KARAGANDA UNIVERSITY OF KAZPOTREBSOYUZ

"I approve"
Rector of Karaganda University of Kazpotrebsoyuz, Doctor of Economics, Professor
Aimagambetov E.B.
_____
"___" _____2021

Approved at the meeting
CS of Karaganda University of Kazpotrebsoyuz
Protocol No. __ dated "__" _____ 2021

EDUCATIONAL PROGRAM

"INFORMATION SYSTEMS"

Level: Master (MA)

KARAGANDA 2021

The educational program "Information Systems" was compiled on the basis of the State Compulsory Standard of Postgraduate Education, approved by the Decree of the Government of the Republic of Kazakhstan dated October 31, 2018 No. 604 training on April 20, 2011 No. 152 (as amended and supplemented).

Developers (academic committee):

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2) Ibragimova M.S.,Art. teacher, master
3) Faber E.N. Art. teacher, master
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Reviewers (experts):

1) Kamenetskaya N.V. Deputy Director of InterComputerService LLP;
2) Muntaev N.A. commercial director of Artson Build Invest LLP.

The educational program was discussed and approved at a meeting of the academic committee04/12/2021, Protocol No. 2

The educational program was reviewed and recommended at a meeting of the Faculty's Educational and Methodological Council.

Protocol No. __ dated "___" _____ 20__

CONTENT

Application form "Inclusion of EP in the Register"

No.	Field name	Note
1	Registration number	
2	Code and classification of the field of education	7M06
3	Code and classification of areas of study	7M061
4	Group of educational programs	M094 Information technology
5	Name of the educational program	Information Systems
6	OP type	a) Current OP
7	Purpose of the OP	scientific and pedagogical direction - training of masters in the field of information systems, capable of developing and implementing information technologies and systems, as well as formulating and solving modern scientific and practical problems in the field of IT technology, planning and conducting research activities, and successfully implementing the results in various applications profile direction -training of highly qualified specialists in the field of design, development, implementation, maintenance and operation of information systems of various profiles, including mathematical, information, software, linguistic, technical and organizational and legal support of information systems, as well as formation of business process modeling skills using new technologies
8	ISCED level	7
9	NQF level	7
10	ORC level	7
11	Distinctive features of the OP	No
	Partner university (SOP)	
	Partner university (DDOP)	
12	List of competencies	A matrix is being formed for correlating the learning outcomes of the educational program with the competencies being formed (Appendix 2.1)
13	Learning Outcomes	
14	Form of study	full-time
15	Language of instruction	Kazakh, Russian
16	Volume of loans	Scientific and pedagogical direction - 120 credits Profile direction - 90 credits
17	Awarded Academic Degree	Scientific and pedagogical direction - master of technical sciences in OP 7M06101 "Information systems" Profile direction - master of engineering and technology OP 7M06102 "Information systems"
18	Availability of an application to the license for the direction of personnel training	Annex to the license for engaging in educational activities KZ10LAA00007296 dated June 22, 2016 GU of the Committee for Control in Education and Science of the Ministry of Education and Science of the Republic of Kazakhstan
19	Availability of EP	Certificate of passing the specialized accreditation of the

	accreditation	Independent Agency for Quality Assurance in Education SA-A No. 0138/2 dated 05/21/2018
	Name of the accreditation body	Independent Agency for Quality Assurance in Education, Kazakhstan
	Validity of accreditation	05/21/2018- 05/19/2023
20	Information about disciplines	Information about disciplines VK/KV DB, PD (Appendix 2.2)
21	The uniqueness of the program	The uniqueness of the program is that it combines the achievements of technical-mathematical and social-humanitarian knowledge. Undergraduates study humanitarian disciplines related to the organization and planning of scientific research, scientific and pedagogical communication and learning technologies in the field of informatization and information security. During their studies, undergraduates participate in scientific conferences, conduct research and prepare scientific publications. The training of masters in the field of information systems is significant and relevant, and graduates of the educational program are clearly in demand in the labor market.

2. Qualification characteristics of the graduate of the educational program

2.1 Awarded degree:

a graduate of the educational program is awarded a degree:

- in scientific and pedagogical training - master of technical sciences in OP 7M06101 "Information systems";
- with profile training - master of engineering and technology according to OP 7M06102 "Information systems";

2.2 List of specialist positions:

Master of Educational Program "Information Systems"scientific and pedagogical direction can work as an engineer; software engineer (programmer); systems engineer (network administrator); specialist of the highest qualification level of the highest category; researcher; teacher of universities and colleges.

