MINISTRY OF SCIENCE AND HIGHER EDUCATION REPUBLIC OF KAZAKHSTAN
KARAGANDA UNIVERSITY NAME OF ACADEMICIAN E.A. BUKETOV

«AGREED»
Director «BSolution» LLP

_____ A. Yesen
«____» 04 2023 y.

«AGREED»
Director of «KIBC Technology» LLP

_____ A.V. Tsai
«14» 04 2023 y.

«AGREED»
Director of LLP« Center of information systems WTO»

_____ O.A. Laptanovich
«44» 04 2023 y.

«CLAIM»
To Chairman of the Board-Rector of Karaganda University of the name of academician E.A.Buketov

_____ professor N.O. Dulatbekov
«30» 05 2023 y.

EDUCATIONAL PROGRAM

«7M06104-Information systems and technologies»

Level: Master

Karaganda, 2023

The educational program «7M06104 - Information systems and technologies» was developed on the basis of:

– Law of the Republic of Kazakhstan dated July 27, 2007 No. 319-III "On Education" (with amendments and additions as of 01.04.2023)

– State mandatory standards of Higher and Postgraduate Education (Order of the Minister of Science and Higher Education of the Republic of Kazakhstan dated July 20, 2022 No. 2) (with amendments and additions dated 19.01.2023 G. No. 21);

– The National Qualifications Framework of March 16, 2016 by the Republican Tripartite Commission on Social Partnership and Regulation of Social and Labor Relations;

– Rules for the organization of the educational process on credit technology (Order of the Ministry of Education and Science of the Republic of Kazakhstan dated April 20, 2011 No. 152) (with amendments and additions dated 09/23/2022 No. 79),

– Classifier of training areas with higher and postgraduate education (Order of the Minister of Education and Science of the Republic of Kazakhstan dated October 13, 2018 No. 569) (with amendments and additions dated 05.06.2020 No. 234)

– Standard rules of activity of educational organizations of the corresponding types (Order of the Minister of Education and Science of the Republic of Kazakhstan dated October 31, 2018 No. 595) (with amendments and additions dated 08/31/2022 No. 385),

– Professional standards of the direction "Information and Communication Technologies" No. 171 dated July 17, 2017

Content

Passport of the educational program

1. Code and name of the educational program: «7M06104 - Information systems and technologies»

2. Code and classification of the field of education, areas of training: 7M06 Information and Communication Technologies 7B061 Information and communication technologies

3. Group of educational programs – M094 - Information technology

4. Volume of credits: 60 ECTS

5. Form of training: full - time

6. Language of training – english

7. Degree awarded – Master of Technical Sciences in the educational program "Information systems and technologies"

8. Type of EP (current, new, innovative) – new

9. ISCED level - 7

10. The level of the NRK – 7

11. The level of the ORC - 7

12. Distinctive features of the EP: no

13. Number of the appendix to the license for the direction of personnel training: Appendix No. 16 to the state license No. KZ83LAA00018495 dated 28.07.2020.

14. The name of the accreditation body and the validity period of the EP accreditation: -

15. The goal EP: Training of competitive specialists in the field of digital information technologies and systems for the IT industry and sectors of the economy of the Republic of Kazakhstan.

16. Qualification characteristics of the graduate

a) List of posts:

- Software Designer
- Software Maintenance Specialist
- Database Administration Specialist
- Software developers and testing specialists, WEB and multimedia applications
- Software Architects
- System Analyst
- System Administrator
- Network Administrator

b). The sphere and objects of professional activity of the graduate:

The sphere of professional activity of graduates under the educational program "7M06104 - Information systems and technologies" are: business, information centers, organizations of industry, science, culture, healthcare, agriculture, public administration.

