudition and versatility. • Dual qualification: Graduates have competencies in the field of education, which makes them in-demand specialists capable of solving complex pedagogical tasks and using modern information technologies in teaching. • Relevance: The program trains personnel who meet the modern requirements of the Kazakhstani education system, where there is a growing need for qualified teachers of natural sciences who are proficient in digital technologies. • Development of key skills: The training is aimed at mastering logical and algorithmic thinking, data analysis, and the application of mathematical methods in information technology, which is critical in the modern world. • Practical orientation: The program is focused on developing practical skills necessary for further professional activities, including the development of algorithms, data analysis, and working with information systems. Thus, the uniqueness of the program lies in the synergy of mathematical knowledge and information competencies aimed at forming a new generation of teachers who can effectively work in the context of digital transformation in education.

Academic Integrity and Ethics Policy	The university has taken measures to maintain academic integrity and academic freedom, protection from any type of intolerance and discrimination: • Rules of academic integrity (order No. 212 of October 10, 2022); • Anti-corruption standard (order No. 221 n/a dated 12/07/2021). • Code of Ethics (Order No. 212 of October 10, 2022)
Regulatory and legal framework for the development of EP	1. Law of the Republic of Kazakhstan “On Education”; 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 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 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, <u>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.</u> 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 6. Qualification reference book for positions of managers, specialists and 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. 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 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 • Student-centered learning • Availability • Inclusivity
Quality assurance of the Educational program	• Internal quality assurance system • Involvement of stakeholders in the development of the Educational Program and its evaluation • Systematic monitoring • Actualization of the content (updating)
Requirements for applicants	They are established in accordance with the Standard Rules for admission to training in educational organizations implementing educational programs of higher and postgraduate education by order of the Ministry of Education and Science of the Republic of Kazakhstan No. 600 dated October 31, 2018,

	with changes and additions dated June 2, 2023. No. 252
Conditions for the implementation of educational programs (EP) for persons with disabilities and special educational needs (SEN)	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. An individual differentiated approach is provided for all types of classes and in the organization of the educational process.

2 PASSPORT of the educational program

Purpose of the EP	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; - Establishing conditions for the development of in-demand knowledge and skills, as well as a conscious attitude towards enhancing the welfare of society and conserving the planet within the framework of the SDGs - 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; - 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; - 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; • Dublin descriptors of the 7th level of qualification; • 2 cycle of a Framework for Qualification of the European Higher Education Area); • 7 th Level of European Qualification Framework for Life long Learning).

Connection of the EP with the professional sphere	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. OThe 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.
Name of the degree awarded	Upon successful completion of the educational program, the graduate is awarded the degree of "Master of Pedagogical Sciences in educational program 7M01534 - Mathematics and Computer Science".
List of qualifications and positions	Teacher, teacher-moderator, teacher-expert, teacher-researcher, and teacher-master. Order of the Minister of Education and Science of the Republic of Kazakhstan dated July 13, 2009, No. 338 "On Approval of the Standard Qualification Characteristics of Teacher Positions".
Field of professional activity	The scope of professional activity is - Education system (school, college, university); - Research organizations.
Objects of professional activity	- educational institutions (higher education institutions, educational institutions)); - state educational institutions; - educational service centers; - educational and research centers; - various forms of ownership that use mathematics and computer science methods in their work. - educational institutions of various forms of ownership that use computer technology in their work.
Subjects of professional activity	- The system of theoretical knowledge in mathematics and computer science; - Theoretical and methodological bases of scientific research in pedagogy; - Research methodology in the field of mathematical and computer education; - A system of methods for implementing research results in practical training; - Mechanisms for commercialization of research results; - a system of practical skills for the development of scientific and methodological complexes, author's courses; - system of higher education pedagogy; - systems of educational psychology; - pedagogical management system; - development of educational and methodical materials; - application of norms, rules, forms, methods and tools of international cooperation in the professional sphere; - Methods of teaching mathematics and computer science in secondary and special education institutions; - The system of research of the educational process and its value-oriented orientations, content, methods, forms and results; - Research system in the field of computer science, applied mathematics, pedagogy, psychology and teaching methods; -innovation and information-analytical services; - Technological process of design, implementation and maintenance of software, mathematical, information software.