Master of Educational Program "Information Systems"profile direction can work as a director (head) of a computing (information and computing) center, an information security administrator, an engineer for automated production control systems, a database administrator, a specialist in the creation and management of information resources, a system analyst, a system design engineer.

Content of the educational program
3.1 Curriculum of the educational program (CP)

The cycle of discipline	Discipline Code	OK/KV/KV	Name of the discipline	Labor intensity		form of control	Types of educational work l / pr / SRMP / SRM / PA	Distribution by semester				Code of competencies
				KAZ/ECTS loans	academician watch			1	2	3	4	
	NOM 1.1 Scientific and educational module											
DB	IFN 5201	VC	History and philosophy of science	5	150	copy	15/30/15/75/15	5				RO1, RO2
DB	FL 5202 IYa 5202	VC	Foreign language (professional) Foreign language (professional)	4	120	copy	0/45/15/45/15	4				
DB	PVSh 5203	VC	Pedagogy of higher education	4	120	copy	15/30/15/45/15	4				
DB	PU 5204	VC	Psychology of management	4	120	copy	15/30/15/45/15	4				
DB	PP (M)	VC	Teaching practice	3	90	report			3			
	PPM 2.1 Professional and pedagogical module											
DB	OPSR 5205 OPNI 5205	HF	Organization and planning of scientific researches - Organization and planning of scientific researches	3	90	copy	15/15/15/30/15	3				RO3, RO4
	NNEK 5205		Science in the national economy of Kazakhstan									
DB	MTOVSh 5206	HF	Methods and technologies of teaching in higher education	4	120	copy	15/30/15/45/15	4				
	KPKKN 5206 OPPO 5206		Kasibi - pedagogical karym-katynas negizideri - Fundamentals of professional and pedagogical communication									
DB	BAW 5207 AP 5207	HF	Basics of academic writing / Basics of academic writing	4	120	copy	15/30/15/45/15		4			
	ASW 5207 ASP 5207		Academic Style in Writing / Academic style in writing									
DB	PPIS 5208	HF	Designing Information Systems Applications	4	120	copy	15/30/15/45/15		4			
	GMRPO 5208		Agile software development methodologies									
	POM 2.1 Professionally oriented module 1											
PD	AMPIS 5301	VC	Analysis, modeling and design of IS	5	150	copy	15/30/15/75/15	5				RO5, RO6
PD	UITP 5302	HF	IT project management	5	150	copy	15/30/15/75/15		5			
	ISPPR 5302		Decision support information tools									
PD	TRIS 5303	HF	Technologies for the development of information and intellectual systems	5	150	copy	15/30/15/75/15		5			
	OPIS 5303		Ontology of Information Systems Design									
PD	APSSU	HF	Automated design of tools and control	5	150	copy	15/30/15/75/15		5			

	5304		systems									
	SSBA 5304		Modern business intelligence tools									
	POM 2.2 Occupation-oriented module 2											
PD	PVSPA 6305	HF	Programming in computing systems of parallel architecture	5	150	copy	15/30/15/75/15			5		RO 7, RO 8, RO 9, RO 10
	VPRP 6305		Introduction to Parallel and Distributed Programming									
PD	PPI 6306	HF	Advanced Software Engineering	5	150	copy	15/30/15/75/15			5		
	KRIS 6306		Cross-platform tool systems									
PD	OABD 6307	HF	Big data processing and analysis	5	150	copy	15/30/15/75/15			5		
	IPBABD630 7		Big Data Business Intelligence Tools and Applications									
PD	SMMKZIS 6308	HF	Modern models and methods of cryptographic protection of information systems	5	150	copy	15/30/15/75/15			5		
	BRP 6308		Security of regional enterprises									
PD	URIS 6309	HF	Information systems development management	5	150	copy	15/30/15/75/15			5		
	UIR 6309		Information resource management									
PD	IP	VC	Research practice	4	120	report				4		
	Total for modules of theoretical training and practical training			84	2520			29	26	29		
	NIRM 3.1 Research, final module											
NIRM	NIRM	OK	Research work of a master student, including an internship and a master's thesis	24	720	report		1	4	1	18	RO 1 - RO 11
DVO	DVO		Additional types of training									
IA	OZMP	OK	Registration and defense of a master's thesis	12	360						12	
	General labor intensity of the educational program			**120**	**3600**			**th ir ty**	**th ir ty**	**th ir ty**	**th ir ty**	

