

MINISTRY OF SCIENCES AND HIGHER EDUCATION OF THE REPUBLIC OF
KAZAKHSTAN
M.O. AUEZOV SOUTH KAZAKHSTAN UNIVERSITY



EDUCATIONAL PROGRAM

7M06120 - "Information Systems"

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| Registration number | 7M06100006 |
| Code and classification of the field of education | 7M06 Information and Communication Technologies |
| Code and classification of areas of training | 7M061 Information and Communication Technologies |
| Group of educational programs | M094 Information technologies |
| Type of EP | acting |
| ISCE level | 7 |
| NQF level | 7 |
| IQF level | 7 |
| Language of instruction | Kazakh, Russian, English |
| The complexity of the EP | 120 credits |
| Distinctive features of the EP | - |
| Partner university (JEP) | - |
| Partner university (DDEP) | - |

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The EP was considered in the direction of training information and communication technologies at a meeting of the academic committee, protocol № 7 « 21 » 02 2023y.

Chairman of the Committee Shertayev E.T.
Signature

The EP was considered and recommended for approval at Educational-methodical meeting of M. Auezov SKU , protocol № 4 « 22 » 02 2023 y.

Chairman of the EMC Abisheva R. D.

The EP was approved by the decision of the Academic Council of the University protocol № 13 « 23 » 02 2023 y.

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1 CONCEPT EP

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| Mission of the University | We are focused on generating new competencies, training a leader who translates research thinking and culture. |
| University Values | <ul style="list-style-type: none"> – 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 | <ul style="list-style-type: none"> – 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 | the program was developed in accordance with the Atlas of New Professions and Competencies, and is aimed at training competent specialists for transport and logistics and scientific and pedagogical structures who are able to organize and manage the activities of a structural enterprise, independently determine the goals of professional activity, choose and justify methods and means to achieve them. |
| Academic Integrity and Ethics Policy | <p>The University has taken measures to maintain academic integrity and academic freedom, protection from any kind of intolerance and discrimination:</p> <ul style="list-style-type: none"> • Rules of academic integrity (Order No. 212-ҢК dated 10.10.2022); • Anti-Corruption Standard (Order No. 221-ҢК dated 07.12.2021). • Code of Ethics (order No. 212-ҢК dated 10.10.2022). • Anti-Corruption Policy of the NJSC “M. Auezov South Kazakhstan University.” (order No. 144 нқ dated 07.14.2022). |
| Regulatory and legal framework for the development of EP | <ol style="list-style-type: none"> 1. Law of the Republic of Kazakhstan "On Education" No. 319-III dated July 27, 2007; 2. Standard rules of activity 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 3. State obligatory standards of higher and postgraduate education, approved by order of the Ministry of Education and Science of the Republic of Kazakhstan dated July 20.2022 No. 2; 4. Rules for the organization of the educational process on credit technology of training, approved by the Order of the Ministry of Education and Science of the Republic of Kazakhstan dated April 20, 2011 No. 152; 5. Qualification directory of positions of managers, specialists and other employees, approved by the Order of the Minister of Labor and Social Protection of the Population of the Republic of Kazakhstan on December 30, 2020 No. 553. |

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| | <p>6. Guidelines for the use of ECTS.</p> <p>7. Guidelines for the development of educational programs of higher and postgraduate education, Appendix 1 to the order of the Director of the Central Research Institute No. 45 o/d dated June 30, 2021.</p> |
| Organization of the educational process | <ul style="list-style-type: none"> – Implementation of the principles of the Bologna Process – Student-centered learning – Availability – Inclusivity |
| Quality assurance of EP | <ul style="list-style-type: none"> – 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 | <p>They are established according to the Standard Rules of admission to training in educational organizations implementing educational programs of higher and postgraduate education Order of the Ministry of Education and Science of the Republic of Kazakhstan No. 600 dated 31.10.2018</p> |
| Conditions for the implementation of educational programs (EP) for persons with disabilities and special educational needs(SSN) | <p>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.</p> <p>An individual differentiated approach is provided for all types of classes and in the organization of the educational process.</p> |

2 EP PASSPORT

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| Purpose of the EP | To train highly qualified, multilingual and competitive specialists in the field of information systems and technologies with research and teaching skills; possessing advanced knowledge in the field of IT-technologies. |
| EP tasks | <ul style="list-style-type: none"> - 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; - the formation of the competitiveness of graduates in the field of information technology, to ensure the possibility of their fastest possible employment in their specialty or continuing education at subsequent levels of education; - providing undergraduates with a solid foundation in the field of informatics, information technology, the operation of telecommunications equipment, equipment for local area networks, servers and personal computers, the design of computer and telecommunications networks, ensuring their protection and reliability of information transmission, according to the principles of building Web-models on the Internet ; which will enable them to successfully continue their studies in their chosen field or other relevant fields; - providing undergraduates with lifelong learning skills that will allow them to successfully adapt to changing technologies throughout their professional career. |
| EP harmonization | <ul style="list-style-type: none"> • Level 7 of the National Qualifications Framework of the Republic of Kazakhstan; • Dublin Descriptors 7 skill levels; • Cycle 2 of the Qualification Framework for the European Higher Education Area (A Framework for Qualification of the European Higher Education Area); • Level 7 of The European Qualification Framework for Lifelong Learning. |
| Communication of the EP with the professional sphere | <p>1. Professional standard "Testing Web and multimedia applications". Annex No. 36 to the order of the Deputy Chairman of the Board of the National Chamber of Entrepreneurs of the Republic of Kazakhstan "Atameken" dated December 24, 2019 No. 259</p> <p>2. Professional standard: "Software Maintenance". Annex No. 20 to the order of the Acting Chairman of the Board of the National Chamber of Entrepreneurs of the Republic of Kazakhstan "Atameken" No. 222 dated 05.12.2022</p> <p>3. Professional standard: "Conducting web monitoring". Appendix No. 6 to the order of the Acting Chairman of the Board of the National Chamber of Entrepreneurs of the Republic of Kazakhstan "Atameken" No. 222 dated 05.12.2022</p> <p>4. Professional standard: "Development of artificial intelligence applications." Appendix No. 17 to the order of the Acting Chairman of the Board of the National Chamber of Entrepreneurs of the Republic of Kazakhstan "Atameken" No. 222 dated 05.12.2022</p> <p>5. Professional standard: "Teacher (teaching staff) of the organization of higher and (or) postgraduate education" (Appendix to the order of the Chairman of the Board of the National Chamber of Entrepreneurs of the Republic of Kazakhstan "Atameken" No. 133 dated June 8, 2017).</p> <p>After the successful completion of this EP, the graduate is awarded the degree of Master of Technical Sciences in the educational program 7M06120 "Information Systems"</p> |

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| Title of the degree awarded | After the successful completion of this EP, the graduate is awarded the degree of «Master of Technical Sciences» in the educational program 7M06120 "Information Systems" |
| List of qualifications and positions | ICT auditor (2519-1-001); Webmaster (2512-2-008); Web analytics specialist; Specialist in BI systems; Artificial Intelligence Engineer (2519-9-001); Teacher of the organization of higher and (or) postgraduate education (231) in research institutions; universities and other institutions of higher education; design and engineering organizations without presenting requirements for work experience in accordance with the qualification requirements of the National Classifier of the Republic of Kazakhstan (NKZ), approved by order of the Committee for Technical Regulation and Metrology of the Ministry of Investment and Development of the Republic of Kazakhstan dated December 30, 2020 No. 553. |
| Sphere of professional activity | Enterprises and organizations of any organizational and legal form that develop, implement and operate information systems in various areas of human activity; universities and other higher education organizations |
| Objects of professional activity | <ul style="list-style-type: none"> - programs and software components of business applications; - programming languages and systems for business applications; - tools for documentation; - descriptions and modeling of information and communication processes in intelligent information systems; - project management tools; - standards and methods of organizing management, accounting and reporting at enterprises. |
| Subjects of professional activity | <p>Theoretical and practical knowledge on: mathematical, informational, software, linguistic, technical and organizational and legal support of information systems, including technologies for designing, developing, implementing, maintaining and operating them; computer visualization of science and technology tasks, animation of natural processes, abstract concepts in scientific research and teaching;</p> <p>modern approaches to the design of database management systems (DBMS), expert systems and artificial intelligence systems, pattern recognition problems; modern mathematical methods, methods of applied mathematics, computer science for solving problems of science, education, technology, economics and management; methodology of teaching informatics, mathematics in higher educational institutions.</p> |
| Types of professional activity | <ul style="list-style-type: none"> - pedagogical; - research; - design and engineering; - production and technological; - organizational and managerial; - operational. |
| Learning Outcomes | <p>LO1 Analyze philosophical problems of the development of civilization; the ability to freely use foreign languages for interpersonal and professional communication; independently acquire and develop skills in applying interdisciplinary and professional knowledge to solve non-standard tasks; proficiency in socio-psychological management technologies.</p> <p>LO2 Demonstrate professional and pedagogical skills and culture of scientific and pedagogical thinking in higher education; development of professional competence of the teacher; skills of working with methods and forms of education in the preparation of future specialists; application of modern educational technologies, including DOT.</p> |