Types of professional activity	- education; - training; - upbringing; - management; - research;
Learning outcomes	LO1 Effectively use a foreign language in interpersonal communication, in professional activity, in writing scientific articles; the use of modern information and digital technologies for research, for work in the educational field. 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. LO3 Evaluate the development and effective use of personnel in the organization, possess socio-psychological technologies for managing mass behavior. LO4 To develop educational and methodological complexes of disciplines taking into account the integration of education, science and innovation. LO5 To implement the educational process based on the principle of student-centered learning using practice-oriented teaching methods and technologies, and to create a psychologically favorable educational environment for inclusive education. LO6 Design digital learning materials and create multimedia content using online platforms. LO7 To model problems of applied mathematics using computer mathematical programs. LO8 Develop educational web applications and create interactive learning websites using digital technologies. 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 . Competencies of an EP graduate

GENERAL COMPETENCIES (SOFTSKILLS). Behavioral skills and personal qualities	
GC 1. Competence in managing one's literacy	SS1.1. Strive for professional and personal growth throughout life. 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. 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.
GC 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. SS 2.2. The ability of mastering the skills of mediation and intercultural understanding.
GC 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. SS3.2. The ability to plan the setting of scientific experiments, integrate and implement the results of scientific research in the

	professional field. SS 3.3. The ability to analyze and comprehend modern methods of pedagogical and psychological science and apply them in pedagogical activity.
GC 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. SS 4.2. Proficiency in the use, recovery, evaluation, storage, production, presentation and exchange of information in a wide range of digital devices. SS 4.3. Ability to confidently use global information resources and apply technological literacy in research and computational and analytical activities.
GC 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. SS 5.2. Formation of a personality capable of mobility in the modern world, critical thinking and physical self-improvement. 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. SS 5.4. Ability to adequately navigate in various social spheres of activity and in conditions of uncertainty. SS 5.5. Ability to find compromises, correlate own opinion with the opinion of the team.
GC 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. SS 6.2. The ability to create conditions for the development of creative and entrepreneurial skills of the team. 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. SS 6.4. Ability to work with consumer needs.
GC 7. Cultural awareness and ability to express yourself	SS7.1. The ability to show worldview, civil and moral positions. SS7.2. The ability to be tolerant of the traditions and culture of the peoples of the world, to have high spiritual qualities.
PROFESSIONAL COMPETENCIES (HARDSKILLS).	
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	PK2.1. The ability to show professional values: professionalism; innovation; creativity; meritocracy; integrity. PK2.2. The ability to apply the methodological foundations of design, perform mathematical research, use modern technology, in accordance with the focus of the master's degree program;
PC3 organizational and managerial	PC3.1. Ability to plan and organize the educational process • to develop and implement educational programs, working curricula and classes; • to determine the goals, objectives and results of training; • to organize classroom, extracurricular, research and project activities of students. PC3.2. Ability to manage the educational and upbringing environment • to coordinate the activities of participants in educational relations;