3.1 Curriculum of the educational program (PROF)

The cycle of discipline	Discipline Code	OK/VK//KV	Name of the discipline	Labor intensity		form of control	Types of educational work l / pr / SRMP / SRM / PA	Distribution by semester			Code of competencies
				KAZ/ECTS loans	academician watch			1	2	3	
	NOM 1.1 Scientific and educational module										
DB	Iya 5201	VC	Foreign language (professional)	2	60	copy	0/30/15/15	2			PO1, PO2, PO3
DB	men 5202	VC	Management	2	60	copy	15/15/15/15	2			
DB	PU 5203	VC	Psychology of management	2	60	copy	15/15/15/15	2			
DB	MMPE 5204	HF	Models and methods for planning experiments	4	120	copy	15/30/15/45/15	4			
	TOIP 5204		Theoretical foundations of information processes								
DB	VSRP 5205	HF	Visual Application Development Tools	5	150	copy	15/30/15/75/15	5			
	GMRPO 5205		Agile software development methodologies								
	POM 2.1 Professionally oriented module 1										
PD	PPI 5301	HF	Advanced Software Engineering	5	150	copy	15/30/15/75/15	5			PO4, PO5
	KPIS 5301		Cross-platform tool systems								
PD	OABD 5302	HF	Big data processing and analysis	5	150	copy	15/30/15/75/15	5			
	IPBABD5302		Big Data Business Intelligence Tools and Applications								
PD	HD 5303	HF	Data store	4	120	copy	15/30/15/45/15	4			
	PBDBO 5303		Large Database Design								
	POM 2.2 Occupation-oriented module 2										
PD	PPIS 5304	VC	Designing Information Systems Applications	5	150	copy	15/30/15/75/15		5		PO6, PO7
PD	APSSU 5305	HF	Automated design of tools and control systems	5	150	copy	15/30/15/75/15		5		
	SSBA 5305		Modern business intelligence tools								
PD	TRIS 5306	HF	Technologies for the development of information and intellectual systems	5	150	copy	15/30/15/75/15		5		
	OPIS 5306		Ontology of Information Systems Design								
PD	UITP 5307	HF	IT project management	5	150	copy	15/30/15/75/15		5		RO8, RO9
	UIR 5307		Information resource management								
PD	PKSZI 5308	HF	Design of complex information security systems	5	150	copy	15/30/15/75/15		5		
	BRP 5308		Security of regional enterprises								

PD	PP	OK	Internship	6	180	report				6	
Total for modules of theoretical training and practical training				**60**	**1800**			**29**	**25**	**6**	
EIM 3.1 Experimental research, final module											
EIRM	EIRM	OK	Experimental research work of a master student, including an internship and a master's project	18	540	report		1	5	12	RO1 - RO10
DVO	DVO		Additional types of training								
IA	OZMP	OK	Design and defense of the master's project	12	360					12	
	General labor intensity of the educational program			**90**	**2700**			**thirty**	**thirty**	**thirty**	

3.1 Information about disciplines
Information about the disciplines of the scientific and pedagogical direction

No.	Name of the discipline	Brief description of the discipline (30-50 words)	Number of credits	Formed competencies (codes)
Cycle of basic disciplines University component				
	History and philosophy of science	Science is considered in a broad socio-cultural context and in its historical development. Particular attention is paid to the problems of the crisis of modern technogenic civilization and global trends in changing the scientific picture of the world, types of scientific rationality, value systems that scientists are guided by. The program is focused on analyzing the main worldview and methodological problems that arise in science at the present stage of its development and getting an idea of the trends in the historical development of science.	5	OK1
	Foreign language (professional) - Foreign language (professional)	The discipline "Foreign language (professional)" is intended for undergraduates of non-linguistic specialties. The study of the course leads not only to the enrichment of knowledge and the expansion of the scientific horizons in the specialty, to a deeper knowledge of the processes of communication, but also allows undergraduates to acquire practical skills necessary in their future professional activities.	4	
	Pedagogy of higher education	Actual problems of pedagogical science; essence of pedagogical activity; fundamentals of higher education pedagogy; methodology of pedagogical science; didactics; content of education; new educational technologies; educational process; didactic concepts of education and upbringing; education management; R&D and R&D	4	
	Psychology of management	The academic discipline is focused on the development by students of knowledge about the psychological content of management as a social system and sphere of professional activity. It contains the socio-psychological knowledge necessary for analyzing and predicting the effectiveness of management, optimizing managerial relationships and decisions, as well as the psychology of managerial activity, managerial communication and conflicts, and making managerial decisions in the educational process of higher education.	4	
	Teaching practice	Pedagogical practice is aimed atthe formation of undergraduate competencies necessary for the organization and management of the educational process,and practical skills of teaching and learning methods in higher education	3	
Cycle of basic disciplines Selectable Component				
	Analysis, modeling and design of IS	The course is aimed at studying modern methods and tools for designing information systems in the field of economics. It is planned to study CASE-tools as a software tool to support the design of information systems (IS).	5	OK2
	Organizationandplanningofscientificresearches - Organization and planning of scientific research	The course is necessary for understanding the processes of functioning and development of science and its role in modern society; for the development of theoretical and empirical methods of scientific research in the context of the possibility of their application in research activities; obtaining skills to effectively organize personal research work		
	Science in the national economy of Kazakhstan	The course is necessary for the formation of ideas about the patterns of functioning and development of science; on the role of the state in the development and regulation of the scientific sphere; on the interaction of the scientific sphere with other spheres of society; about the role of science in the development of every sphere of modern society.		

