

MINISTRY OF SCIENCES AND HIGHER EDUCATION OF THE REPUBLIC OF
KAZAKHSTAN

M.O. AUEZOV SOUTH KAZAKHSTAN UNIVERSITY



Chairman of the Board-Rector
D.Zh.Ahmed-Zaki

03

2026y.

EDUCATIONAL PROGRAM

7M06110 – Computer science

Registration Number	7M06100028
Code and Classification of Education	7M06 Information and communication technologies
Code and Classification of Areas of Training	7M061 Information and communication technologies
Group of educational programs (EP)	M094 Information technologies
Type of EP	Acting
ISCE level	7
NQF level	2
IQF level	7
Language learning	Kazakh, Russian
The complexity of EP	120 credits
Distinctive features of EP	-
Partner University (JEP) -	-
University partner (DDEP) -	-

Shymkent, 2026

Drafters:

Name	Position	Sign
Zhaydakbaeva L.K.	Associate Professor	
Kozhabayev S.	senior teacher	
Karatayev G.	PhD, teacher	
Alibekov A.K.	Director of the Robo Park Training Center	
Nurmukhanbetova G.K.	Director of «KaztilDamu» LLP, The educational center	
Utegenov M.K.	Director of the "Higher College of New Technologies named after Manap Utebaev"	

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 and Pedagogy" the Higher School,
Minutes # 6 « 23 » 02 2026 y.

Chairman of the Committee _____ Tursynbayev A.

The EP was considered and recommended for approval at Educational-methodical meeting of M. Auezov SKU

Minutes # 4 « 22 » 02 2026 y.

Chairman of the UMS  E.Imangaliyev

The EP was approved by the decision of the Academic Council of the University

Minutes # 14 « 26 » 02 2026 y.

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1. Concept of the Educational program

Mission of the University	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 – 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
Uniqueness of the EP	• Orientation to the regional labor market and social order through the formation of professional competencies of the graduate, adjusted to the requirements of stakeholders • Practical orientation and emphasis on the development of critical thinking and entrepreneurship, the formation of a wide range of skills that will allow to be functionally literate and competitive in any life situation and be in demand in the labor market
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. 8 n/a dated 08/01/2025). • 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 Organisations of Higher and Postgraduate Education», approved by order of the Ministry of Education and Science of the Republic of Kazakhstan dated October 30, 2018 No. 595; 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; 4. State mandatory standards for higher and postgraduate education, approved by order of the Ministry of Education and Science of July 20, 2022 No. 2; 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; 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 н/к
Organization of the educational process	• Implementation of the principles of the Bologna Process • Student-centered learning • Availability • Inclusivity
Quality assurance of EP	– Internal quality assurance system – Involvement of stakeholders in the development of the EP and its evaluation – Systematic monitoring - Updating 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 as reworded by order of the Minister of Science and Higher Education of the Republic of Kazakhstan dated July 26, 2024. No. 372
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. 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	Preparation of competent masters of the scientific and pedagogical direction, having knowledge in information and communication technologies used in solving natural science problems.
Tasks of the EP	- formation of socially responsible behavior in society, understanding the importance of professional ethical standards and following these standards; - providing lifelong learning skills that will enable them to successfully adapt to changing conditions throughout their professional careers; - providing conditions for acquiring a high general intellectual level of development, mastering literate and developed speech, a culture of thinking and the skills of scientific organization of labor in the field of IT technologies; - formation of the competitiveness of graduates in the field of IT technologies, to ensure the possibility of their fastest possible employment in their specialty or continuing education at subsequent levels of education. - Creating conditions for the formation of in-demand knowledge and skills, a conscious attitude towards improving the well-being of the population and protecting the planet in the context of the SDGs
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); • 7th Level of European Qualification Framework for Life long Learning).
Connection of the EP with the professional sphere	The Sectoral qualifications Framework Education, approved by Protocol No. 2 of the meeting of the sectoral Tripartite Commission on Social Partnership and Regulation of Social and Labor Relations under the Ministry of Education and Science of the Republic of Kazakhstan dated November 23, 2016. Professional standard "Testing WEB and multimedia applications" approved by the order of the Chairman of the Board of the National Chamber of Entrepreneurs of the Republic of Kazakhstan "Atameken" No. 259 dated 24.12.2019 Professional standard "Artificial Intelligence Application Development" approved by the order of the Chairman of the Board of the National Chamber of Entrepreneurs of the Republic of Kazakhstan "Atameken" No. 222 dated 05.12.2022 Professional standard "Teacher" approved by the order of the Chairman of the Board of the National Chamber of Entrepreneurs of the Republic of Kazakhstan "Atameken" No. 591Н/К dated 20.11.2023
Name of the degree awarded	After the successful completion of this educational program, the graduate is awarded the degree: of Master of Technical Sciences 7M06110-«Computer science» of the educational program
List of qualifications and positions	Masters in EP 7M06110-Computer Science can hold the positions of a university teacher, IT specialist, software engineer, system administrator, researcher of the IT department in (research institutions, design and design organizations) without presenting requirements for work experience in accordance with qualification requirements of the Qualification directory of 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 May 21, 2012 No. 201-ө-м and with Appendix 2 to the Sectoral Qualifications Framework "Information and Communication Technologies", approved " December 20, 2016, protocol No. 1.
Field of professional activity	The sphere of professional activity is the field of information and communication technologies in the sectors of the real sector of the economy, the field of management and business, education, dealing with the