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| | <p>LO3 Demonstrate skills in analyzing and managing the state of informatization, business processes, IS, the operating environment of the organization, development, and maintenance of all types of IT projects of the organization.</p> <p>LO4 Demonstrate skills in conducting security audits of computer systems and software; developing recommendations for improving process and system management; developing utilities for managing peripheral IC devices; managing the operation of devices via I/O ports.</p> <p>LO5 Demonstrate the skills of developing a mathematical model of a process or phenomenon (problems of science, education, technology, economics, and management); formalizing this model in the form of mathematical relations; building on the basis of a mathematical and computer model and conducting a computational experiment, checking its adequacy using factor analysis.</p> <p>LO6 Practically work with Maxima, Sci Lab mathematical applications; with functional and logical programming tools for solving scientific and applied problems (including artificial intelligence and parallel computing tasks based on MPI and Open MP technologies): programming in Scheme, F# languages, as well as defining a functional approach in C++ and C# programming languages.</p> <p>LO7 Demonstrate the skills of developing, maintaining and documenting software components and software applications of IS; developing software complexes for solving applied tasks of mobile devices; recommendations of options for developing products, services and solutions using methods of intellectual analysis based on big data.</p> <p>LO8 Demonstrate skills in developing services based on big data analytics; developing and implementing new methods and technologies for using big data; data visualization; reverse engineering of business processes of the organization; IT project management, application of PERT analysis techniques.</p> <p>LO9 Demonstrate the ability to organize and conduct independent research in the field of ICT; argumentation and development of sound recommendations; development of new models and methods for solving problems in various subject areas using information technology; evaluation of scientific, applied (professional) information and its presentation in the form of an analytical review.</p> <p>LO10 Demonstrate skills in applying search engine optimization methods; effective work with a content management system (CMS); development of recommendations for the use of mathematical models and methods in the formalization and optimization of management tasks; building models of applied problems, solving decision-making problems, optimizing their results.</p> <p>LO11 Demonstrate proficiency in computational experiment technology; optimization methods; approaches and methods used in solving artificial intelligence problems; application of neural network programming skills in pattern recognition tasks; skills in working with basic tools for building data mining.</p> <p>LO12 Demonstrate skills in choosing the necessary research methods; carrying out scientific research and experimental work; processing the results obtained, analyzing and presenting them in the form of completed research developments; knowledge of modern issues in the field of ICT.</p> |
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3 COMPETENCES OF THE GRADUATE

| GENERAL COMPETENCES (SOFTSKILLS). Behavioral skills and personal qualities | |
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| GC 1. Competence in managing one's own literacy | GC1.1. The ability to self-learn, self-develop and constantly update their knowledge within the chosen trajectory and in an interdisciplinary environment. GC1.2. Ability to express thoughts, feelings, facts and opinions in the professional field. OK1.3. The ability for mobility in the modern world and critical thinking. |
| GC 2. Language competence | GC2.1. Ability to build communication programs in the state, Russian and foreign languages. GC 2.2. Ability to interpersonal social and professional communication in terms of intercultural communication. |
| GC 3. Mathematical and scientific competence | GC 3.1. The ability and willingness to apply the educational potential, experience and personal qualities acquired during the study of mathematical, natural science, technical disciplines at the university, to solve professional problems. |
| GC 4. Digital competence, technological literacy | GC 4.1. The ability to demonstrate and develop information literacy through the mastery and use of modern information and communication technologies in all areas of their lives and professional activities. GC 4.2. The ability to use various types of information and communication technologies: Internet resources, cloud and mobile services for searching, storing, protecting and disseminating information. |
| GC 5. Personal, social and academic competencies | GC 5.1. Ability to physical self-improvement and focus on a healthy lifestyle to ensure full-fledged social and professional activities through the methods and means of physical culture. GC 5.2. Ability to social and cultural development based on the manifestation of citizenship and morality. GC5.3 The ability to build a personal educational trajectory throughout life for self-development, career growth and professional success. GC 5.4. The ability to successfully interact in a variety of socio-cultural contexts at school, at work, at home and at leisure. |
| GC 6. Entrepreneurial competence | GC 6.1. Ability to be creative and entrepreneurial in a variety of environments. GC 6.2. The ability to work in a mode of uncertainty and rapidly changing task conditions, make decisions, allocate resources and manage your time. GC 6.3. Ability to work with consumer requests. |
| GC 7. Cultural Awareness and Expressiveness | 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 other peoples of the world, to have high spiritual qualities. |
| PROFESSIONAL COMPETENCES (HARD SKILLS). | |
| Theoretical knowledge and practical skills specific to this area | PC1 - Ability to develop a strategy, new design tool technologies, determine design goals, performance criteria, applicability limitations |
| | PC2 - The ability to carry out modeling of processes and objects based on standard packages of computer-aided design and research, to predict the development of information systems and technologies |
| | PC3 - Ability to operate telecommunications equipment, equipment for local area networks, servers and personal computers; to the design of computer and telecommunications networks, ensuring their protection and reliability of information transmission, according to the principles of building Web-models on the Internet; |
| | PC4 - The ability to carry out author's support of the design processes, |

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| | implementation and maintenance of information systems and technologies, organize the interaction of developer and customer teams, make management decisions in the face of various opinions, find the best solution |
| | PC5 - The ability to develop methods for solving non-standard problems and new methods for solving traditional problems, reproduce knowledge for the practical implementation of innovations, train and educate personnel, master the methods of professional university pedagogy and scientific and pedagogical approaches using active learning methods. |
| | PC6 - Ability to develop a plan for modification and manage the work of modifying the information system; manage the maintenance and design of IS modifications that automate organizational management tasks and business processes |
| | PC7 - Ability to conduct audits of information systems, platforms and operating procedures; evaluate ICT infrastructures in terms of risk to the organization |
| | PC8 - Ability to perform work on the creation (modification) and maintenance of web resources (creation and support of a web resource; testing a web resource) |
| | PC9 - The ability to collect and analyze data about site visitors (analysis of the behavior of site visitors; search optimization for site promotion); analysis of data from the data warehouse (design and creation of a database; visualization and generation of data reports for business analysis); |
| | PC10 - Ability to perform work on the design and creation (modification) of artificial intelligence systems (implementation of artificial intelligence systems; trial operation of artificial intelligence systems and its implementation); |
| | PC11 - The ability to take a direct part in the development of macro-processes of university education (academic, educational, research, scientific and methodological): training; socialization of studying youth; conducting scientific research; implementation of scientific and methodological work; interaction with stakeholders of higher and postgraduate education |

3.1 Matrix of correlating the learning outcomes of the EP in general with the formed competencies

| | LO1 | LO2 | LO3 | LO4 | LO5 | LO6 | LO7 | LO8 | LO9 | LO10 | LO11 | LO12 |
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| GC1 | v | | | | | | | | | | | |
| GC2 | v | | | | | | | | | | | |
| GC3 | | | v | | | | | | | | | |
| GC4 | | | | v | | | | | | | | |
| GC5 | v | | | | | | | | | | | |
| GC6 | | | | | | | | | v | | | |
| GC7 | v | | | | | | | | | | | |
| PC1 | | | v | | | | | | v | | | |
| PC2 | | | | | v | v | | | | | | |
| PC3 | | | v | | | | | | | | | |
| PC4 | | | | | | | v | | | | | |
| PC5 | | | | | v | | | | | v | | |
| PC6 | | | | | | | v | | | | | |
| PC7 | | | | v | | | | | | | | |
| PC8 | | | | | | v | v | | | | | |
| PC9 | | | | | | | | v | v | | v | |
| PC10 | | | | | | | | | | v | | v |
| PC11 | | v | | | | | | | | | | |

4 MATRIX OF THE INFLUENCE OF DISCIPLINES ON THE FORMATION OF LEARNING OUTCOMES AND INFORMATION ON LABOR INTENSITY

| № | Name of the module | Cycle | Component | Name of the discipline | Brief description of the discipline | Number of credits | Formed LO (codes) | | | | | | | | | | | |
|---|---|-------|-----------|-----------------------------------|---|-------------------|-------------------|------|------|------|------|------|------|------|------|-------|-------|-------|
| | | | | | | | LO 1 | LO 2 | LO 3 | LO 4 | LO 5 | LO 6 | LO 7 | LO 8 | LO 9 | LO 10 | LO 11 | LO 12 |
| 1 | Module of Scientific and Pedagogical Training | BD | HsC | History and Philosophy of Science | Purpose: Study of the problems of the phenomenon of science as a subject of special philosophical analysis, patterns, and trends in the development of special activities for the production of scientific knowledge taken in a socio-cultural context. The contents. Identification of the specifics and relationship of the main problems of history and philosophy of science. Study of the laws of the development of science and the structure of scientific knowledge, methods of scientific research. Knowledge of the main concepts and directions of the non-classical and post-classical stage of the development of science. Analysis of the realities of modern theory and practice based on understanding the methodology of natural science, socio-humanitarian and technical knowledge. Critical thinking as a prerequisite for the development and functioning of modern society. Technologies for the development of critical thinking: consideration and study of the logic of arguments. Formation of critical reflexive thinking and metacognitive abilities. | 4 | v | | | | | | | | | | | |
| | | BD | HsC | Foreign Language (professional) | The aim is systemic deepening of communicative competence within the framework of foreign language education's international standards based on the further skills and abilities" active language proficiency development in the professional activities of the future master's student The contents. Levels B2, C1 are presented in the form of a pragma-professional orientation for professional and academic aims at an advanced level: scientific information base, interpretation of scientific information, argumentation, persuasion, scientific controversy, academic writing. Use of innovative methods and technologies, and attraction of modern means (Internet resources). Demonstration of language material's knowledge in any related discipline. | 4 | v | | | | | | | | | | | |
| | | BD | HsC | Psychology of Management | Purpose: to ensure the competence of a psychologist by mastering his knowledge in the field of psychological management, developing skills in managing the organization's | 4 | v | | | | | | | | | | | |

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| | | | | | human resources. Content: methodological foundations of management psychology. Development of psychological theories of management. General theoretical questions of management psychology. Psychology of managerial communication. Psychological characteristics of the staff. Psychology of employee motivation. Technologies of human resource management of the organization. Psychological support of the personnel policy of the organization. Psychology of conflict in the organization. Technologies for preventing professional deformation of personality. Practical implementation in the form of creating diagnostic tools, developing digital methods for training leaders, and management consulting. | | | | | | | | | | | | | | |
| | | BD | HsC | Higher School Pedagogy | The aim: formation of the foundations of the professional and pedagogical culture of a university teacher, general pedagogical competencies, familiarization of undergraduates with the theoretical and methodological foundations of higher education pedagogy. Technologies for planning, organizing and managing the educational process at a university. Content. Modern paradigms of education, history and latest trends in the development of higher professional education in the world and in Kazakhstan. Genesis and methodology of pedagogy of higher education, the competence of a university teacher. Problems of university didactics, problems of organizing educational work with students, management of a modern university. Modern approaches and methods of teaching and organization of educational activities of students, evaluation of educational achievements. | 4 | | v | | | | | | | | | | | |
| 2 | Methodical Fundamentals of Teaching | ChD | HsC | Teaching Methods of Special Disciplines | Purpose: formation of basic knowledge and skills for teaching IT disciplines, formation of the ability to use the skills of effective application of new information technology tools in professional activity, education, as well as mastering the methodology of teaching information technology disciplines. Formation of a system of basic knowledge and skills for teaching IT disciplines among future specialists. Content: knowledge and use of the main provisions of the methodology of teaching professional disciplines: information systems in education; full knowledge of the activities of new information technologies; skills of effective use of new information technologies in professional activities; multimedia technologies in education and new telecommunication technologies; knowledge of the principles of | 5 | | v | | | | | | | | | | | |