	• to form a positive psychological climate in the class or group. PC3.3. Ability to carry out the management and coordination of pedagogical activity • to lead methodological associations and creative pedagogical groups; • to organize the work of colleagues in the implementation of educational projects; • to participate in the management of education quality. PC3.4. Ability to use modern management tools • to apply methods of pedagogical management; • to use digital services for the organization, monitoring and analysis of learning outcomes;
PC4 pedagogical and educational	PC4.1. The ability to conduct educational and methodological work and develop methodological competence; PC4.2. The ability to improve professional qualifications; PC4.3. The ability to ensure the integration of psychological and pedagogical knowledge and knowledge in the subject area when conducting seminars/practical classes for bachelor's degree students; PC4.4. The ability to apply modern and innovative (including digital) teaching technologies.
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; 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	LO9
GC1		+	+						+
GC2	+	+						+	
GC 3			+	+		+	+		+
GC 4				+	+	+		+	
GC 5	+	+	+						+
GC 6			+	+	+		+		
GC 7	+	+	+						
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	ИИ К.И	BK/K B	Component Name	Brief course description (in 30-50 word)	Number of credits	Formed PO (codes)								
						RO1	RO2	RO3	RO4	RO5	RO6	RO7	RO8	RO9
Scientific and pedagogical training module	BD	HsC	History and philosophy of science	Goal: 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		✓							

				problems of the development of modern global civilization, modern topical methodological and philosophical problems of the pedagogy and linguistics.										
	BD	HsC	Foreign language (professional)	Goal: 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. 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	✓								

				of modern means (Internet resources). Demonstration of knowledge of language material in any related discipline										
	BD	HsC	Psychology of Management	Goal: 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			✓						

				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 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. <u>The relevance and objectives of inclusive education.</u>	5				✓	✓				

				<u>Psychological and pedagogical aspects of teaching students with special educational needs. Creating a psychologically supportive educational environment for inclusive education at universities.</u>										
Teaching methodology	PD	HsC	Methods of Teaching Mathematics in Higher Education	Goal: preparation of undergraduates for teaching mathematical disciplines in universities of various profiles. Content: General principles of the methodology of teaching mathematical disciplines in higher education. Methodological features of the study of mathematical disciplines in higher education. Conceptual provisions of teaching mathematics at a university in the Field of mathematical activity and mathematical education. Methodological principles of teaching mathematics at the university. Trends and directions of content development. Profiles of mathematical education in higher education. lecture on mathematics. Activation of students at the lecture. Problem-based learning. Methods of teaching the proof of theorems. University textbook of mathematics.	5					✓				
	BD	HsC	Pedagogical practice	<u>The relevance and objectives of inclusive education. Psychological and pedagogical aspects of teaching students</u>	4					✓				

				with special educational needs. Creating a psychologically supportive educational environment for inclusive education at universities. 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										
Fundamental problems of modern mathematics	PD	EC	Fundamental Problems of Algebra, Geometry and Logic	Goal: formation of knowledge of trends in the development of the science of algebra and geometry, the ability to solve problems of algebra, geometry and mathematical logic, the ability to demonstrate the methodology of solving problems of algebra and geometry. Content: Elements of set theory. Group. Ring. Field. Complex numbers. Expression conversion. Equations of the highest degree. Euclidean geometry. Not Euclidean geometry. Opinion. Speech operations. The structure of the mathematical proof. Types of mathematical theorems. Predicates. Quantifiers.	4					✓				

	PD	EC	Polynomial Theory	Goal: formation of systematized knowledge in the field of polynomial theory, ideas about methods and techniques for solving algebraic equations of higher degrees. Content: Monomials. The degree of a polynomial, the largest of the degrees. The standard form of the polynomial. Linear equations. Solutions of transcendental equations and systems of transcendental equations. Methods for solving problems in the theory of polynomials.						✓				
	BD	EC	Elements of Probability Theory and Mathematical Statistics in School	Goal: be able to formulate logical problems and apply mathematical logic tools to solve them, know the basic principles of mathematical logic, set theory and algorithm theory, formulas of the algebra of statements, methods of minimizing algebraic transformations, the basics of language and predicate algebra. Content: Basic concepts of probability theory. The theorem of addition and multiplication of probabilities. Repetition of tests. Distinguishing the types and types of discrete and discrete quantities. Mathematical expectation, the variance of a discrete random variable. The law of large numbers. Integral and differential probability distribution functions of a continuous	4							✓		