	search, storage, transmission, processing and protection of information.
Objects of professional activity	The objects of professional activity of master's degree graduates are information services of research institutions; government bodies; design organizations; industrial enterprises; business structures; educational and scientific institutions; standards and profiles of computer systems; means of administration of system and network resources, security management of information resources;
Subjects of professional activity	The subjects of professional activity of the Master of Technical Sciences in EP are the following systems: - modern mathematical methods, methods of applied informatics for solving the problems of production, education and the service sector; - software for computer visualization of science and technology tasks, animation of natural processes, abstract concepts in scientific research; - Methods of teaching informatics in higher educational institutions.
Types of professional activity	- pedagogical; - research; - design and engineering; - production and technological; - organizational and managerial; - operational.
Learning outcomes	LO1 Analyze the main worldview and methodological problems, incl. interdisciplinary nature that arise in science at the present stage of its development, evaluate various facts and phenomena based on the position and category of the philosophy of science. LO2 Develop an educational and methodological complex of disciplines, critically evaluate the scientific organization of work of a higher school teacher, analyze the nature of pedagogical phenomena. LO3 Develop Internet resources using professional web programming skills. LO4 To solve the tasks of achieving the quality and efficiency of the design and implementation of network and communication technologies for programming and building computer networks based on existing standards and technologies. LO5 Use modern design methods and software tools to compile design, working and technological documentation. LO6 Demonstrate knowledge of a foreign language in interpersonal communication, professional activity, writing scientific articles. LO7 Evaluate the development and effective use of personnel in the organization, possess socio-psychological technologies for managing mass behavior. LO8 To conduct and analyze scientific research with the interpretation of the results obtained on the basis of modern modeling methods, computer and network technologies as part of an independent and scientific team. LO9 Solve professional problems using modern computer systems and ensure the functionality and security of interconnected components of the IT infrastructure.