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| | | | | | building educational programs, active methods and forms of education, innovative methods, technology, and methods of organizing independent work, distance learning technologies. | | | | | | | | | | | | | | | |
| | | | | Pedagogical Practice | Purpose: Formation of practical skills and teaching methods. Content: to have an idea of the professional competence of a teacher of higher education; know: the psychology of cognitive activity of students in the learning process; psychological methods and means of improving the efficiency and quality of education; apply the knowledge of pedagogy and psychology of higher education in their pedagogical activities; apply interactive teaching methods; implementation of educational and pedagogical activities on credit technology of education; methods of teaching professional disciplines; use of modern information technologies in the educational process | 4 | | v | | | | | | | | | | | | |
| 3 | Design of Information Systems Infrastructure | ChD | EC | Analysis, Modeling and Design of Information Systems | Purpose: Mastering practical skills of modeling and designing IS. Content: Apply risk assessment methods; risk management methods and tools; plan work on system analysis taking into account the assumptions, limitations, and dependencies of the organization's IT projects; monitor the performance of work on system analysis; evaluate and analyze the state of the organization's informatization; analyze business processes, IS, the operating environment of the organization; advise on the creation of business strategies of the system. | 4 | | | v | | | | | | | | | | | |
| | | ChD | EC | Organization and Functioning of Information Systems | Purpose: Formation of practical skills for the organization of optimal functioning of information systems. Content: To practice the basic provisions of the organization and functioning of the IP: principles of construction and functioning, structure and architecture, composition and purpose of elements; mathematical foundations and methods of automated data processing, design technology, the procedure for the development and commissioning of work tasks functional, mathematical, technical and information support. | | | | | v | | | | | | | | | | |
| | | ChD | EC | Infrastructure of Information Systems | Purpose: Mastering practical skills of analyzing the state of information systems infrastructure. Content: To assess the quality of computer systems and software and security vulnerability in IT; to determine the trajectories of expert audit in information security and IT audit; to identify compliance with established corporate standards for efficiency, accuracy, and security; to establish controls; skills to identify and formulate recommendations for improvement in existing risk management tools. | 6 | | | | v | | | | | | | | | | |

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| | | ChD | EC | Management by Peripheral Units of Informative Systems | Purpose: Mastering practical skills of optimal management of peripheral devices of information systems. Contents: To know and use the basic provisions of peripheral device management and To have the skills of processor management, process interaction in distributed systems; solving the problem of exclusive use of shared resources in the system core; developing proprietary interrupt handlers of protected mode, reprogramming the interrupt controller, controlling the operation of devices through I/O ports; implementing the correct interaction of parallel processes; developing monitors for various operating systems, network administration. | | | | | v | | | v | | | | |
| 4 | Scientific and Methodological Support of Scientific Activities | ChD | EC | Innovative Technologies of Educational and Research Work | Purpose: Mastering practical skills of using innovative technologies in educational and research work Content: To form the skills of using the electronic scientific and educational space not only of an educational institution, region, education system of a particular country, but also globally; to take into account the mass and continuity of education as factors in the development of a high-tech environment of universities; the transition from the mass introduction of individual software products to the creation of a distributed environment, cross-platform distribution, support for network distributed structures and services. | 4 | | | | | | | | | | | |
| | | ChD | EC | Organization and Planning of Educational and Research Work | Purpose: Mastering practical skills in the organization and planning of educational and research work. Content: To form the ability to organize an independent scientific search on the problem; to develop practical skills and abilities to apply scientific research methods when performing CPM; to classify educational and research activities; to choose priority areas of educational and research work; to analyze sources of scientific information. | | | v | | | | | | | v | | |
| | | BD | EC | Technologies for Development of Modern Software Systems | Purpose: Formation of practical skills in the application of new technologies for the development of modern software systems. Content: Be able to develop software complexes in integrated production complexes, automated control systems for technical objects. Know the models and standards of software development. Methods and tools for developing software complexes using CASE tools. To master the formal methods of describing the syntax and semantics of programming languages and the basic constructions of modern programming languages and their implementation in language processors. | 5 | | | | | | v | | v | | | |
| | | BD | EC | Software in Professional | Purpose: Mastering practical skills of using various mathematical applications and tools. Contents: To study and practically master | | | | | | | v | | v | | | |

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| | | | | Activities | working with mathematical applications Maxima, SciLab; to practically master the tools of functional and logical programming for solving scientific and applied problems (including artificial intelligence and parallel computing, based on MPI and OpenMP technologies): Scheme, F# languages, as well as a functional approach in programming languages C++ and C#. | | | | | | | | | | | | | |
| | | | | Research Practice | Purpose: Acquaintance with the latest theoretical, methodological and technological achievements of domestic and foreign science, with modern methods of scientific research, processing and interpretation of experimental data. Content: To know the methodology of scientific knowledge; principles and structure of organization of scientific activity; be able to use the acquired knowledge for the original development and application of ideas in the context of scientific research; critically analyze existing concepts, theories and approaches to the analysis of processes and phenomena; integrate knowledge gained within different disciplines to solve research problems in new unfamiliar conditions; by integrating knowledge, make judgments and make decisions based on incomplete or limited information | 6 | | | | | | | | | | v | v | v |
| 5 | Data Management in Information System | BD | EC | Methods of Intelligent Data Analysis | Purpose: To form theoretical knowledge, practical skills and skills in the application of modern methods of data mining. Contents: Basic methods of consolidation, transformation, visualization, quality assessment, cleaning and preprocessing of data; principles of construction and structural organization of data warehouses; statistical and machine methods of classification and regression; technologies for building ensembles and comparing models; the ability to freely navigate the modern dynamic market of analytical software products. | 5 | | | | | | | | | v | | | v |
| | | BD | EC | Big Data Processing Methods | Purpose: To form theoretical knowledge and teach practical skills of analyzing large amounts of information. Contents: Batch data processing, MapReduce models, techniques for solving typical tasks; streaming data processing and methods of data processing "in real time" – with minimal delay between the receipt of data and their processing; various data warehouses, use cases; tools that facilitate working with data, SQL engines; automation systems for data processing. | | | | | | | | | | v | | | v |
| | | ChD | EC | Modern Technologies for Building | Purpose: Mastering practical skills of working with modern database construction technologies. Contents: Fundamentals and principles of database construction; handling large amounts of data; multidimensional and relational models; methods of data | 5 | | | | | | | | | | | v | v |

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|---|---|-----|----|---|---|---|--|--|---|--|---|--|---|--|--|--|---|--|--|
| | | | | Databases | mining; data mining research methods. Have skills in working with technologies for using the software products Deductor Studio and MS SQL, Server 2008R2. Apply them when solving tasks, perform, analyze and formulate conclusions. | | | | | | | | | | | | | | |
| | | ChD | EC | Methods of Automated Treatment of Large Volumes of Data | Purpose: Practical development of methods of automated processing of large amounts of data. Content: Analyze data using machine learning on the Microsoft Azure platform; analyze the effectiveness of internal processes and operational activities. Have the skills to model the behavior of complex systems; analyze various risks; compile periodic reports with forecasts and data presentations; develop services based on big data analytics; develop and implement new methods and technologies for using big data; visualize data. | | | | | | | | v | | | | v | | |
| | | BD | EC | The latest Technologies for Processing and Managing Data in Information Systems | Purpose: Practical mastering of the latest technologies of data processing and management. Content: The latest technologies of data processing and management; documentation of existing business processes of the customer's organization (reverse engineering of business processes of the organization); management of planning and development of requirements, resources; implementation of expert support for the development of IP architecture and development of IP prototypes; planning and management of IP documentation. Project personnel performance management skills: manage project personnel; develop and coordinate regulations and procedures for the project management office. | 5 | | | | | v | | | | | | v | | |
| | | BD | EC | IT Project Management | Purpose: Formation of practical skills of IT project management. Content: To use methods of evaluation from projects and drawing up a plan for the development of a software product; methods of risk assessment; specifics of copyright; methodology for the application of PERT analysis. Have the skills to manage projects from; interact with customers / suppliers of products and services; coordinate the work of system analysts, programmers and other specialists; monitor the implementation of projects; monitor the completion of necessary documentation. | | | | v | | | | | | | | v | | |
| 6 | Organizational and Optimization of the Functioning of Information | ChD | EC | Mathematical Modeling in Scientific Researches | Purpose: Formation of practical skills of mathematical modeling in scientific research. Content: Be able to build a mathematical model of a process or phenomenon (problems of science, education, technology, economics, and management), an approximate description of the system using mathematical relations and replacing the original (investigated, controlled, operated) system with its mathematical model and further | 6 | | | | | v | | | | | | v | | |

| | | | | | | | | | | | | | | | | | | |
|--|-------|--|--|--|---|-----|--|--|--|--|--|--|--|--|--|--|--|--|
| | | | | | of scientific qualification; demonstrate the internal unity of work and display the progress and results of the development of the chosen topic; apply the rules for the design and defense of a master's thesis; find out readiness for work in an educational or research institution according to the profile. | | | | | | | | | | | | | |
| | Total | | | | | 120 | | | | | | | | | | | | |

**5 SUMMARY TABLE SHOWING THE AMOUNT OF DISCOVERED LOANS BY
EDUCATIONAL PROGRAM MODULES**

| Course of study | Semester | Number of modules to be mastered | Number of disciplines studied | | | Number of KZ credits | | | | | Total hours | Total loans KZ | Quantity | |
|-----------------|----------|----------------------------------|-------------------------------|----|-----|----------------------|---------------|-------------------|---|-------|-------------|----------------|----------|---------------------|
| | | | CC | UC | ChC | Theoretical training | Ped. practice | Research practice | Registration and defense of a master's thesis | MSR W | | | Exam | Differential offset |
| 1 | 1 | 5 | - | 5 | 2 | 29 | - | - | - | 1 | 900 | 30 | 5 | 3 |
| | 2 | 5 | - | 1 | 4 | 23 | 4 | - | - | 3 | 900 | 30 | 4 | 2 |
| 2 | 3 | 3 | - | - | 2 | 10 | - | 6 | - | 4 | 600 | 20 | 2 | 2 |
| | 4 | 3 | - | - | 3 | 16 | - | - | - | 4 | 600 | 20 | 3 | 1 |
| | 5 | 1 | - | - | - | 0 | - | - | 8 | 12 | 600 | 20 | - | 1 |
| Total | | 8 | - | 6 | 11 | 78 | 8 | 12 | 8 | 24 | 3600 | 120 | 14 | 9 |