	Methods and technologies of teaching in higher education	The academic discipline is focused on the formation of practical skills for planning, organizing and analyzing the educational process at the university. The content of the academic discipline is based on the technology of designing the educational process. The conditions for the optimal choice of effective methods, forms and technologies of teaching at the university are studied.		
	Kasibi-pedagogykalyққarym-katynasnegizideri - Fundamentals of professional and pedagogical communication	The course "Fundamentals of professional and pedagogical communication" is aimed at the formation of professionally significant qualities of future specialists in the process of teaching the basics of professional communication, equipping them with knowledge of the theoretical foundations of the discipline, the features of the interaction of teachers with all subjects of the educational process.	4	
	Basics of academic writing / Basics of academic writing	The discipline is based on the study of the grammatical characteristics of the scientific style in writing; involves the preparation of written reports on topics related to the scientific work of the undergraduate (scientific article, theses, report, translation, abstracting, annotation), the development of skills in formalizing official documentation on various forms of international cooperation, the ability to work with explanatory and bilingual dictionaries, as well as reference literature by specialty.		
	AcademicStyleinWriting/ Academic style in writing	Academic writing is used to present an idea and then discuss it. The scientific style of language (speech), like any other, has a number of features, style-forming factors that distinguish it from other functional aspects of language (speech). Such qualities as accuracy, clarity, logicality are not the specifics of only scientific speech. However, here they are a requirement of the very spheres of application of style; without them, a scientific work cannot exist. In the scientific style of speech, it is customary to distinguish substyles: natural science, scientific and technical, scientific and humanitarian. As we can see, the scientific style is heterogeneous in its structure. Therefore, depending on the sphere of functioning, the form of presentation (oral or written), the genre, the selection of language means will also depend.	4	
	Agile software development methodologies	A series of approaches to software development focused on the use of iterative development, the dynamic formation of requirements and ensuring their implementation as a result of constant interaction within self-organizing working groups consisting of specialists in various fields. Basic principles of flexible software development technologies. Development through testing. Coding and source code management. An overview of agile software development methodologies.		
Cycle of major disciplines University Component/Elective Component				
	IT project management	Analysis of requirements for information systems (IS). Analysis of the tasks facing the IS. The degree of automation of business processes. Modern ERP, CRM systems. The main characteristics of systems of classes ERP, CRM. A brief overview of the ERP-systems market. Examples of implementation of ERP-systems. Basic information systems. IP infrastructure, its elements; list of IP infrastructure components. The totality of computer technology.	5	PC1
	Decision support information tools	The content of the section Structural model of the decision-making process (PPR) is a technological scheme of the PPR. Elements of the decision problem. Statement of the problem of making a decision. The functional model of the PPR is a decision table. Modeling of problem situations of decision-making. Problems of integration of computer technologies for making effective decisions. Information technology of the decision-making process.	5	