3. Competencies of an EP graduate

GENERAL COMPETENCIES (SOFTSKILLS). Behavioral skills and personal qualities	
GC 1. Competence in managing one's literacy	GC 1.1. Strive for professional and personal growth throughout life. GC 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. GC 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	GC 2.1. 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. GC 2.2. The ability of mastering the skills of mediation and intercultural understanding.
GC 3. Mathematical competence and competence in the field of science	GC 3.1. The ability to interpret the methods of mathematical analysis and modeling for solving applied problems in the field of study. GC 3.2. The ability to plan the setting of scientific experiments, integrate and implement the results of scientific research in the professional field. GC 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	GC 4.1. The ability to confidently use modern information and digital technologies, artificial intelligence systems for work, leisure and communications. GC 4.2. Proficiency in the use, recovery, evaluation, storage, production, presentation and exchange of information in a wide range of digital devices. GC 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 educational competencies	GC 5.1. Possession of the norms of business ethics, social and ethical values and focus on them in professional activities. GC 5.2. Formation of a personality capable of mobility in the modern world, critical thinking and physical self-improvement. GC 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. GC 5.4. Ability to adequately navigate in various social spheres of activity and in conditions of uncertainty. GC 5.5. Ability to find compromises, correlate own opinion with the opinion of the team.
GC 6. Entrepreneurial competence	GC 6.1. The manifestation of leadership qualities and the ability to have a positive impact on others, to lead a team. GC 6.2. The ability to create conditions for the development of creative and entrepreneurial skills of the team. GC 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. GC 6.4. Ability to work with consumer needs.
GC 7. Cultural awareness and self-expression	GC 7.1. The ability to show worldview, civil and moral positions. GC 7.2. 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 Ability to analyze the latest achievements in the field of information technology, ways and means of improving

	computer technology, software, information systems, modern requirements of the labor market;
PC2 scientific and innovative	PC2.1 Ability to critically analyze teachers ' experience, pedagogical literature and normative documentation;
PC3 organizational and managerial	PC3.1 Ability to program using modern tools; .
PC4 pedagogical and educational	PC4.1 Ability to analyze and evaluate the results of innovation in the educational process;
PC5 innovation and design	PC5.1. Ability to create, investigate, develop mathematical and program models of the computing and information processes connected with functioning of objects of professional activity; PC 5.2. The ability to show professional values: professionalism; innovation; creativity; meritocracy; integrity.

3.1 Matrix for correlating learning outcomes in the EP as a whole with the competencies being developed

	LO1	LO2	LO3	LO4	LO5	LO6	LO7	LO8	LO9
GC1	+			+	+	+	+	+	+
GC2				+	+	+	+	+	
GC3			+		+	+	+	+	+
GC4	+	+				+	+	+	+
GC5		+		+	+	+		+	
GC6			+					+	
GC7	+						+		
PC1	+			+	+	+	+	+	+
PC2				+	+	+	+	+	+
PC3				+		+	+	+	+
PC4				+	+	+	+	+	+
PC5	+			+	+	+	+	+	+

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

Module	Cycle	Component	Name of the discipline	Brief description of the discipline	Quan-ty loans	The generated LO (codes)								
						LO1	LO2	LO3	LO4	LO5	LO6	LO7	LO8	LO9
Cycle of basic disciplines High school component														
Module of scientific and pedagogical training	BD	UC	History and Philosophy of science	Purpose: Formation of ideas about the laws of scientific cognition, scientific rationalism, its forms, historical types and ways of development of science. Content: Subject philosophy of science. Science in culture, civilization. General patterns and trends of scientific cognition. The emergence and development of science. Scientific revolutions. Scientific rationality. Philosophical methods. Science as a social institution Natural Sciences. History of social sciences and humanities. Organization of scientific activity. The evolution of knowledge. Ethical aspects of modern science. Computerization of science. Actual problems of natural and social sciences and humanities.	4	✓								
	BD	UC	ForeignLang uage (professional	Purpose: To improve language competence for reading foreign-language original sources with varying degrees of	4						✓			