The objects of professional activity of masters in the educational program "7M06104 - Information systems and technologies" are: business organizations, management bodies, departments, financial organizations, business structures, enterprises and organizations of various forms of ownership that use information and communication technologies in their professional activities.

c) Types of professional activity

The types of professional activity of graduates are: design, technological; research and production; organizational and managerial.

d) Functions of the professional activity of the graduate

The main functions of the activity are:

- research activities in areas using the methods of IT technology, information systems and ICT;

- development of requirements and specifications of objects of professional activity based on the analysis of user requests, models of the subject area and the capabilities of technical means;

- analysis of the information needs of the business, determination of IT solutions that will allow the business to effectively and efficiently perform its tasks;

- design and development of information systems and their components, taking into account security issues and applying professional principles and standards;

- organization of teamwork in the process of developing software products with a given quality in a given time.

17. Formulation of learning outcomes based on competencies

Type of competencies	Codes	Learning outcomes
Behavioural skills and personal compe-tencies (Soft skills)	LO1	Has an idea of the management of the socio-economic system, analyzes the interrelationships and interdependencies between economic, organizational and managerial processes and phenomena occurring in professional activity.
	LO2	Applies knowledge of psychological phenomena and patterns underlying the management process to optimize the management activities of staff and teamwork in professional activities.
	LO3	Has the skills to analyze problems that arise when solving research and practical problems, including interdisciplinary areas, in order to develop application software.
Professional compe-tencies (Hard skills, Digital skills)	LO4	Proficient in English and translation techniques at the professional level, sufficient communication skills for interpersonal communication using general, business and professional vocabulary.
	LO5	Applies in practice modern methods of analysis of innovative solutions to enterprise problems, planning and organization of processes of the life cycle of IS and ICT enterprise management, owns the methods of organization and management of IT projects and business operations, organizational and management decisions and organizational changes in the process of project management.
	LO6	Knows the technology of designing and developing corporate information systems, the basic principles of building distributed systems, applies methods of developing distributed systems and applications using Java technology.
	LO7	Knows modern technologies and means of programming, testing and maintenance for the implementation of all stages of the software life cycle.
	LO8	Applies methods and means of information security to ensure the protection of information and the objects of informatization; owns the methods of cryptographic protection to ensure the security of information in computer systems.

18. Determination of modules of disciplines in accordance with the results of training

Learning outcomes code	Name of the module	Name of disciplines	Volume (ECTS)
LO4	Social management	Foreign language (professional) (in English)	2
LO1		Management (in English)	2
LO2		Management Psychology (in English)	2
LO6, LO7	Enterprise IT innovation	Design and development of corporate information systems (in English)	5
LO5		IT project management (in English) Innovation in the IT field (in English)	4
LO3, LO7, LO6	Professional	Python in scientific research (in English) Building Distributed Systems in Java (in English)	4
LO3, LO8		Cryptology (in English)/ Information Security Technologies (in English)	5
LO2, LO7		Web Application Development (in English)/ Software development for mobile devices (in English)	5
LO1, LO2, LO3, LO7		Practical training	10
LO3	Experimental research work of a master student, including an internship and a master's project	Experimental research work of a master student, including an internship and a master's project (EIRM)	13
LO3	Final examination	Design and defense of the master's project	8

19. Matrix of achievability of learning outcomes

N	Name of disciplines	Brief description of the discipline (30-50 words)	Number of credits	Formed learning outcomes (codes)						
				LO1	LO2	LO3	LO4	LO5	LO6	LO7
		Cycle of basic disciplines **University component**								
D1	Foreign language (professional) (in English)	It is studied with the aim of developing speaking, reading, writing and listening skills for effective communication in situations of professional communication, work with specialized literature in various fields, two-way interpreting in situations of professional communication.	2				+			
D2	Management (in English)	This discipline is aimed at the formation of the basic principles and practical skills in the implementation of the basic functions of innovation management related to the management of the intellectual capabilities of the enterprise. The course involves meeting the needs associated with the management of interests associated with making a profit from a business.	2	+						
D3	Psychology of management (in English)	It is studied with the aim of forming knowledge about the psychological laws of managerial activity, skills in analysis of socio-psychological principles, the characteristics of the psychology of management, the personal characteristics of the leader.	2		+					
		Cycle of basic disciplines **Selectable component**								
D4	IT project management (in English)	The course is studied with the aim of developing planning and project management competencies in the IT industry for software development; formation of knowledge about approaches to managing IT projects, stages of the project life cycle; the formation of practical skills in planning project activities, conducting a decomposition of project tasks, estimating the costs of performing project tasks; formation of skills in managing the processes / content of the project, managing the schedule, resources, cost, communications of the IT project.	4					+		