6 STRATEGIES AND METHODS OF TRAINING, MONITORING AND EVALUATION

| | |
|--|---|
| Learning Strategies | <p>Student-centered learning: the learner is the center of teaching/learning and an active participant in the learning and decision-making process.</p> <p>Practice-oriented learning: focus on the development of practical skills.</p> |
| Teaching methods | <p>Conducting lectures, seminars, practical and laboratory work with:</p> <ul style="list-style-type: none"> • application of innovative technologies; • problem learning; • case study; • work in a group; • discussions and dialogues, intellectual games, competitions, quizzes; • software development; • presentations; • rational and creative use of information sources; • multimedia educational programs; • electronic textbooks; • virtual laboratory work; • digital resources. <p>Organization of independent work of undergraduates, individual consultations.</p> |
| Monitoring and assessing the achievability of learning outcomes | <p>Current control on each topic of the discipline, control of knowledge in classroom and extracurricular activities (according to the syllabus).</p> <p>Assessment Forms:</p> <ul style="list-style-type: none"> • survey in the classroom; • testing on the topics of the academic discipline; • test papers; • protection of independent works; • discussions; • trainings; • colloquia; • essays, etc. <p>Midterm control at least two times during one academic period within the same academic discipline.</p> <p>Intermediate certification is carried out in accordance with the working curriculum, academic calendar.</p> <p>Conduct forms:</p> <ul style="list-style-type: none"> • exam in the form of testing; • oral exam; • a written exam; • combined exam; • protection of projects; • protection of practice reports. <p>Final state certification.</p> |


7 TRAINING AND RESOURCE SUPPORT OF THE EP


| | |
|------------------------------------|--|
| Information Resource Center | <p>The structure of the OIC includes 6 subscriptions, 16 reading rooms, 2 electronic resource centers (ERC). The network infrastructure of the JRC is based on 180 computers with Internet access, 110 workstations, 6 interactive whiteboards, 2 video doubles, 1 video conferencing system, 3 A-4 format scanners, 3. The software of the JRC is AIBS "IRBIS-64" under MS Windows (basic set of 6 modules), stand-alone server for uninterrupted operation in the IRBIS system.</p> <p>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.</p> <p>Thematic databases of their own generation have been created: "Almamater", "Proceedings of SKSU scientists", "Electronic archive". Online access from any device in 24/7 mode via an external link http://articles.ukgu.kz/ru/pps.</p> <p>Working with catalogs in electronic form. EC consists of 9 databases: "Books", "Articles", "Periodicals", "Proceedings of the teaching staff of SKSU", "Rare Books", "Electronic Fund", "SKSU in Print", "Readers" "SKU".</p> <p>The JIC provides its users with 3 options for accessing its own electronic information resources: from the "Electronic Catalog" terminals in the catalog hall and divisions of the JIC; through the information network of the university for faculties and departments; remotely on the library website http://lib.ukgu.kz/.</p> <p>Access to international and republican resources is open: SpringerLink, Plenipotentiary, Web of Science, EVSCO, Epigraph, electronic versions of scientific journals in open access, 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</p> |
| Material and technical base | <p>Specialized Audiences:</p> <p>Computer classes and lecture halls equipped with modern functional and presentation equipment. Modern hardware and licensed software are installed in computer classes. All laboratory rooms are equipped with new generation computers that are in working order, allow for scientific and laboratory work, and are used in full. Computers are united in a local network and connected to the high-speed network of the university. Lecture halls are equipped with computers, multimedia projectors, which allow teaching at a high level.</p> |

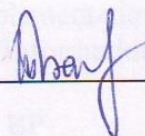
APPROVAL SHEET

according to the Educational program

7M06120 «Information systems»

Director of DAA  Naukenova A.S.

Director DAaSA  Nazarbek U.B.

Director DPaC  Bazhirov T.S.

REVIEW
for an updated educational program
7M06120 "Information systems"
(code and name)

developed in NJSC M. Auezov SKU, Shymkent

1. Brief description of the enterprise and the profile of its activities

The implementation of the proposed updated EP will be carried out on the basis of the Higher School of Information Technologies and Energy of the NJSC South Kazakhstan University named after M. Auezov. The University is the leading multidisciplinary university of the Turkestan region. Responsible for the implementation of the updated educational program was determined by the graduating department "Information Systems and Modeling".

2. The relevance and relevance of the EP

The educational program **7M06120 "Information Systems"** was developed in accordance with the needs of the regional labor market in personnel with higher professional education. In the context of the formation and development of professionally oriented education, the problem of training highly qualified personnel for the implementation of managerial and analytical functions in the application of ICT technologies becomes urgent. Currently, the number of business facilities, medical, educational and government, research organizations in need of the development, implementation and maintenance of intelligent information systems is increasing in the information space of the region. This circumstance imposes certain obligations on higher education institutions in terms of personnel training.

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

The learning outcomes and competencies proposed in the updated EP fully comply with the modern qualification requirements for specialized specialists with a bachelor's qualification, and also contribute to the formation of integral theoretical knowledge, practical skills and professional skills.

4. The presence of components that develop practical skills

The academic disciplines of the EP provide the formation of the necessary practical skills of a specialist with fundamental and applied knowledge in the field of information systems development.

All internship programs are developed taking into account the requirements of the professional standard, as well as taking into account the opinion of employers. The types of practices included in the updated educational program are determined in accordance with the types of activities that the educational program is focused on. Their content, goals and objectives testify to the orientation of the updated educational program to the development of practical skills and abilities of students.

5. Content of the updated educational program (modules, disciplines)

The modules "Methodological foundations of teaching", "Software for scientific activity", "Organization and optimization of the functioning of information systems", "Data

management in information systems" introduced disciplines that contribute to the formation of the competence of a modern specialist in the fields of information systems application.

The disciplines of the curriculum according to the reviewed updated OP form the entire necessary list of general cultural, general professional and professional competencies.

One of the advantages is taking into account the requirements of employers in the formation of profile disciplines, which in their content make it possible to ensure the competence of the graduate. The quality of the content component of the curriculum is beyond doubt.

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 practices, registration and defense of master's theses.

The distribution of disciplines by academic periods is rationally and logically justified. 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: compulsory academic disciplines, disciplines of the university component and the elective component.

The structure of the updated educational program is generally logical and consistent. Evaluation of the section of academic disciplines allows us to conclude about their high quality and a sufficient level of methodological support. The content of the disciplines corresponds to the competence of the graduate model.

6. The quality of the modular guide

The content of the modular reference book of the educational program corresponds to the accepted competence model of the graduate. The composition of educational modules covers all relevant areas of training for specialists in the field of information systems.

7. Conclusion on EP

Based on the foregoing, I consider it possible to assert that the goals and content of the presented updated educational program meet the modern qualification requirements for training bachelors specializing in information systems.

Director of «Innova Corporation Company» LLP



Turdaliev Zh.K.

Expert opinion
For an educational program
7M06120 "Information systems"
 Name of OP

1. Relevance of the OP

The educational program (OP) 7M06120 "Information systems", proposed for implementation in the educational process of the UCU, seems to be very relevant. Further intensification of the domestic economy in the conditions of market production relations requires an increasingly widespread introduction of the latest achievements of the scientific and technical process, including in the field of information technology and digitalization.

The OP under consideration is aimed at training professional managers and specialists for the ICT industries, teachers in the field of ICT, capable of non-standard thinking and bold original solutions.

2. Compliance of the OP with the formulated goals consistent with the mission of the university, the requests of employers and students

The goals and objectives of the preparation of Masters of technical sciences formulated in the OP, the requirements for the organization of the educational process, working conditions and applied learning technologies, as well as the composition of the educational modules embedded in the OP, their structure and disciplinary content correspond to the mission of the university "We are aimed at generating new competencies, training a leader who translates research and entrepreneurial thinking and culture", meet the needs of employers and undergraduates.

3. Compliance With The National Qualification Framework Of The Republic Of Kazakhstan

The OP corresponds to the 7th level of the National Qualification Framework of the Republic of Kazakhstan.

4. Reflection in the OP of results and competencies based on the Dublin descriptors laid down in professional standards/industry frameworks

The content of the OP reflects the embedded learning outcomes, key and professional competencies that are consistent with the Dublin descriptors, the 2nd cycle of the Qualification Framework of the European Higher Education Area (A Frame work for Qualifications of the European Higher Education Area), the 7th level of the European Qualification Framework (The European Qualifications Framework for Lifelong Learning) for lifelong education.

5. Compliance with the classifier of training areas with higher education

The structure and content of the OP meet the requirements of the classifier of training areas with higher education of the educational program 7B06120 – "Information systems".

6. The structure and content of the OP, the application of the modular principle of their construction.

The OP is developed in accordance with the requirements of the credit technology of training and has a modular structure. The academic disciplines include modules of basic disciplines; university component disciplines and elective components. Along with this, the

disciplines are divided into modules: scientific and pedagogical training; Methodological foundations of teaching; IT infrastructure design; Software for scientific activities; Data management in information systems; Organization and optimization of the functioning of IS; Module of research work and final certification. The amount of academic load for the study of disciplines is calculated in credit units.

The composition of academic disciplines in educational modules, their number and distribution by academic periods of study meet the requirements of current standards and meet the needs of modern professional training of highly qualified specialists of the profile in question.

7. The presence in the OP of components for training for professional activity, developing key competencies, intellectual and academic skills that reflect the changing requirements of society, including the implementation of the presidential program for mastering three languages: Kazakh, Russian and English.

The OP has been sufficiently developed in all areas of training for a Master of Technical Sciences, who has key and professional competencies, knowledge and skills that meet modern and prospective qualification requirements and the needs of society.

The educational disciplines of the OP cover all subject aspects of the training of specialized specialists, and the practices provided for in them, by their type and volume of load, ensure the achievement of the required learning outcomes and competencies.

The implementation of the presidential program for mastering Kazakh, Russian and English languages by undergraduates is ensured.

8. Logical sequence of disciplines and reflection of basic requirements in curricula and training programs

The distribution of academic disciplines by academic periods of study meets the requirements of a logical sequence that contributes to their effective development, progressive nature and continuity of accumulated knowledge, competencies, skills and abilities.

The curricula and training programs reflect the basic requirements for the organization and content of the educational process.

9. Reflection in the OP of the system of accounting for the academic load of undergraduates and teachers in loans, its compliance with the parameters of the credit technology of training

The OP complies with the requirements of the credit technology of education in terms of accounting for the workload of undergraduates and teachers in credit units.

10. Availability of research and pedagogical practice in programs to consolidate theoretical material expressed in the academic load in credits

The OP provides two types of practice for undergraduates to consolidate theoretical material: research and pedagogical. The deadlines for internships and their distribution by academic periods of study are justified. The complexity of the practice is expressed in credits.

11. Information about the teaching staff involved in the implementation of the OP

The OP reflects the required information about the PPP involved in its implementation. The qualification requirements for teaching staff are met.

12. Qualifications obtained as a result of the implementation of the OP

As a result of the implementation of OP 7M06120 "Information Systems", it is envisaged that the graduate will be awarded the academic degree "Master of Technical Sciences" in the field of training 7M061 Information and Communication Technologies.