	Technologies for the development of information and intellectual systems	Basic concepts of information and intellectual systems. Intelligent systems and their types. Basic concepts of intelligent systems and decision support systems. Basic concepts for the development of technologies of information and intelligent systems (IIS). IMS design stages. Stages of existence of IMS. Modern methodology and design tools CASE IMS. Methodology of functional analysis and design. The main provisions of the SADT concept (IDEF0). Methodology of object-oriented analysis and design. Basic provisions of the OOP concept. Unified modeling language UML. The main types of UML diagrams used in the design of information systems. Modeling database. Basic designations. Diagrams IDEF1X. Data Mining Technology, Data Mining. Problems of data mining.		
	Ontology of Information Systems Design	Introduction to ontological engineering. Ontology as specification of conceptualization. Types of ontologies Designing ontologies. Ontology creation life cycle Manual development of ontologies. Reuse of existing ontologies. Description logics as formal models of ontologies. semantic web.	5	
	Automated design of tools and control systems	Introduction to computer-aided design. General information about objects and design tasks. Basic concepts of CAD. Technical support of CAD. Mathematical support for the analysis of design solutions. CAD system environments. Mathematical support for the synthesis of design solutions. Methods for designing automated systems.		
	Modern business intelligence tools	Forms competencies in the field of business analytics. Business intelligence functions: identification, modeling, forecasting, decision optimization, sensitivity analysis. Business analytics methods. New knowledge search models, regression, time series forecasting, clustering, associations, sequences. Business intelligence technologies: OLAP technologies, DM technologies, data visualization systems and solutions, report generators. Evaluation of the effectiveness of business intelligence systems.	5	
	Programming in computing systems of parallel architecture	Relationship between algorithmic and architectural aspects in building aircraft. Features and limitations of parallel architecture. Parallel architectures with shared memory and message passing. Finn's taxonomy. levels of parallelism. Variants of computing system architectures based on parallel, pipelined and sequential data processing. Classification of computing systems of parallel architecture. processors with full and reduced instruction sets.		
	Introduction to Parallel and Distributed Programming	Introduction to parallel computing. Development of parallel computing. Modern architectures of computing systems. Development of parallel algorithms. Technologies of parallel programming. Technologies for building distributed systems.	5	PC2, PC3
	Advanced Software Engineering	Development of systematic models and reliable methods for the production of high-quality software, and this approach extends to all levels - from theory and principles to real practice in software development.		
	Cross-platform tool systems	Basic concepts and modern cross-platform programming tools. An overview of the Qt class hierarchy. Philosophy of the object model. Basics of working with Qt. container library. Controlling the automatic placement of elements. control elements. Interview or model-representation. Events.	5	
	Big data processing and analysis	When studying the discipline, undergraduates will study the following aspects: Modern problems of analysis and processing of big data. Experience in developing and analyzing conceptual and theoretical models for applied problems of big data analysis using Data Mining models. Methods for solving problems of processing and analyzing big data, the possibilities of high-		

		performance computing systems, distributed computing technologies, methods and models of Data Mining. Conceptual and theoretical models of applied problems of big data analysis. Time and hardware resources for solving problems of data analysis and processing. Algorithms for analyzing and processing large amounts of data using Data Mining models.		
	Big Data Business Intelligence Tools and Applications	Business analytics concepts. Business analytics technologies. Business intelligence platforms. Data warehouses. Using tools and applications for business reporting and online analytical processing. OLAP and MicroStrategy for creating visualizations and dashboards. Decision support systems. Business analytics and big data concept in economic analysis.	5	
	Modern models and methods of cryptographic protection of information systems	The main provisions of the theory of cryptographic information protection, the principles of constructing symmetric and asymmetric ciphers, digital signature schemes and hashing functions, the infrastructure of key management systems, cryptographic strength assessment, imitation resistance and noise immunity of ciphers, features of the use of computer technology in cryptography, cryptographic protocols.		
	Security of regional enterprises	Basic standards governing information security management; principles for developing information security management processes; approaches to the integration of information security management systems into the overall enterprise management system.	5	
	Information systems development management	Information systems development strategy. Mission and goals of the organization. Strategy Development. The role of information technology in business development and management organization. Methods for identifying and prioritizing directions for the development of information systems. Analysis of the state of information systems. Organization of a round table. Questionnaire method. Analysis of the state of information systems. Interaction of the IT service with the organization.		
	Information resource management	Modern methods of analysis and modeling of a modern corporation, domestic and foreign software for enterprise resource management. Construction of document management systems for geographically distributed organizations and enterprises.	5	
	Research practice	Research practice is carried out in order to familiarize with the latest theoretical, methodological and technological achievements of domestic and foreign science, modern methods of scientific research, processing and interpretation of experimental data in the field of information systems and technologies	4	
NIRM				
	Research work of a master student	The research work is aimed at preparing the undergraduate for independent research work related to scientific research, research, experiments in order to expand existing and acquire new knowledge, test scientific hypotheses in the field of information systems and technologies, the main result of which is writing and successful defense of master's thesis	24	OK1, OK2, PC1,PC2, PC3, PC4