	Innovation in the IT field (in English)	The course is aimed at the formation of theoretical ideas about the trends of innovative development in the field of IT, technologies in the field of managing the IT infrastructure of organizations of various profiles and scales, the formation of practical skills in designing, developing and modernizing the company's IT infrastructure. Formation of practical skills in planning and deploying the enterprise infrastructure, strategic planning and organizing the life cycle processes of IS and ICT enterprise management.							+		
Cycle of major disciplines **University component**											
D5	Design and development of corporate information systems (in English)	The purpose of the course is to form theoretical knowledge about the general principles of operation of corporate information systems (CIS), their architecture, capabilities in managing production and other enterprise processes, as well as developing practical skills for operating systems of this class.	5							+	+
Cycle of major disciplines **Selectable Component**											
D6	Python in scientific research (in English)	The purpose of the course is to study the Python programming language, the library of standard modules and the principles of developing software systems; the formation of knowledge about the standard modules of the language, the formation of practical skills in the use of built-in objects, structures and Python libraries for analyzing, processing and visualizing data (NumPy, Pandas, Matplotlib, Tkinter, PyQT); creating applications for solving scientific and applied problems.	4			+					+
	Building distributed systems in Java (in English)	The purpose of the discipline is to form knowledge about the methods and tools for developing distributed applications using Java technology (java.net API, RMI, CORBA, Web services, JMS), about methods for developing distributed applications on the J2EE platform, studying the problems that accompany the development of distributed software systems, and methods for solving these problems.								+	

D7	Cryptology (in English)	The purpose of the course is to study cryptographic algorithms used in symmetric and asymmetric cryptosystems; formation of knowledge about the construction of a cryptosystem, mathematical modeling of cryptology; formation of skills for the implementation of basic number-theoretic algorithms in cryptographic applications; formation of skills in the use of modern methods of analysis of cryptographic algorithms to ensure security.	5			+				
	Information security technologies (in English)	The course is aimed at the formation of knowledge about the basic principles, methods and means of protecting information in the process of its processing, transmission and storage using computer tools in information systems; formation of skills in the use of means and tools of information protection for the construction of secure information systems.								
D8	Web application development (in English)	The course is aimed at forming knowledge about modern trends and tools for developing Web applications, about approaches to designing, developing, debugging, optimizing and deploying Web applications with dynamic content (backend, frontend); the formation of practical skills for analyzing and formalizing the requirements for a Web resource, designing a structure and design, developing a frontend Web application, and implementing the integration of mobile applications with Web applications.	5		+					+
	Software development for mobile devices (in English)	The course is aimed at the formation of knowledge about the main methods of creating mobile applications, the formation of practical skills in developing programs for mobile devices for Android and iOS using modern integrated tools; skills in creating user interfaces and controls in mobile applications.			+					+