			)	content coverage. Content: Preparation of written messages on scientific topics on the educational program: a scientific report, theses on the topic of scientific research, summarization of original sources in a foreign language, annotation of the scientific text, summary. Understanding the overall content of authentic records. Perception by ear of lectures, messages containing professional information. Development of oral communication skills in the educational program: presentation of a scientific report, presentation of scientific research, scientific discussion, scientific debate, use of situational games.										
	BD	UC	Psychology of Management	Purpose: Formation of system knowledge, skills and skills of effective personnel management Contents: Introduction to management psychology. Psychological factors of managerial efficiency. Personality in the management system. Motivation and effectiveness of organization. Leadership in organization. Stress in organization and emotional burnout. Psychology of conflict management. The personality of subordinate. Psychological characteristics of the head personality. Psychological influence in management activities. Psychological foundations of managerial decision-making. Interpersonal communication in management	3							✓		

Methodical bases of teaching	BD	UC	Pedagogy and Psychology of Higher Education	Purpose: The aim is to develop undergraduates' skills in planning and organizing the educational and scientific process based on the principles of student-oriented learning and assessment, extrapolating innovative (including digital) and practice-oriented teaching methods and technologies into the educational process, preparing them for academic and scientific and methodological activities in the educational educational institution. Contents: It covers the methodological, didactic, and managerial foundations of higher education pedagogy, modern global and Kazakhstani trends in the development of higher education, innovative technologies, and student-centered learning in HEIs (Higher Education Institutions), as well as topical issues of inclusive education, including the psychological and pedagogical characteristics of teaching students with special educational needs, creating a favorable educational environment, promoting national values, and developing the organizational culture of the university.	5		✓					✓		
	PD	UC	Teaching Methods of Special Disciplines	Purpose: Training of competent, motivated to cognition and creativity, training and self-study specialists capable of analyzing a wide range of modern innovative technologies, directions in the process of teaching specialized disciplines	5				✓	✓				

				Content: To analyze the idea of the activity of new information technologies; methods of teaching disciplines of information technology; the methodological system of teaching IT disciplines in higher education and Their application in solving problems, setting, performing, analyzing and formulating a conclusion when performing work in a group and individually.										
	BD	UC	Pedagogical practice	Purpose: Pedagogical practice is the study of the basics of pedagogical and educational-methodical work in higher educational institutions, mastering the pedagogical skills of conducting certain types of training sessions in the disciplines of the profile corresponding to the direction of study. Content: Scientific-pedagogical thinking culture. Participation in lectures of leading teachers. Preparation and conducting of practical and laboratory classes on special subjects. Development of new active forms of teaching with students and use in practical lessons.	4		✓						✓	
Theoretical Foundations of Informatics and Scientific Research	BD	EC	Design of Artificial Neural Networks	Purpose: Mastering the discipline is to study the theoretical foundations of teaching neural networks and gain skills in their application to solve practical problems. Contents: 1) theoretical justification of the chosen direction; 2) demonstration of the advantage of artificial neural network technology over algorithmic programming in solving problems; 3)	5				✓	✓				

				teaching the technology of creating and applying neural networks through their software implementation; 4) providing the opportunity for graduate students to create their own neural networks.										
	BD	EC	Neural Networks for Pattern Recognition	Purpose: Objective: In this course, we analyze what methods of pattern recognition exist, where they are used, and which technologies are the most promising for increasing the accuracy and reliability of work processes. Content: Evaluation of features, recognition of specific and abstract images, methods for solving problems of the theory of knowledge, analysis and evaluation of differences between statistical and logical methods.					✓	✓				
	PD	EC	Recognition theory	Purpose: the ideas, tasks and cognitive systems of cognitive theory, cognitive theory. Content: Recognition of features, concrete and abstract images, formulation of problems of the theory of knowledge, evaluation of methods of solving problems of the theory of knowledge, analysis and assessment of differences between statistical and logical methods of the theory of knowledge.	5				✓					✓
	PD	EC	Expert System	Purpose: Formation of students' knowledge about Expert Systems, how they use the principles of artificial intelligence and formalized knowledge of an expert to process operational information and make informed					✓					✓