13. Recommendations

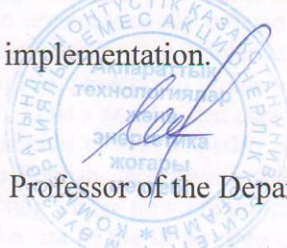
Based on the above, I believe that OP 7M06120 "Information Systems" meets the qualification requirements for the preparation of masters of technical sciences, in the field of training 7M061 Information and communication technologies.

OP is recommended for implementation.

Expert

Musabekova L.M.

Doctor of Technical Sciences, Professor of the Department "Computer technology and software"



Professional Standards

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| <p>Appendix No. 36 to the order of the Deputy Chairman of the Board of the National Chamber of Entrepreneurs Republic of Kazakhstan "Atameken" dated December 24, 2019 No. 259</p> | |
| <p>professional standard "Testing Web and multimedia applications"</p> | |
| <p>Glossary The following terms and definitions apply in this professional standard:</p> <p>Information system (IS)- an organizationally ordered set of information and communication technologies, service personnel and technical documentation that implement certain technological actions through information interaction and are designed to solve specific functional problems.</p> <p>Information technology (IT, IT) is a process that uses a set of means and methods for collecting, processing and transmitting data to obtain information of a new quality about the state of an object, process or phenomenon. Information technology (IT, from the English. Information technology, IT) is a class of areas of activity related to technologies for managing and processing a huge flow of information using computer technology.</p> <p>IS maintenance- ensuring the use of the IS put into commercial operation in accordance with its purpose, including measures to correct, modify and eliminate software defects, without upgrading and implementing additional functional requirements and subject to maintaining its integrity.</p> <p>Information system architecture- a concept that defines the model, structure, functions performed and the relationship of the components of the information system.</p> <p>Database (DB)- a set of data organized according to a conceptual structure that describes the characteristics of this data, as well as the relationships between their objects.</p> <p>Software -a set of programs, program codes, as well as software products with technical documentation necessary for their operation.</p> <p>Software interface -a system of unified links intended for the exchange of information between the components of a computing system, specifying a set of necessary procedures, their parameters and methods of handling.</p> <p>Software -an independent program or part of software that is a product, which, regardless of its developers, can be used for the intended purposes in accordance with the system requirements established by the technical documentation.</p> <p>Redesign– modification of the graphic and / or structural and functional components of an existing site or software product</p> <p>Graphical user interface (GUI), graphical user interface (GUI) - a type of user interface in which the interface elements (menus, buttons, icons, lists, etc.) presented to the user on the display are executed in the form of graphic images.</p> <p>web-page (eng. Web page) - a document or information resource of the World Wide Web, which is accessed using a web browser. A typical web page is an HTML text file</p> <p>Web resource is a page or set of pages hosted on the Internet, which may include both text and graphic information, as well as multimedia components (video, music, etc.).</p> <p>front-end is the client side of the user interface to the software and hardware part of the service. This type of development includes everything that the user sees when opening a web page.</p> <p>backend-this is a set of hardware and software tools that implement the logic of the web resource.</p> <p>Search Engine Optimization(English search engine optimization, SEO) - a set of measures for internal and external optimization to raise the position of the site in search engine results according to certain user requests, in order to increase network traffic (for web-resources) and potential customers (for commercial resources) and subsequent monetization (revenue generation) of this traffic. SEO can target a variety of search types, including image search, video search, news search, and industry-specific search engines.</p> <p>Obfuscation(from lat. obfuscare - obscure, obscure; And English obfuscate - make non-obvious, confusing, confusing) or code obfuscation - casting source code or the executable code of the program to a form that preserves its functionality, but makes it difficult to analyze, understand the operation algorithms and modify when decompilation. One of the goals of obfuscation is to optimize the program in order to reduce the size of the running code and (if a non-compiled language is used) speed up the work.</p> <p>ICT– Information and communication technologies;</p> <p>BY- Software;</p> <p>ISCED– International Standard Classification of Education</p> | |
| <p>1. Professional Standard Passport</p> | |
| PS name: | Web and multimedia application testing |

| | | |
|--|---|--|
| PS number: | | |
| The names of the section, section, group, class, and subclass according to OKED: | J Information and communication 62 Computer programming, consulting and other related services 62.0 Computer programming, consulting and other related services 62.01 Computer programming activities 62.01.1. Software development 63.12 Web portals 63.12.0 Web portals | |
| Brief description of the PS: | Creation, modification and maintenance of websites, corporate portals of organizations, multimedia and interactive applications, web resources on the Internet. | |
| 2. Occupation cards | | |
| List of profession cards | web developer | 5th-6th levels of ORC |
| | Web page developer | 5th-6th levels of ORC |
| | Application developer | 5th-6th levels of ORC |
| | Graphical user interface specialist | 5th-6th levels of ORC |
| | GUI Architecture Specialist | 5th-6th levels of ORC |
| | webmaster | 5th-7th levels of ORC |
| PROFESSION CARD "WEB-MASTER" | | |
| Code: | 2512-2-008 | |
| Group code: | 2512-2 | |
| Profession: | webmaster | |
| Other possible job titles: | web programmer 2512-1-002 Software Engineer | |
| Qualifying ORC level: | 7 | |
| The main purpose of the activity | Perform work on the creation (modification) and maintenance of web resources | |
| Labor functions | Mandatory labor functions | 1. Testing a web resource 2. Web resource design |
| | Additional labor functions | - |
| Labor function 1:Testing a web resource | Task 1: Expert assessment of the functioning of a web resource and planning methods for its implementation | Skills: 1. Design web resource architectures 2. Check (verify) the architecture of a web resource 3. Produce research and analysis 4. Methods for developing, analyzing and designing a web resource |
| | | Knowledge: 1. Normative and technical documents (standards and regulations) describing the processes for assessing the complexity, labor intensity, terms of work 2. Interpret data from message logs, protocols 3. Possibilities of the existing technical and/or software architecture 4. Management decision-making methods 5. Methods and tools for checking the health of a web resource 6. Collaborative software development environment and version control system |
| | | |
| Labor function 2: Web resource design | Task 1: Web resource design management | Skills: 1. Apply software architecture principles and types of software architectures 2. Apply methodologies and software design tools 3. Apply database design methods and tools 4. Apply interface design methods and tools 5. Apply the basic principles and methods of personnel management 6. Apply functional standardization methodology for open systems |

| | | | |
|--|--|---|---|
| | | | 7. Interact with departments of the organization as part of the design process of a web resource, database structure, program interfaces 8. Apply management decision-making methods 9. Apply regulatory and technical documents (standards and regulations) on the process of developing the architecture of a web resource |
| | | | Knowledge: 1. Principles of constructing the architecture of a web resource 2. Methodologies and tools for designing web resources 3. Database Design Methods and Tools 4. Interface Design Methods and Tools 5. Management decision-making methods 6. Basic principles and methods of personnel management 7. Functional standardization methodology for open systems |
| | Task 2: Management of the development of design and technical documentation | Skills: 1. Apply regulatory and technical documents (standards and regulations) that define the requirements for design and technical documentation 2. Apply a collaborative software documentation environment 3. Apply management decision-making methods | |
| | | | Knowledge: 1. Rules for editing scientific and technical documentation 2. Normative and technical documents (standards and regulations) that define the requirements for design and technical documentation 3. Methods for improving the readability of program code 4. Management decision-making methods 5. Basic principles and methods of personnel management |
| | Task 3: Management of processes for assessing complexity, labor intensity, and deadlines for completing work | Skills: 1. Apply regulatory and technical documents (standards and regulations) that describe the processes for assessing the complexity, labor intensity, and timing of work 2. Apply methods and tools for assessing the complexity, labor intensity and timing of work 3. Apply the basic principles and methods of personnel management | |
| | | | Knowledge: 1. Normative and technical documents (standards and regulations) describing the processes for assessing the complexity, labor intensity, terms of work 2. Methods for assessing the complexity, labor intensity and timing of work 3. Software tools for assessing the complexity, labor intensity and timing of work 4. Basic principles and methods of personnel management |
| | Requirements for personal competencies | Analytical thinking, Critical analysis, Responsibility organization | |
| | Relationship with other professions within the OQF | 5 | web developer |
| | | 6 | web developer |
| Communication with ETKS or KS | KS | 185. Technician - programmer 140. Software Engineer | |
| Relationship with the system of education and qualifications | The level of education: Postgraduate (6M ISCED code) | Qualification: Master in ICT | Direction of training: Information and communication technologies |
| 3. Professional standard technical data | | | |
| Designed by: | Limited Liability Partnership "System Research Company "Factor" | | |

| | |
|-------------------------------------|--|
| | Project manager: Gabbasov M.B. Contact details of the head: Mars0@mail.ru +7 701 908 25 11 Project executors and contact details of executors: Abdeshov H.U. habdeshov@rambler.ru +7 777 2505831 Uvaleev Zh.E. zh_uali@mail.ru 87015228028 Baydeldinov M.U. Make3508@gmail.com +77013918037 |
| The expertise is provided by: | Organisation: 10Tech LLP Experts and contact details of experts: Deputy General Director Boldyrev V.A. 87017173689 |
| Version number and year of release: | Version 1, 2019 |
| Date of indicative revision: | 30.12.2022 |