20. Coordination of the planned learning outcomes with the methods of teaching and evaluation within the module

Learning outcomes	Planned learning outcomes for the module	Teaching methods	Assessment methods
LO1	Has an idea of the management of socio-economic system, analyzes the relationships and interdependencies between economic, organizational and managerial processes and phenomena occurring in professional activity.	Interactive lecture, discussion	Test, colloquium, control tasks
LO2	Applies knowledge of psychological phenomena and patterns underlying the management process to optimize personnel management and teamwork in professional activities.	Interactive lecture, discussion, round table	Test, colloquium, control tasks
LO3	Has the skills to analyze problems that arise when solving research and practical problems, including interdisciplinary areas, in order to develop application software.	Interactive lecture, discussion, round table, group work	Test, colloquium, control tasks
LO4	Proficient in English and translation techniques at the professional level, sufficient communication skills for interpersonal communication using general, business and professional vocabulary.	Interactive lecture, discussion	Test, colloquium, control tasks
LO5	Applies in practice modern methods of analysis of innovative solutions to enterprise problems, planning and organization of processes of the life cycle of IS and ICT enterprise management, owns the methods of organization and management of IT projects and business operations, organizational and management decisions and organizational changes in the process of project management.	Interactive lecture, the method of demonstration examples practical teaching method; group work	Test, colloquium, control tasks, software product
LO6	Knows the technology of designing and developing corporate information systems, the basic principles of building distributed systems, applies methods of developing distributed systems and applications using Java technology.	Interactive lecture, the method of demonstration examples practical teaching method; group work	Test, colloquium, control tasks, software product
LO7	He knows modern technologies and means of programming, testing and maintenance for the implementation of all stages of the software life cycle.	Interactive lecture, the method of demonstration examples practical teaching method; group work	Test, colloquium, control tasks, software product
LO8	Applies methods and means of information security to ensure the protection of information and the objects of informatization; owns the methods of cryptographic protection to ensure the security of information in computer systems.	Interactive lecture, the method of demonstration examples practical teaching method; group work	Test, colloquium, control tasks

21. Criteria for assessing the achievability of learning outcomes

Codes of LO	Criteria
LO1	Knows: modern concepts of organization management; methods and approaches to making managerial decisions; Able to: analyze socially significant problems and processes taking place in society and predict their possible development in the future Owns: skills of theoretical and applied analysis of social processes.
LO2	Knows: the main provisions of the psychological laws of managerial activity, Able to: use social and psychological knowledge to work in a team Owns: methods of analysis of the socio-psychological principles underlying effective management.
LO3	Knows: methodologies for solving applied research and practical problems. Able to: identify features, analyze methodological problems arising in the solution of applied problems; create software products. Owns: skills to analyze methodological problems arising in the solution of research and practical problems, including interdisciplinary areas.
LO4	Knows: functional features of oral and written professionally oriented texts, including scientific and technical character; requirements and principles of academic writing; specialized terms of computer science and IT in English. Able to: compose texts on the basis of academic writing, apply foreign terminology in professional communication; compose abstracts of scientific articles and state in native language/ from native language the main content of texts on the profile. Owns: language communication skills necessary to work in a multilingual team.
LO5	Knows: the concept of innovation and innovation process, project management methodology, structure and typical content of IT project. Able to: analyze and optimize the work plan and cost of the IT and business project; design project documentation; apply tools to solve project management problems, Owns: methods of planning and organization of processes of life cycle of IS and ICT of enterprise management, methods of analysis of project risks and determination of measures of response to them,
LO6	Knows: modern approaches, methods and means of research of corporate information systems, technology integration of corporate information systems; principles of building distributed systems. Able to: design and develop corporate information systems; use methods to develop distributed systems and applications using Java technology. Owns: skills in modeling and administration of corporate information systems.
LO7	Knows: basic technologies of software development, testing and prototyping, modern programming languages. Able to: design and develop cross-platform applications, information systems for science, technology and education. Owns: methods and tools of software development using modern programming languages.
LO8	Knows: the principles and requirements of information security for the objects of information. Able to: apply methods of risk analysis and selection of IS hazards, used in international standards; apply methods of cryptographic protection to ensure information security. Owns: the principles of organization, a comprehensive approach to the selection of means and technologies to ensure information security of the objects of protection.