				decisions in the analyzed subject area. Content: Expert systems have an intelligent database, basic concepts, techniques and methods of work in knowledge representation languages and tools for the development of intelligent systems, in methods of extracting knowledge										
	PD	EC	Planning and Organization of Scientific Research	Purpose: The study of the discipline is to prepare undergraduates for independent planning, organization and implementation of scientific and applied research. Contents: Selection of scientific topics, basic research methods, principles of standardization in research work, registration of research results, development of skills in working on scientific publications and articles, content of master's theses and requirements for them, methods of literary search.	4	✓							✓	
	PD	EC	Methods of the Experiment	Purpose: The methods of conducting the experiment include a thorough theoretical analysis. Contents: Identification of unresolved problems, selection of the topic of this study, setting the goal and objectives of the study, studying real practice in solving this problem; the study of measures existing in theory and practice that contribute to solving the problem; formulation of the research hypothesis. Experimental proof, taking into account innovation, unusualness, contradiction to		✓								

				existing opinions.										
	RP		Research Practice	Purpose: Practical study of the latest theoretical, methodological and technological achievements of domestic and foreign science. Contents: Modern methodology of scientific research; analysis, processing of experimental studies with the interpretation of the results obtained on the basis of modern modeling methods, computer and network technologies. Conduct theoretical and experimental research on the topic of the dissertation.	6								✓	
Technology of realization of programmatic facilities	PD	EC	Technology of Software Development	Purpose:: To evaluate and compare technologies, methodologies and standards that support software development processes. Content: architecture, life cycle, management, testing methods, models, metrics and processes of object-oriented software systems, learning knowledge and skills in the field of design, testing, debugging, implementation and maintenance of computer software using modern CALS technologies and CASE	5					✓			✓	
	PD	EC	Algorithm and their Complexity	Purpose: "Algorithms and their complexity" aims to familiarize undergraduates with fundamental data processing algorithms, as well as with modern methods for studying algorithms and assessing their algorithmic complexity. Content: Theoretical knowledge about the main problems of the theory of algorithms, the model of calculations and						✓			✓	

				approaches to evaluating the effectiveness of algorithms; - the skill of practical use of classical algorithms, their modification for specific tasks, the development and implementation of new algorithms - to apply the acquired knowledge in their professional activities										
	BD	EC	Creation of a Package of Applied Programs	Purpose: In programming environments, packages of applied programs are created that are solved by numerical methods using a computer. Contents: Creation of a package of applied programs; formation of an idea about the methods for checking the correctness and accuracy of the obtained numerical solutions; the ability to learn, acquire new knowledge, skills in the field of mathematical sciences and use them in professional activities	4					✓			✓	
	BD	EC	Application Software	Purpose: formation of undergraduates' basic competencies in the field of application software use, which are further developed in the formation of professional competencies of a specialist in applied informatics. Content: Skills in working with tools for modeling the subject area, applied and information processes; development of technological documentation; working with database and knowledge design tools						✓			✓	
	BD	EC	High-performance Systems and Technologies	Purpose: Within the framework of the course "High-Performance Computing Systems and Technologies" it is proposed to study the hardware and	6					✓			✓	

			s	software parts of multiprocessor and multimachine computing systems, their classification. The study of general approaches to the construction of parallel algorithms and software systems. Content: To orientate in the hardware and software of parallel systems; know the basic concepts of designing software systems designed to work on various types of multiprocessor computing systems.										
	BD	EC	High Performance Computing	Purpose: study of the main architectures of multiprocessor systems and the principles of developing application software for them. Content: Knowledge of the architecture of modern mathematical and graphical coprocessors; The ability to independently understand and study the architecture of newly emerging accelerators; Knowledge of software development principles for modern GPUs; Navigate the CUDA technology stack for nVidia GPUs; Know the composition of the CUDA library for non-graphical computing, be able to use these libraries when developing software for the nVidia GPU					✓			✓		
New methods and way of teaching Informatics	PD	EC	Mathematical Foundations of AI	Purpose: To form the foundational mathematical knowledge and tools required for designing, analyzing, and implementing artificial intelligence, machine learning, and data science algorithms. Additionally, to develop skills in effectively utilizing theoretical mathematical models to solve applied programming problems.	6				✓	✓				