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| Appendix No. 20 to the order of the Acting Chairman of the Board of the National Chamber of Entrepreneurs Republic of Kazakhstan "Atameken" No. 222 dated 12/05/2022 |
| Professional Standard: Software Maintenance |
| <p>Glossary</p> <p>The following terms and definitions apply in this professional standard:</p> <p>Information system (IS)- an organizationally ordered set of information and communication technologies, service personnel and technical documentation that implement certain technological actions through information interaction and are designed to solve specific functional problems.</p> <p>Information technology (IT, IT) is a process that uses a set of means and methods for collecting, processing and transmitting data to obtain information of a new quality about the state of an object, process or phenomenon. Information technology (IT, from the English. Information Technology, IT) is a class of areas of activity related to technologies for managing and processing a huge flow of information using computer technology.</p> <p>IS maintenance- ensuring the use of the IS put into commercial operation in accordance with its purpose, including measures to correct, modify and eliminate software defects, without upgrading and implementing additional functional requirements and subject to maintaining its integrity.</p> <p>Information system architecture- a concept that defines the model, structure, functions performed and the relationship of the components of the information system.</p> <p>Database- a set of data organized according to a conceptual structure that describes the characteristics of this data, as well as the relationships between their objects.</p> <p>Graphical user interface(Graphical User Interface-GUI) - a specific program that provides the ability to use user interface elements in the form of graphical objects.</p> <p>User Interface (UI)- elements of the system interface that are used by the user while working in the system (menus, buttons, dialog boxes) in the form of objects, which takes into account the color scheme, size, style and other graphic features.</p> <p>Program development automation systems (CASE - tools)- a set of software engineering tools and methods for software design that helps to ensure high quality programs, the absence of errors and ease of maintenance of software products.</p> <p>IR– Information and communication technologies;</p> <p>BY- Software;</p> <p>DB- Database</p> |

| 1. Professional standard passport | | |
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| Name of the Professional Standard: | Software maintenance | |
| Professional Standard Number: | | |
| The names of the section, section, group, class, and subclass according to OKED: | J Information and communication 62 Computer programming, consulting and other related services 62.0 Computer programming, consulting and other related services 62.01 Computer programming activities 62.01.1. Software development. | |
| Brief description of the Professional Standard: | Setting up, configuring, monitoring, upgrading, eliminating software failures, assessing the adequacy and effectiveness of the internal control system and the risk management system in the field of information technology, conducting and maintaining participation in complex information security audits, management of planning and conducting audit procedures, development of programs, methods of checks on the audit of information technology. | |
| 2. Occupation cards | | |
| List of profession cards | Software Maintenance Specialist | 5th - 6th levels of ORC |
| | ICT auditor | 6th - 7th levels of ORC |
| PROFESSION CARD:ICT AUDITOR | | |
| Code: | 2519-1-001 | |
| Group code: | 2519-1 | |
| Profession: | ICT auditor | |
| Other possible job titles: | | |
| Qualification level for ORK: | 7 | |
| The main purpose of the activity: | Conducting an audit procedure in the IT field | |
| Labor functions: | Mandatory job functions: | 1. Conducting an audit of information systems, platforms and operating procedures |
| | | 2. Assessment of ICT infrastructure in terms of risk to the organization |
| | Additional labor functions: | - |
| Labor function 1: Conducting an audit of information systems, platforms and operating procedures | Task 1: Determination of the trajectory expert audit and in information security and IT audit | Skills: 1. Determine strategy and tactics audit, volume checks. 2. Develop programs and specific audit procedures in information security. 3. Participation in comprehensive information security audits 4. Determine legal requirements to IT infrastructure 5. Ensure compliance with organizational ICT standards, legal requirements |
| | | Knowledge: 1. Methodologies and principles for conducting and organizing audit activities 2. Fundamentals of information and communication technology, software and hardware |
| | | |
| | Task 2: Match detection with established corporate standards for efficiency, accuracy and safety. | Skills: 1. Conduct audit of information systems for work safety. 2. Monitor unauthorized access to the information systems of the organization 3. Conduct quality checks operation of computer systems and software 4. Perform a security vulnerability assessment in IT 5. Prepare financial audit reports 6. Compile a report on the conduct web security audit |
| | | Knowledge: 1. Modern software applications 2. ICT process quality models 3. Knowledge ICT quality policies 4. International and national information security standards |
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| Labor function 2: | Task 1: | Skills: |

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| Assessment of ICT infrastructure in terms of risk to the organization | Installing the control | 1. Monitor the implementation of the audit recommendation 2. Follow technology trends in IT 3. Conduct contract compliance checks to use the software 4. Manage IT security compliance | |
| | | Knowledge: 1. Methodology for conducting and organizing audit activities 2. Principles of conducting audit activities 3. Fundamentals of information and communication technology, software and hardware | |
| | Task 2: Identification and recommendations for improvement in existing risk controls | Skills: 1. Manage the audit procedure and highlight the main objectives of the audit 2. Create an object audit report 3. Implement changes or updates to the system to reduce losses. 4. Implement ICT risk management | |
| | | Knowledge: 1. Procedures and rules for conducting audit procedures 2. Regulations for the basis of audits 3. Basics of conducting a business letter and official documentation. | |
| Requirements for personal competencies | Logical thinking. Flexibility of thinking. Organization. Creativity. Sociability. Learnability. Attentiveness. Independence in decision making. Accuracy. Responsibility. Initiative. | | |
| Relationship with other professions within the OQF | 5-6 | Software Maintenance Specialist | |
| Link to ETKS or KS or other job directories | KS | 140. Software Engineer 256. Junior researcher 96. Project manager | |
| Relationship with the system of education and qualifications | Level of education: postgraduate (ISCED level 7) | Direction: Information and Communication Technologies | Qualification: Master of Engineering and Technology / Master of Science |
| 3. Professional standard technical data | | | |
| Designed by: | Limited Liability Partnership "System Research Company "Factor" Project manager: Gabbasov M.B. Contact details of the head: Mars0@mail.ru +7 701 9082511 Project executors and contact details of executors: Isin N.K. info@itk.kz +7 701 1111871 Abdeshov H.U. habdeshov@rambler.ru +7 777 2505831 Akanova A.S. akerkegansaj@mail.ru +77054480680 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 December 24, 2019 | | |
| The expertise is provided by: | Organization: LLP "Tamur" Experts and contact details of experts: General Director Berentaev B. 870171476511 | | |
| Version number and year of release: | Version 1, 2019 | | |
| Updated: | ALE "International Association for Certification and Development of Information Technologies Master-It" Chairman: Omarov Zh.B. | | |

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| Expertise provided by: | <p>ALE "International Association for Certification and Development of Information Technologies Master-It" Chairman: Omarov Zh.B. master_it_rk@mail.ru +7 777 8151000</p> |
| Version number and year of release: | Version 2, 2022 |
| Date of indicative revision: | 12/30/2025 |

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| <p>Application No. 6 to the order of the Acting Chairman of the Board of the National Chamber of Entrepreneurs Republic of Kazakhstan "Atameken" No. 222 dated 12/05/2022</p> |
| <p>Professional standard: "Conducting web monitoring"</p> |
| <p>Glossary The following terms and definitions apply in this professional standard: Information system (IS)- an organizationally ordered set of information and communication technologies, service personnel and technical documentation that implement certain technological actions through information interaction and are designed to solve specific functional problems.</p> |

Information technology (IT, IT) is a process that uses a set of means and methods for collecting, processing and transmitting data to obtain information of a new quality about the state of an object, process or phenomenon. Information technology (IT, from the English. Information Technology, IT) is a class of areas of activity related to technologies for managing and processing a huge flow of information using computer technology.

IS maintenance- ensuring the use of the IS put into commercial operation in accordance with its purpose, including measures to correct, modify and eliminate software defects, without upgrading and implementing additional functional requirements and subject to maintaining its integrity.

Information system architecture- a concept that defines the model, structure, functions performed and the relationship of the components of the information system.

Database- a set of data organized according to a conceptual structure that describes the characteristics of this data, as well as the relationships between their objects.

Redesign- modification of the graphic and / or structural and functional components of an existing site or software product

Rendering -the process of obtaining an image from a model using a computer program

Graphical user interface(Graphical User Interface - GUI) - a specific program that provides the ability to use user interface elements in the form of graphical objects.

User-centric design(User Centered Design) - provides a combination of ergonomic, aesthetic, artistic requirements for the system

User Interface (UI)- elements of the system interface that are used by the user while working in the system (menus, buttons, dialog boxes) in the form of objects, which takes into account the color scheme, size, style and other graphic features.

SQL (Structured Query Language)- Structured query language, a declarative programming language for creating, modifying and managing data.

OLAP(English Online Analytical Processing, interactive analytical processing) is a data processing technology that consists in preparing summary (aggregated) information based on large data arrays structured according to a multidimensional principle.

Product Analyst -Analyst conducted big data analysis to predict product behavior.

B.I. (Business intelligence) - translation of transactional business information into a human-readable form

ICT- Information and communication technologies;

BY- Software;

DB- Database

CRM(Customer Relationship Management) - customer relationship management system

1. Professional Standard Passport

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| Name of the Professional Standard: | Carrying out web monitoring |
| Professional Standard Number: | |
| The names of the section, section, group, class, and subclass according to OKED: | J Information and communication 62 Computer programming, consulting and other related services 62.0 Computer programming, consulting and other related services 62.01 Computer programming activities 62.01.1. Software development. |
| Brief description of the PS: | Providing transactional business information in a human-readable form, interpreting large amounts of data, modeling initial courses of action, maintaining a business solution. Working with big data, studying metrics, building a funnel, monitoring changes, using a statistical significance indicator. Applying the Data Driven Development approach. Monitoring website traffic, studying the behavior of visitors. |

2. Occupation cards

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| List of profession cards | web analytics specialist | 6th and 7th levels of ORC |
| | BI systems specialist | 6th and 7th levels of ORC |
| | Product analytics specialist | 6th and 7th levels of ORC |

PROFESSION CARD: WEB ANALYSIS SPECIALIST

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| PROFESSION CODE: WEB ANALYTICS SPECIALIST | | |
| Code: | | |
| Group code: | | |
| Profession: | web analytics specialist | |
| Other possible job titles: | - | |
| Qualification level for ORK: | 7 | |
| The main purpose of the activity: | Collection and analysis of data about website visitors | |
| Labor functions: | Mandatory job functions: | 1. Analysis of the behavior of site visitors |
| | | 2. Search engine optimization for website promotion |

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| | Additional labor functions: | - |
| Labor function 1: Website visitor behavior analysis | Task 1: Development of programs for collecting information about the behavior of site visitors | Skills: <ol style="list-style-type: none"> 1. Create SQL queries on the behavior of visitors and their needs 2. Based on the collected data, identify problems that lead to site inefficiency 3. Take into account, when developing a site, keywords for the convenience of searching and finding the site by the user 4. Create blocks for aggressive advertising. |
| | | Knowledge: <ol style="list-style-type: none"> 1. Methods and principles for improving the efficiency of the site at the user level and at the programmer level (speed, hosting, access, and so on) 2. SQL query language, database design, query processing 3. Fundamentals and principles of website design development |
| | Task 2: Work on processing data for the content and database of the site | Skills: <ol style="list-style-type: none"> 1. Edit sections of the site, add and delete sections, make decisions on posting and updating material on the site to promote it 2. Develop applications and use existing ones to evaluate and analyze site performance (content and optimization) 3. Select up-to-date, easy-to-read material. |
| | | Knowledge: <ol style="list-style-type: none"> 1. Knowledge of modern (with enhanced functionality) software applications for site analysis 2. Programming languages for developing a site and applications for data analysis |
| Labor function 2: Search engine optimization for website promotion | Task 1: Site Vulnerability Prevention | Skills: <ol style="list-style-type: none"> 1. Develop analytical test programs, test scenarios for error detection. 2. Carry out statistical analytical work to determine the effectiveness of the site for various parameters (creation of a survey, questionnaire, and so on). 3. Use the SSL protocol, HTTP Only parameters and other means to ensure cookie security. 4. Apply new ranking algorithms to optimize the search process and site definition. |
| | | Knowledge: <ol style="list-style-type: none"> 1. Components of the effectiveness of the site, including site design, trust in the site, in the product, feedback from the seller, and so on. 2. Analytical software for site testing 3. Basic principles and methods of SEO website promotion |
| | Task 2: Extracting data from web resources | Skills <ol style="list-style-type: none"> 1. Develop a set of measures for internal and external optimization to raise the position of the site 2. Develop a modernization plan and implement after site analysis 3. Use libraries to extract data from a web resource. |
| | | Knowledge <ol style="list-style-type: none"> 1. Fundamentals of advertising, marketing 2. Basic principles of SEO optimization 3. Methods and principles of site modernization 4. Methods and tools for extracting data from web resources |
| Requirements for personal | Responsibility. performance. Logical thinking. Flexibility of thinking. Result | |