				random variable.										
	BD	EC	Mathematical Processing of Observations	Goal: formation of ideas about mathematical methods of collecting, systematization, processing and interpretation of observation results to identify statistical patterns, as well as ideas about the possibilities of using modern information technologies in performing mathematical processing of observation results. Content: Setting a static problem. Selection. Variation series. Empirical distribution function. Numerical characteristics of the variational series. Kolmogorov's criterion of consent. Point estimates. Interval estimates. Estimation of the parameters of the normal distribution. Correlation analysis. Methods of statistical processing on a computer. Markov chains. Basic concepts of random processes. Stationary processes. Poisson processes. Markov processes. Kolmogorov differential equations. Simulation of random processes on a computer.								✓		
Information and Communication Technology	PD	EC	Methods and Technologies of STEM Education	Goal: 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	6							✓		

				new technologies. 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. 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	EC	Methods of Teaching Robotics in Education	Goal: 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. 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.							✓				

	PD	EC	Modeling Applied Mathematics Taks in MatLab	Goal: to form the ability to use the Matlab system in solving applied problems and teach how to use it in order to simplify calculations, increase the speed of calculations. Content: Introduction to the MatLab system. Simple calculations. Vectors and operations applied to matrices. Plotting function graphs. M-files. Working in the m-file Editor. Program file. File functions. Programming in MatLab. Branching operators. Loop operators. Function research. Function intergalization. Problems of linear algebra. Solving differential equations. The main features of the SIMULINK mathematical modeling package. Organization of work with the Simulink library. Sipcsigns receiver. Scope oscilloscope. Using the ToolBoxOptimiz ation tools. Program file. ToolBox functions for solving linear and nonlinear programming problems.	6							✓		
	PD	EC	Scientific Research in Computer Modeling and Information Technologies	Goal: mastering the technology, approaches and theory of computer modeling in the design and research, the use of computer systems in the processing and management of information. Content: Basic concepts of computer modeling. Complex systems.								✓		

				Characteristics of complex systems. The goals of computer modeling of complex systems. The system principle of modeling. Classifier of modeling types. Analytical and simulation models. Stages of computer modeling. Principles of construction of modeling algorithms. The general structure of modeling algorithms. Software modeling. Information model. Mathematical model. Physical model. Computer model. Dynamic model. Probabilistic models. Deterministic models. Simulation algorithmic modeling. Properties of the model: symmetry, transitivity, reflexivity. Quantitative and qualitative assessments of models.											
	PD	EC	Digital Teacher	Goal: 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	6					✓	✓				

				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. 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	Creating Digital Learning Materials	Purpose: training of master's students who are capable of developing high-quality digital educational resources based on didactic principles and modern IT technologies. Content: Introduction to digital educational resources. Pedagogical design (ADDIE model). Types of digital educational materials. Development tools (Canva, Genially). Creating video lessons. Developing interactive assignments. Gamification in education.						✓	✓			

				LMS platforms. UX/UI design of educational materials. Adaptive learning. Using artificial intelligence. Evaluating the quality of digital resources. Copyright and licensing. Developing a project. Protecting a project										
Organization of the educational process in terms of scientific foundations	BD	EC	Scientific Foundations of Elementary Mathematics	Goal: knowledge of the theoretical-complex and logical base of mathematics, application of the axiomatic method in the construction of mathematical structures, their modeling, application of the logical structure of arithmetic and its study. Content: Algebraic equations and inequalities, algebraic and transcendental numbers, the transcendence of the numbers e and π. Properties of functions, their classification, limit, continuity, differentiation. Methods of defining and transmitting a function.	5				✓			✓		
	BD	EC	Methodical System of Teaching Mathematics	Goal: formation of skills in organizing the process of teaching mathematics based on the application of theoretical and applied knowledge gained in the study of mathematical and psychological-pedagogical disciplines, development of design-target, subject-informational, organizational-methodological, communicative, control-evaluation and diagnostic skills					✓			✓		