				Content: Matrices and Vectors: Data representation and applying matrix operations. Dimensionality Reduction: Principal Component Analysis (PCA) and matrix decomposition. Gradient Descent and Backpropagation: Reducing errors through function derivatives and training neural networks. Bayes' Theorem and Probability: Conditional probability, Gaussian distribution, and data covariance. Logic and Graphs: Boolean algebra, search algorithms, and knowledge graphs.										
	PD	EC	Big Data Methods and Tools	Purpose: To form skills in applying modern technologies and tools for collecting, storing, processing, and analyzing large volumes of data (Big Data). Contents: Foundations of Big Data: The concept of big data, core characteristics (5Vs), and architecture. Data Storage Systems: HDFS (Hadoop Distributed File System) and NoSQL databases. Distributed Computing: MapReduce model and fast data processing using Apache Spark. Stream Data Processing: Working with real-time data streams via Apache Kafka or Spark Streaming. Big Data Analytics: Applying machine learning algorithms and SQL queries on big datasets.					✓	✓				
	PD	EC	Network Technologies in Cloud Computing	Purpose: To form skills in working with network technologies, virtualization methods, and modern cloud platforms required for creating, managing, and securing cloud infrastructures. Contents: Foundations of Cloud	6			✓	✓					

				Technologies: Cloud computing models (IaaS, PaaS, SaaS) and network architecture. Network Virtualization (SDN & NFV): Software-Defined Networks (SDN), Network Functions Virtualization (NFV), and virtual switches. Cloud Network Infrastructure: Virtual Private Clouds (VPC), subnets, routing, and load balancing. Security in Cloud Environments: Network firewalls, VPN channels, Identity and Access Management (IAM), and data encryption. Practical Cloud Platforms: Configuring and managing virtual network infrastructure based on AWS, Google Cloud, or Azure.											
	PD	EC	Sensor Network Technologies	Purpose: "Sensor networks" is to study the basic principles of building wireless sensor networks (WSN), familiarization with domestic and foreign experience in the use of WSN and mastering the basics of modeling the work of WSN in specialized emulators. Content: Obtaining knowledge in the field of theoretical foundations of work, as well as the principles of construction and specifics of the use of wireless sensor networks; the formation of skills and abilities to apply the acquired knowledge in the process of developing the WSN structure and software for network nodes, as well as in modeling the work of the WSN.				✓	✓						
Pedagogical bases of	PD	EC	Design and Development	Purpose: To understand the architecture of blockchain technology, and to form	6								✓	✓	

computer science			t of Blockchain Platforms	skills in designing decentralized applications, as well as developing and ensuring the security of smart contracts. Contents: Foundations of Blockchain and Cryptography: Principles of decentralized systems, hash functions, and digital signatures. Consensus Algorithms: Network security and transaction validation mechanisms. Smart Contract Development: Writing smart contracts on Ethereum or alternative platforms and code deployment. Decentralized Applications (dApps): Integrating web interfaces with blockchain networks and building dApps architecture. Enterprise Blockchain Platforms: Design features of permissioned (private) blockchain systems based on Hyperledger Fabric or their equivalents.										
	PD	EC	Cryptology	Purpose: Evaluate and characterize mathematical models and cryptographic properties of cryptosystems with symmetric algorithms. Content: symmetric encryption standards; cryptosystem requirements; symmetric cryptography algorithms programming; master the properties of programming technologies used to create cryptosystems; master the technology of creating cryptosystems in an object-oriented programming environment.									✓	✓
	PD	EC	Simulation Technologies in	Purpose: To form skills in the virtual modeling of the educational process, designing and developing educational	5		✓						✓	