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| competencies | orientation. Organization. Creativity. Attentiveness. Independence in decision making. Accuracy. Responsibility. | | |
| Relationship with other professions within the OQF | 6-7 | BI systems specialist | |
| | 6-7 | Product analytics specialist | |
| Link to ETKS or KS or other job directories | KS | 140. Software Engineer 96. Project manager 157. Programmer (web master, web designer) | |
| Relationship with the system of education and qualifications | Level of education: postgraduate (ISCED level 7) | Direction: Information and Communication Technologies | Qualification: Master of Engineering and Technology / Master of Science |
| PROFESSION CARD: BI SYSTEMS SPECIALIST | | | |
| Code: | | | |
| Group code: | | | |
| Profession: | BI systems specialist | | |
| Other possible job titles: | | | |
| Qualification level for ORK: | 7 | | |
| The main purpose of the activity: | Conduct data analysis from the data warehouse | | |
| Labor functions: | Mandatory job functions: | 1. Designing and creating a database 2. Visualization and report generation of data for business analysis | |
| | Additional labor functions: | - | |
| Labor function 1: Designing and creating a database | Task 1: Database development and work with data | Skills: 1. Determine the architecture for building a data warehouse: traditional or cloud 2. Use Data Warehouse Tools | |
| | | Knowledge: 1. Data warehouse design approaches 2. Architecture and organization principles of cloud data storages | |
| | Task 2: Providing reporting | Skills: 1. Use multidimensional aggregation when designing data warehouses 2. Post to vaults data and extract data 3. Make changes to the data store 4. Manage the created storage | |
| | | Knowledge: 1. Fundamentals of mathematics, economics and computer science. 2. OLAP technology 3. Data warehouse architecture | |
| Labor function 2: Visualization and report generation of data for business analysis | Task 1: Data Modeling and Rendering | Skills: 1. Use ready-made analytics systems 2. Use special ready-made tools for data analysis 3. Develop an action plan to optimize the operation of the data warehouse, search and extract data, place and conduct data analytics | |
| | | Knowledge: 1. Methods and stages of business process optimization 2. Fundamentals of marketing and management | |
| | Task 2: Organization of the process of documenting the results of the analysis | Skills: 1. Identify and distribute data according to the degree of need and frequency of use. 2. Use software tools to develop a business solution 3. Create reports on analysis data. 4. Optimize the process of generating business decision analysis reports | |
| | | Knowledge: | |

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| | | 1. Fundamentals of marketing and management 2. Methodologies for implementing large-scale business transformation projects using advanced management practices 3. Fundamentals of the implementation of reengineering of processes and organizational structures | |
| Requirements for personal competencies | Responsibility. performance. Logical thinking. Flexibility of thinking. Result orientation. Organization. Creativity. Attentiveness. Independence in decision making. Accuracy. Responsibility. | | |
| Relationship with other professions within the OQF | 6-7 | web analytics specialist | |
| | 6-7 | Product analytics specialist | |
| Link to ETKS or KS or other job directories | KS | 140. Software Engineer 96. Project manager | |
| Relationship with the system of education and qualifications | Level of education: postgraduate (ISCED level 7) | Direction: Information and Communication Technologies | Qualification: Master of Engineering and Technology / Master of Science |
| PROFESSION CARD: PRODUCT ANALYSIS SPECIALIST | | | |
| Code: | | | |
| Group code: | | | |
| Profession: | Product analytics specialist | | |
| Other possible job titles: | | | |
| Qualification level for ORK: | 7 | | |
| The main purpose of the activity: | Definition of a metric to analyze the implementation of the product | | |
| Labor functions: | Mandatory job functions: | 1. Conducting research to promote the product 2. Providing system analysis with an information system | |
| | Additional labor functions: | - | |
| Labor function 1: Conducting research to promote the product | Task 1: Collection of data on the behavior of products in the market | Skills: | |
| | | 1. Use time series as a predictive tool 2. Search by criteria, determine the required data, retrieve data from storage, download, save, transfer. 3. Apply real-time data analysis tools 4. Determine the types of data collected | |
| | | Knowledge: | |
| | Task 2: Conducting data analysis | 1. Types of forecasting and forecasting scenario 2. Methods and principles for measuring social phenomena 3. Elements of combinatorics, probability theory, statistics. | |
| | | Skills: | |
| | | 1. Automate queries from marketing, product, and business operations analysts. 2. Use the skills of working with neural networks, machine learning to develop an analytics system 3. Develop ways to solve problems associated with automating the implementation of the product 4. Generate product sales forecasting reports | |
| Labor function 2: Providing system analysis with an information system | Task 1: Process automation and support for existing analytics systems | Knowledge: | |
| | | 1. Methods of machine learning, neural networks 2. Programming languages 3. Data analysis tools | |
| Labor function 2: Providing system analysis with an information system | Task 1: Process automation and support for existing analytics systems | Skills: | |
| | | 1. Develop queries for specific data types 2. Use and manage modern data collection tools 3. Adjust spam mailing rate (decrease, increase) 4. Ensure the integrity and integration of the developed business solutions in the system | |

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| | | Knowledge: 1. Big data classification 2. SQL queries 3. Managing data collection tools 4. Programming languages for data analysis systems | |
| | Task 2: Determining the point of growth for business | Skills 1. Process data by classification to optimize their use in measurement processes 2. Conduct statistical data analysis on a data sample | |
| | | Knowledge 1. Methods and principles of data processing 2. Methods of statistical analysis 3. Tools for productive analysis | |
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| Requirements for personal competencies | Responsibility, performance, Logical and analytical thinking, Flexibility of thinking, Result orientation, Organization, Creativity, Attentiveness, Accuracy, Independent in decision making, Responsibility. | | |
| Relationship with other professions within the OQF | 6-7 | web analytics specialist | |
| | 6-7 | BI systems specialist | |
| Link to ETKS or KS or other job directories | KS | 140. Software Engineer 96. Project manager 157. Programmer (web master, web designer) | |
| Relationship with the system of education and qualifications | Level of education: postgraduate (ISCED level 7) | Direction of preparation: Information and Communication Technologies | Qualification: Master of Engineering and Technology / Master of Science |
| 3. Professional standard technical data | | | |
| Designed by: | Limited Liability Partnership "System Research Company "Factor" Project manager: Gabbasov M.B. Contact details of the head: Mars0@mail.ru +7 701 9082511 Project executors and contact details of executors: Isin N.K. info@itk.kz +7 701 1111871 Abdeshov H.U. habdeshov@rambler.ru +7 777 2505831 Akanova A.S. akerkegansaj@mail.ru +77054480680 Approved by the order of the Deputy Chairman of the Board of the National Chamber of Entrepreneurs Republic of Kazakhstan "Atameken" dated December 24, 2019 No. 259 | | |
| The expertise is provided by: | Organization: Helios Soft LLP Experts and contact details of experts: Director Butumbaev S.B. 8 777 777 7653 | | |
| Version number and year of release: | Version 1, 2019 | | |
| Date of indicative revision: | 30.12.2022 | | |
| Updated: | CIB ICRIAP RK | | |
| The expertise is provided by: | Organization: ALE "Kazakhstan Information Security Association" Experts and contact details of experts: General Director Pokusov V.V. +7 771 716 18 16 | | |
| Version number and year of release: | Version 2, 2022 | | |
| Date of indicative revision: | 2025 | | |

Professional Standard: "Development of artificial intelligence applications"

Glossary

The following terms and definitions apply in this professional standard:

Information system (IS)- an organizationally ordered set of information and communication technologies, service personnel and technical documentation that implement certain technological actions through information interaction and are designed to solve specific functional problems.

Information technology (IT, IT) is a process that uses a set of means and methods for collecting, processing and transmitting data to obtain information of a new quality about the state of an object, process or phenomenon. Information technology (IT, from the English. Information technology, IT) is a class of areas of activity related to technologies for managing and processing a huge flow of information using computer technology.

Artificial intelligence (AI; English artificial intelligence, AI) - the property of intelligent systems to perform creative functions that are traditionally considered the prerogative of man; the science and technology of building intelligent machines, especially intelligent computer programs.

IT infrastructure is a complex structure that combines all information technologies and resources used by a particular organization or company. The information technology infrastructure includes all computers, installed software, communication systems, information centers, networks and databases.

IS maintenance- ensuring the use of the IS put into commercial operation in accordance with its purpose, including measures to correct, modify and eliminate software defects, without upgrading and implementing additional functional requirements and subject to maintaining its integrity.

Information system architecture- a concept that defines the model, structure, functions performed and the relationship of the components of the information system.

Database (DB)- a set of data organized according to a conceptual structure that describes the characteristics of this data, as well as the relationships between their objects.

Knowledge base- A set of software tools that provide search, storage, transformation and recording in the computer memory of complexly structured information units (knowledge).

Data Mining (English data mining)- this is the process of discovering in raw data previously unknown, non-trivial, practically useful and accessible for interpretation of knowledge necessary for decision-making in various areas of human activity

Software -a set of programs, program codes, as well as software products with technical documentation necessary for their operation.

Software interface -a system of unified links intended for the exchange of information between the components of a computing system, specifying a set of necessary procedures, their parameters and methods of handling.

Software -an independent program or part of software that is a product, which, regardless of its developers, can be used for the intended purposes in accordance with the system requirements established by the technical documentation.

Ontoengineer or knowledge engineer(English knowledge engineer; synonyms: knowledge engineer, cognitive scientist, AI specialist) - an artificial intelligence specialist who designs and creates an expert system. Typically, a knowledge engineer acts as an intermediary between an expert and a knowledge base.

Expert system (ES, English expert system)- a computer system that can partially replace a specialist expert in resolving a problem situation.