				of a mathematics teacher. Content: Methodological foundations of the competence approach. Scientific and psychological-pedagogical foundations of the structure and content of the mathematics course at school and higher education institution. Principles and methods and means of teaching mathematics. Planning of academic work. Scientific and methodological analysis of educational material. Analysis of methodological studies of the implementation of a competence-based approach to teaching mathematics.											
	PD	EC	Development of Educational Applications	Goal: training of master's students who are capable of designing and developing educational applications that focus on effective learning for students. Content: Introduction to educational applications. Requirements analysis and task setting. Application architecture. Fundamentals of UX/UI design. Web development (HTML, CSS, JavaScript). Frontend frameworks. Backend development. Databases and APIs. Mobile application development. Interactive elements and gamification. Integration with LMS. Use of artificial intelligence. Testing and debugging. Project development. Project defense	5									✓	

	PD	EC	Development of Electronic Educational Resources	Goal: Training of master's students who are capable of creating high-quality, interactive, and methodologically sound electronic educational resources. Content: Introduction to electronic educational resources (EER). Classification and types of EER. Pedagogical design (ADDIE, SAM). Structure and scenario of EER. Multimedia technologies. Creation of video content. Interactive elements (H5P, Genially). Testing and assessment of knowledge. LMS and integration (Moodle). SCORM and xAPI standards. UX/UI in educational resources. Use of artificial intelligence. Assessment of the quality of EER. Development of the project. Project defense									✓	
	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									✓

Scientific and pedagogical informatics	PD	EC	Informatization of Education and learning Problems	Goal: formation of basic concepts of informatization of education among undergraduates, identification of the main learning problems and finding optimal solutions to various learning problems. Content: Computer science and education. The main directions of using ICT in teaching and education management. Methods of using ICT in teaching. Informatization of education as a direction of scientific research and training of teaching staff. Multimedia technology. Computer software and methodological support. Informational educational environment. Information culture of teachers. The concept of "information culture". Psychological and pedagogical foundations of informatization of education. The influence of informatization on the methodological system of education. Pedagogical possibilities of a modern computer.	5				✓	✓				
	PD	EC	Problems of Theory and Practice of Teaching Informatics	Goal: formation and development of general cultural and professional competencies among undergraduates, formation of systematized knowledge, skills and abilities in the field of theory and methodology of teaching computer science, its main methods that allow to prepare a competitive graduate for the					✓	✓				

			field of education, ready for innovative creative implementation in educational institutions of various levels and profiles. Content: Actual problems of computer science as a fundamental science and the sphere of human activity. Modern trends and trends in the development of information technologies. Theoretical computer science and related areas: development and analysis of algorithms, program verification, recognition theory, information security problems, modern computing paradigms, social informatics, problems of free software technologies. Modern concepts of distributed computing systems.											
	PD	EC	Pedagogical Informatics	Goal: familiarization of undergraduates with the theoretical foundations, basic methods of pedagogical informatics and the main directions of the process of informatization of education and the formation of information culture of future pedagogical specialists. Content: General problems of pedagogical informatics. The purpose of teaching pedagogical informatics. Pedagogical informatics as a scientific and methodological direction. The object and subject of the study of pedagogical informatics. Basic concepts and categories of pedagogical	6				✓	✓				

				informatics. Tasks of pedagogical informatics. The connection of pedagogical informatics with other sciences.										
	PD	EC	Information Technologies in Education	Goal: formation of general cultural and professional competencies in the process of studying computer science, educational technologies and mathematics for subsequent use in educational and practical activities. Content: Information technologies in education . Goals and objectives of the use of ICT in education. Education and socialization in the information society. Using Microsoft Office to create a set of didactic materials on "mathematics and computer science". The use of digital educational resources in teaching the discipline. Software complexes for building information management systems and electronic document management systems.					✓	✓				
	PD	EC	Planning and Organization of Scientific Research	Goal: training in the selection of scientific topics, basic research methods, design of research results, development of skills in working on a manuscript, report, scientific publications and articles. Content: Classification and organization of science. The concept of science. Science and art. Classification of science. Scientific ethics.	5									✓