				Transformation of Information and Communication Technologies: Methods for evaluating the impact of educational platforms, AI tools, and cloud technologies on the quality of teaching and learning. Pedagogical Experiment and Statistical Analysis: Quantitative and qualitative research methods. Mathematical and statistical processing of experimental results. Scientific Information Retrieval and Analysis: Working with international databases, conducting literature reviews, and using plagiarism detection systems. Formatting Research Results: International structure of scientific articles (IMRAD format), academic writing style, and publication ethics.										
	PD	EC	Intelligent Education Systems	Purpose: To form skills in designing, developing, and effectively applying intelligent educational systems in the learning process, based on artificial intelligence algorithms that adapt to the needs of each learner. Contents: Foundations of Intelligent Systems: The concept, evolutionary history, and architecture of intelligent (ITS) and adaptive learning systems. The Four-Component Model of ITS: Expert model (domain model), Student model, Pedagogical model (instructional model), and Interface model. Applying AI Algorithms in Education: Logical inference rules and Bayesian networks in student knowledge assessment and error	5		✓					✓		

				diagnosis. Educational Data Analytics (EDM): Big data analysis in the educational process and models for predicting student performance. Intelligent Agents and Chatbots: Design tools for cognitive chatbots and virtual tutors to support the learning process.										
	PD	EC	Digital Resource Management	Purpose: Getting students an idea of the existing digital resources and services in the educational process. Content: New multimedia features of information and communication technologies, draw students' attention to the most important topics of education, orient students. Attention to the specifics of the scenes being studied, in order to connect students with ongoing changes, life experiences, interests in the subject and phenomena.			✓					✓		
	NIR M		Research work of a master student	Analyze the well-known modern methods of educational and information technologies in accordance with the purpose and objectives of the dissertation research. Carry out experimental research work according to the plan of the academic period. Selection and justification of the technological scheme of production in accordance with the topic of the master's thesis. Characterize the economic efficiency of the technology being developed. Form conclusions, modeling, processing and interpretation of the results obtained.	24									
Module			Registration	The final qualification work of the	12									

Research Work and Final Attestation			and defense of a master's thesis	graduate of the master's program, confirming the competencies acquired in the learning process in accordance with the chosen training specialization. Defense of a master's thesis at an open meeting of the State Attestation Commission with the participation of the chairman of the commission and at least half of its members. The order and regulations for the defense of a master's thesis are established by the chairman.										
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5. Summary table reflecting the volume of credits mastered by modules of the educational program

Course of training	Semester	Amount of the mastered modules	Amount of the studied disciplines			Amount of KZ credits					Total hours	Total KZ credits	Amount	
			Compulsory component	University component	Optional component	Theoretical training	Physical education	Training practice	Production practice	Pre-diploma practice			exam	differentiated credit
1	1	5	-	5	2	29	-	-	1	-	900	30	6	1
	2	5	-	1	4	23	4	-	3	-	900	30	4	1
2	3	5	-	-	5	26	-	6	3	-	1050	35	5	1
	4	1	-	-	-	-	-	-	17	8	750	25	-	-
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-centered learning: The student is the center of teaching/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.

7. Educational and resource support for EP

Information Resource 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 for students in the magistracy: - there are 3 computer classes for laboratory work, one of them with an interactive whiteboard; - lecture halls; - STEM center. <i>Bases of practice for undergraduates</i> 1. SMCE "Higher College of New Technologies" named after Manap Utebayev" 2 Water Resources-Marketing LLP 3. KazTilDamu LLP 4. South Kazakhstan College of Humanities and Economics 5. M. Auezov SKU, laboratory "Mechatronics and Robotics"

AGREEMENT SHEET

on the Educational program 7M06110 – «Computer science»

Director of DAAEQA _____ Naukenova A.S
Sign

Director of DASc _____ Nazarbek U.B.
Sign