BY- Software;

ISCED– International Standard Classification of Education

1. Professional Standard Passport

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| Name of the Professional Standard: | Development of artificial intelligence applications |
| Professional Standard Number: | |
| The names of the section, section, group, class, and subclass according to OKED: | J Information and communication 62 Computer programming, consulting and other related services 62.0 Computer programming, consulting and other related services 62.01 Computer programming activities |
| Brief description of the Professional Standard: | Application of artificial intelligence techniques in engineering, robotics, and computer science to develop programs that mimic intelligence, including thought patterns, cognitive and knowledge-based systems, problem solving, and decision making. The integration of |

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| | structured knowledge into computer systems (knowledge bases) to solve complex problems, usually requiring a high level of human expertise or artificial intelligence techniques. | |
| 2. Occupation cards | | |
| List of profession cards | artificial intelligence engineer | 6th-7th levels of ORC |
| | Application programmer | 5th-6th levels of ORC |
| | Artificial intelligence specialist | 6th-7th levels of ORC |
| PROFESSION CARD: ARTIFICIAL INTELLIGENCE ENGINEER | | |
| Code: | 2519-9-001 | |
| Group code: | 2519-9 | |
| Profession: | artificial intelligence engineer | |
| Other possible job titles: | AI programmer | |
| Qualification level for ORK: | 7 | |
| The main purpose of the activity: | Perform work on the design and creation (modification) of artificial intelligence systems | |
| Labor functions: | Mandatory job functions: | 1. Implementation of artificial intelligence systems 2. Trial operation of artificial intelligence systems and its implementation |
| | Additional labor functions: | - |
| | Labor function 1: Implementation of artificial intelligence systems | Task 1: Development of an intelligent system project |
| Knowledge: 1. Rules for editing scientific and technical documentation 2. Normative and technical documents (standards and regulations) that define the requirements for design and technical documentation 3. Methods of making managerial decisions. 4. Basic principles and methods of personnel management 5. Principles of building the architecture of artificial intelligence systems 6. Methodologies and tools for designing artificial intelligence systems 7. Methods and tools for designing knowledge bases 8. Interface Design Methods and Tools 9. Functional standardization methodology for open systems | | |
| Task 3: Software implementation of an intelligent system | | Skills: 1. Apply methods and means of planning and control (monitoring) of the execution of plans 2. Apply regulatory and technical documents (standards and regulations), the best world practices for managing the process of developing intelligent systems 3. Make plans for the development process of artificial intelligence systems 4. Assess the quality of the AI systems development plan (resources, timeframe, risks) 5. Monitor the implementation of plans for the development of artificial |

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| | | intelligence systems | |
| | | 6. Adjust the plan for the development of artificial intelligence systems | |
| | | Knowledge: | |
| | | 1. Methods and means of planning and control (monitoring) of the execution of plans | |
| | | 2. Methods for assessing the quality of an artificial intelligence system development plan (resources, deadlines, risks) | |
| | | 3. Basic principles and methods of personnel management | |
| | | 4. Regulatory and technical documents (standards and regulations), best world practices for managing the process of developing artificial intelligence systems | |
| Labor function 2: Pilot operation of artificial intelligence systems and its implementation | Task 1: Testing of artificial intelligence systems | Skills: | |
| | | 1. Prepare test datasets | |
| | | 2. Apply methods and tools for testing the performance of artificial intelligence systems | |
| | | 3. Interpret data from message logs, protocols | |
| | | 4. Use the capabilities of the existing technical and / or software architecture of artificial intelligence systems | |
| | | 5. Apply a collaborative software development environment and version control system | |
| | | Knowledge: | |
| | | 1. Regulatory documents that define the requirements for testing the performance of artificial intelligence systems | |
| | | 2. Basic principles of debugging artificial intelligence systems | |
| | | 3. The main types of diagnostic data and ways to present them | |
| | | 4. Methods for preparing test datasets | |
| | | 5. Methods and tools for testing the performance of artificial intelligence systems | |
| Requirements for personal competencies | Analytical thinking, Critical analysis, Responsibility | | |
| Relationship with other professions within the OQF | Organization, ability to solve non-standard tasks | | |
| Relationship with other professions within the OQF | 6 | Artificial intelligence specialist | |
| | 7 | Artificial intelligence specialist | |
| Communication with ETKS or KS | KS | 140. Software engineer (programmer) | |
| Relationship with the system of education and qualifications | The level of education: Postgraduate (6M ISCED code) | Direction of training: Information and communication technologies | Qualification: Master in ICT |
| PROFESSION CARD: SPECIALIST IN ARTIFICIAL INTELLIGENCE | | | |
| Code: | 2519-9-003 | | |
| Group code: | 2519-9 | | |
| Profession: | Artificial intelligence specialist | | |
| Other possible job titles: | Knowledge Engineer Ontoengineer | | |
| Qualification level for ORK: | 7 | | |
| The main purpose of the activity: | Design and create artificial intelligence systems - expert systems | | |
| Labor functions: | Mandatory job functions: | 1. Organization of expert systems development processes | |
| | | 2. Management of expert systems development processes | |
| | Additional labor functions: | - | |
| Labor function 1: Organization of expert systems development processes | Task 1: Management of expert systems software development process | Skills: | |
| | | 1. Apply methods and means of planning and control (monitoring) of the execution of plans | |
| | | 2. Apply regulatory and technical documents (standards and regulations), the best world practices for managing the software product development process | |
| | | 3. Plan the software development process | |
| | | 4. Evaluate the quality of the software product development plan | |

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| | | (resources, deadlines, risks) 5. Monitor the execution of software product development plans 6. Adjust the software development plan |
| | | Knowledge: 1. Methods and means of planning and control (monitoring) of the execution of plans 2. Methods for assessing the quality of a software product development plan (resources, deadlines, risks) 3. Basic principles and methods of personnel management 4. Regulatory and technical documents (standards and regulations), the best world practices for managing the software product development process 5. Theoretical foundations of expert systems design 6. Basic tools of expert systems |
| | Task 2: Managing the Infrastructure of a Collaborative Development Environment | Skills: 1. Apply software development methodologies 2. Apply software development project management methodologies 3. Apply methods and tools for organizing design data 4. Apply the basic principles and methods of personnel management 5. Apply regulatory and technical documents (standards and regulations) that describe the processes for managing the infrastructure of a collective development environment |
| | | Knowledge: 1. Software Development Methodologies 2. Software development project management methodologies 3. Methods and means of organizing design data 4. Software Development Management Best Practices 5. Basic principles and methods of personnel management 6. Normative and technical documents (standards and regulations) describing the processes of managing the infrastructure of a collective development environment |
| | Task 3: Management of processes for assessing complexity, labor intensity, and deadlines for completing work | Skills: 1. Apply regulatory and technical documents (standards and regulations) that describe the processes for assessing the complexity, labor intensity, and timing of work 2. Apply methods and tools for assessing the complexity, labor intensity and timing of work |
| | | Knowledge: 1. Normative and technical documents (standards and regulations) describing the processes for assessing the complexity, labor intensity, terms of work 2. Methods for assessing the complexity, labor intensity and timing of work 3. Software tools for assessing the complexity, labor intensity and timing of work 4. Basic principles and methods of personnel management |
| Labor function 3: Management of expert systems development processes | Task 1: Management of the development of design and technical documentation | Skills: 1. Apply regulatory and technical documents (standards and regulations) that define the requirements for design and technical documentation 2. Apply a collaborative software documentation environment 3. Apply management decision-making methods |
| | | Knowledge: 1. Rules for editing scientific and technical documentation 2. Normative and technical documents (standards and regulations) that define the requirements for design and technical documentation 3. Methods for improving the readability of program code 4. Management decision-making methods 5. Basic principles and methods of personnel management 6. Theoretical foundations of expert systems design |
| Requirements for personal competencies | Structural thinking, perseverance and mindfulness Creative approach, Ability to self-learning, Responsibility, Focus on the final result and | |

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| | customer requirements, Business communication skills, Systems thinking, Ability to solve non-standard tasks | | |
| Relationship with other professions within the OQF | 6 | artificial intelligence engineer | |
| | 7 | artificial intelligence engineer | |
| Link to ETKS or KS or other job directories | KS | 140. Software engineer (programmer) | |
| Relationship with the system of education and qualifications | The level of education: Postgraduate (6M ISCED code) | Direction of training: Information and communication technologies | Qualification: Master in ICT |
| 3. Professional standard technical data | | | |
| Designed by: | <p>Limited Liability Partnership "System Research Company "Factor"</p> <p>Project manager: Gabbasov M.B.</p> <p>Contact details of the head:</p> <p>Mars0@mail.ru</p> <p>+7 701 908 25 11</p> <p>Project executors and contact details of executors:</p> <p>Abdeshov H.U.</p> <p>habdeshov@rambler.ru</p> <p>+7 777 2505831</p> <p>Uvaleev Zh.E.</p> <p>zh_uali@mail.ru</p> <p>87015228028 Baydeldinov M.U.</p> <p>Make3508@gmail.com</p> <p>+77013918037</p> <p>Approved by the order of the Chairman of the Board of the National Chamber of Entrepreneurs of the Republic of Kazakhstan "Atameken"</p> <p>No. 259 dated December 24, 2019</p> | | |
| The expertise is provided by: | <p>Organization: LLP "Tamur"</p> <p>Experts and contact details of experts:</p> <p>General Director Berentaev B.</p> <p>870171476511</p> | | |
| Version number and year of release: | Version 1, 2019 | | |
| Updated: | <p>ALE "International Association for Certification and Development of Information Technologies Master-It"</p> <p>Chairman: Omarov Zh.B.</p> <p>Artists:</p> <p>Kaisenov K.K.</p> <p>master_it_rk@mail.ru</p> <p>+7 701 2140195</p> <p>Danilov M.S.</p> <p>marymasterit@mail.ru</p> <p>+7 777 8151000</p> <p>College of Kazakhstan Engineering and Technology University</p> <p>Shalabaeva M.Kh.</p> <p>m.shalabaeva@mail.ru</p> <p>+7 701 4735134</p> <p>Kazakhstan Reading Association</p> <p>Zeynegul K.</p> <p>Zikonti24@gmail.com</p> <p>+7 701 1913948</p> <p>"Orleu" biliktilikti arttyru ulttyk ortalyygy"</p> <p>Mukhamedzhanova S.T.</p> <p>orleualmaty@inbox.ru</p> <p>+7 778 2007402</p> <p>IT school of service LLP "SDM-Services"</p> <p>Rybalko L.V.</p> | | |

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| Expertise provided by: | ALE "International Association for Certification and Development of Information Technologies Master-It" Chairman: Omarov Zh.B. master_it_rk@mail.ru +7 777 8151000 |
| Version number and year of release: | Version 2, 2022 |
| Date of indicative revision: | 12/30/2025 |