				Organization of science. Academic and university science. Priority areas of academic and university science. Features of scientific research. Science and scientific research. Stages of scientific research. The algorithm of scientific research. Topics of scientific research. The choice of the topic of scientific research. Significance and relevance of the topic. Research work of undergraduates. Methods of preparation of master's theses.										
	PD	EC	Organization of a Pedagogical Experiment	Goal: Training of master's students in independent conducting of pedagogical experiments and research activities in the field of education. Content: Introduction to pedagogical experiment. Methodology of pedagogical research. Types of pedagogical experiments. Formulation of the problem and hypothesis. Planning of the experiment. Selection of the sample and organization of groups. Methods of data collection. Research tools (questionnaires, tests). Conducting the experiment. Methods of data processing. Statistical analysis										✓
	BD	EC	Simulation Technologies in Education	Goal: Developing students' ability to design, implement, and evaluate simulation technologies in mathematics, computer science, and interdisciplinary courses.	5						✓	✓		

				Content: Introduction to simulation technologies. Theoretical foundations of simulation learning. Classification of simulators. Psychological and pedagogical foundations. Designing a simulation scenario. Simulations in mathematics education. Simulations in computer science education. Virtual laboratories. Debriefing and reflection. Assessment in simulation learning. Developing a mini-project. Digital platforms. Research on effectiveness. Presenting projects. Final summary												
	BD	EC	Scientific and Pedagogical Basis of Information Modeling	Goal: formation of systematized knowledge in the field of mathematical and computer modeling methods; skills of using information models on graphs in solving professional problems in the subject area. Content: Information model. Signs of the model. The purpose of modeling is the classification of models. Model construction technology types of information models analysis and processing of modeling results. Quantitative and qualitative assessment of models by parameters. Mathematical model. Interpretation in mathematical modeling. Modeling of queuing systems. Methods of modeling continuous systems. Stages of modeling. Building a model. Modeling							✓	✓				

				of socio-economic systems. Modeling of production processes.										
Module Research Work and Final Attestation			Research Work of a Master Student, Including Passing an Internship and Completing a Master's Thesis	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 A SUMMARY TABLE SHOWING THE VOLUME OF CREDITS IN THE CONTEXT OF THE
MODULES OF THE EDUCATIONAL PROGRAMME**

Training course	Semester	Number of modules to be mastered	Number of subjects studied			Number of subjects studied					Total hours	Total credits KZ	Number	
			GC	VC	EC	Theoretical training	Pedagogical practice	Research. practice	Research work of a master's degree student	Final certification			exam	differentiated credit
1	1	3		5	2	29			1		900	30	6	1
	2	2		1	4	22	4		4		900	30	4	1
2	3	1			2	11		6	3		900	20	2	1
	4	1			3	16			4		900	20	3	
	5								12	8		20		
total		7	-	6	11	78	4	6	24	8	3600	120	15	3

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

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

	• discussions; • trainings; • colloquiums; • abstract, etc . Boundary control at least twice during one academic period within the framework of one academic discipline. Intermediate certification is carried out in accordance with the working curriculum, academic calendar. Forms of conducting: • exam in the form of testing; • oral examination; • written exam; • combined exam; • project protection; • protection of practice reports. Final state certification.
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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. 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. 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. 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". 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/. 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. 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: - there are 3 computer classes for laboratory work, one of them with

	an interactive whiteboard; - lecture halls; - STEM center. Practice bases for undergraduates: 1. O.Zhanibekov South Kazakhstan Pedagogical University 2. Peoples' Friendship University named after Academician A.Kuatbekov 3. M.Utebaev Higher College of New Technologies
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AGREEMENT SHEET

by Education Program code 7M01534- «Mathematics and Computer Science»