22. The graduate model of the educational program

Graduate Attributes:
- High professionalism in the field of IT technologies
- Emotional intelligence
- Adaptability to global challenges
- Leadership
- Entrepreneurial thinking
- Global citizenship
- Understanding the principles and culture of academic integrity

Types of competencies	Description of competencies
Behavioural skills and personal competencies (Soft skills)	Improves and develops his intellectual and general cultural level, strives for the development and growth of personal qualities, creative abilities to achieve the chosen goals, re-evaluation of accumulated experience The ability to apply innovative methods and approaches to making managerial decisions, analyze the information needs of the business and offer IT solutions for the efficiency of the organization Analyze methodological problems that arise when solving research and practical problems
Professional competencies (Hard skills, Digital skills)	Willingness to solve real communicative problems in certain situations of communication and professional activity through the language being studied, to master professional terminology, to develop professionally significant skills and experience of foreign language communication in all types of speech activity (reading, speaking, listening, writing) in the conditions of scientific and professional communication in the field of informatics Ability to apply modern methods for analyzing innovative solutions to scientific and applied problems, planning and organizing the life cycle processes of IS and ICT enterprise management Ability to apply methods of organizing and managing projects in the IT field. Ability to apply the basic principles of design, development and administration of corporate information systems. Ability to apply modern technologies for software development, design and development of software products, information systems to solve the problems of scientific and technological activities The ability to analyze threats to information security, to perform the main stages of solving problems of information security, to put into practice the basic principles of the theory and practice of information security and information protection.

Compilers:
Members of the working group:
Head of Department AMaI, PhD, Associate professor   A.B. Keldibekova

Professor of the Department AMaI   D.A. Kazimova

Associate professor of the Department AMaI   E.A. Spirina

Assistant professor of the Department AMaI   N. A. Gorbunova

Teacher of the Department AMaI   E.G. Kamen

Director «BSolution» LLP   A. Yesen

Master student   E.A. Nurmakhanov

The educational program was reviewed by the Faculty Council _25.04.2023_ Protocol № _7_

The educational program was considered at a meeting of the Academic Council from _28 04.2023_ Protocol № _5_

The educational program was reviewed and approved at a meeting of the University Board _30.05.23_ Protocol № _12_

Member of the Board, Vice-Rector for Academic Affairs   **T.Z. Zhusipbek**

Acting Director of the Department for Academic Work   **S.A. Smailova**

Dean of the Faculty of Mathematics and Information Technology   **D.A. Kazimova**

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EDUCATIONAL PROGRAM DEVELOPMENT PLAN

7M06104 Information Systems and Technology

The purpose of the Plan is to contribute to improving the quality of the conditions for the implementation of the educational program, taking into account the current requirements of the labor market and the achievements of modern science.

Target indicators

№	Indicators	Unit of measurement	2023-2024	2024-2025	2025-2026	2026-2027
1	**Human resources development**					
1.1	Increase in the number of teachers with academic degrees	Number of people	6	+1	+1	
1.2	Advanced training in the teaching profile	Number of people	2	+2	+2	+2
1.3	Involvement of practitioners in teaching	Number of people	-	-	-	+1
1.4	Other	Number of people				
2	**Promotion of the EP in the ratings**					
2.1	IQAA	Position	-	-	-	-
2.2	IAAR	Position	-	-	-	-
2.3	Atameken	Position	-	-	-	-
3.	**Development of educational and scientific-methodical literature, electronic resources**					
3.1	Textbooks	Number	-	-	-	-
3.2	Training manuals	Number	11	-	-	+1
3.3	Methodological recommendations/instructions	Number	-	-	+1	-
3.4	Electronic textbook	Number	-	+1	-	+1
3.5	Video/audio lectures	Number	-	-	-	-
3.6	Other	Number				
4.	**Development of educational and laboratory facilities**	Number				
4.1	Purchase of software products	Number	-	1	-	1

4.2	Purchase of equipment	Number	1	-	+1	-
4.3	Other	Number				
5.	**Updating the content of the EP**					
5.1	Updating the learning outcomes and the list of disciplines taking into account the requirements of the labor market, scientific achievements, professional standards	Year	+	-	-	+
5.2	Introduction to the EP of academic disciplines in foreign languages*	Year	+	+	+	+
5.3	Introduction of new teaching methods	Year			+	+
5.4	Opening of joint/two-degree program on the basis of the EP	Year				
5.5	Other	Year				

Head of the Department of Applied Mathematics and Computer Science   **A.B. Keldibekova**