Director of the Department for
Academic Affairs and Quality
of the Educational Process

_____ A.S. Naukenova

Director of the Department
of Academy of Science

_____ U.B. Nazarbek

REVIEW

on the educational program
«7M01534 - Mathematics and Computer Science»
developed in M. Auezov SKU, Shymkent

1. Brief description of the enterprise and its business profile

The general characteristics of the educational program are presented on the university's official website and include the following information: the graduate's qualification, the form and duration of study, a brief description of the field and activities of the graduates, a complete list of key and professional competencies that the graduate should possess as a result of completing the educational program, as well as the area of professional activity that the graduate is preparing for, and a list of professional tasks that the graduate should be able to perform in accordance with the types of professional activity.

2. The relevance and demand for EP

Training of specialists in the educational program «7M01534 - Mathematics-Computer Science» is very relevant from the point of view of further development of the field of information and communication technologies within the framework of the program "Digital Kazakhstan". Applying theoretical knowledge in solving mathematical and computer applied problems and professional activities, competently solving professional problems using modern computer systems, successfully carrying out scientific and pedagogical activities using effective teaching methods. Conducts monitoring to improve knowledge in the field of applied mathematics, mathematical modeling and system programming, mathematical economics, mathematics, will conduct research on mathematical modeling and computer technology.

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

The learning outcomes and competencies embedded in the OP, the theoretical knowledge, practical skills and professional skills provided fully meet the modern qualification requirements for specialized specialists of the master's qualification.

4. Availability of components that develop practical skills

Academic disciplines of educational program of basic and specialized training provide the formation of the necessary practical skills of a specialist with fundamental knowledge in mathematics, possessing computer methods of collecting, storing and processing information used in his professional activities, able to assess the perspectivity of the methods used to solve tasks, competitive in the domestic and international labor markets.

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 content of the academic disciplines is relevant and reflects the current achievements in mathematics and computer science. The balance between theoretical and practical training is maintained at a high level.

The structure of the educational program includes cycles of general education disciplines and cycles of specialized disciplines.

The quality of the content of the educational program's disciplines is beyond doubt. The brief descriptions of the disciplines provide sufficient information about the theoretical material.

The educational program 7M01534-Mathematics-Computer Science meets the current requirements of higher education in pedagogy and contributes to the training of competent, creative, and competitive specialists who are proficient in modern technologies for teaching mathematics and computer science.

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 "7M01534 -Mathematics-Computer Science".

Director of the Lyceum
Physics and Mathematics
School «Intellect» _____

E.D. Khudaibergenov

Expert conclusion

on the educational program
«7M01534 - Mathematics and Computer Science»

1. The relevance of the EP

Currently, students in the field of teacher training in natural sciences apply mathematical knowledge and information literacy at all levels of education, in research institutes, state and non-state scientific and educational institutions. Because the effective use of modern software products, technical means and technologies in the professional sphere is a requirement of modernity. The student analyzes and applies information from various sources of information on issues arising in the course of his activities, carries out professional activities in compliance with the rules of information security, applies information and communication technologies in conducting mathematical research.

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

The educational program "7M01534 -"Mathematics-Informatics" formulates the concept of the educational program, the goals and objectives of training specialists, requirements for the organization of the educational process and for applicants, the results of training in the OP, and also contains a description of the qualification characteristics of the graduate of the educational program, his key and professional competencies, information about disciplines. The list of academic subjects and their content meet the modern qualification requirements for specialists in the field of information technology and mathematics and computer science.

The requirements for the selection of academic disciplines, formed knowledge, practical skills and professional competencies are fully consistent with the mission of the university "aimed at the formation of new competencies, training of a leader who spreads research thinking and culture", meets the needs of employers and undergraduates.

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 Education 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 "7M01534 -"Mathematics-Computer Science".

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.