3.2.1 Information about the disciplines of the profile direction

No.	Name of the discipline	Brief description of the discipline (30-50 words)	Number of credits	Formed competencies (codes)
		Cycle of basic disciplines University component		
	Foreignlanguage (professional) - Foreign language (professional)	The discipline "Foreign language (professional)" is intended for undergraduates of non-linguistic specialties. The study of the course leads not only to the enrichment of knowledge and the expansion of the scientific horizons in the specialty, to a deeper knowledge of the processes of communication, but also allows undergraduates to acquire practical skills necessary in their future professional activities.	2	OK1
	Management	The discipline "Management" consists of the organizational elements of the study of the management process, communication and decision making, management functions such as planning, organization, coordination and control, teamwork and leadership, as well as the study of various functional departments in the organization such as production, marketing, finance, human resources	2	
	Psychology of management	The academic discipline is focused on the development of knowledge by studentsabout the psychological content of management as a social system and sphere of professional activity. It contains socio-psychological knowledge necessary for the analysis and forecasting of management effectiveness, optimization of management relationships and decisions, as well as an introduction to management theory, psychology of management activities, management communication and conflicts, management decision-making.	2	
		Cycle of basic disciplines Selectable Component		
	Designing Information Systems Applications	The course provides for the study of: the composition and structure of various classes of economic IS as design objects; modern technologies for designing IS and methods for substantiating the effectiveness of their application; the content of the stages and stages of IS design and their features when using various design technologies; goals and objectives of conducting a pre-project survey of informatization objects; methods for modeling information processes in the subject area; classification and general characteristics of modern CASE tools.	5	OK2
	Models and methods for planning experiments	Basic concepts of modeling theory, current state and general characteristics of the problem of IP modeling. Methodological basis of modeling. Modeling as a cognitive process. The use of modeling in the study and design of information systems. Classification of types of system modeling. Classical (inductive) approach. Systems approach. Possibilities and efficiency of computer systems modeling.	4	
	Theoretical foundations of information	Introduction to the theory of processes and systems. Classification of systems. Definition of the system and its components. The state and behavior of the	4	

	processes	system. Cybernetic approach to the description of information systems. The main tasks of the theory of information systems. Deterministic and stochastic systems. Complex and simple. Patterns of information systems.		
	Visual Application Development Tools	Visual programming systems are systems for rapid application development RAD (Rapid Application Development) in object-oriented programming languages. Elements of the programming environment being studied, standard objects and their properties, techniques for working with such objects, examples of using such objects, basic techniques for working with the programming environment, ways of presenting data.	5	
	Agile software development methodologies	A series of approaches to software development focused on the use of iterative development, the dynamic formation of requirements and ensuring their implementation as a result of constant interaction within self-organizing working groups consisting of specialists in various fields. Basic principles of flexible software development technologies. Development through testing. Coding and source code management. An overview of agile software development methodologies.	5	
Cycle of major disciplines University Component/Elective Component				
	Advanced Software Engineering	Development of systematic models and reliable methods for the production of high-quality software, and this approach extends to all levels - from theory and principles to real practice in software development.	5	PC1
	Cross-platform tool systems	Basic concepts and modern cross-platform programming tools. An overview of the Qt class hierarchy. Philosophy of the object model. Basics of working with Qt. container library. Controlling the automatic placement of elements. control elements. Interview or model-representation. Events.	5	
	Big data processing and analysis	When studying the discipline, undergraduates will study the following aspects: Modern problems of analysis and processing of big data. Experience in developing and analyzing conceptual and theoretical models for applied problems of big data analysis using Data Mining models. Methods for solving problems of processing and analyzing big data, the possibilities of high-performance computing systems, distributed computing technologies, methods and models of Data Mining. Conceptual and theoretical models of applied problems of big data analysis. Time and hardware resources for solving problems of data analysis and processing. Algorithms for analyzing and processing large amounts of data using Data Mining models.	5	
	Big Data Business Intelligence Tools and Applications	Business analytics concepts. Business analytics technologies. Business intelligence platforms. Data warehouses. Using tools and applications for business reporting and online analytical processing. OLAP and MicroStrategy for creating visualizations and dashboards. Decision support systems. Business analytics and big data concept in economic analysis.	5	
	Data store	Features of systems focused on data analysis. Decision support systems and the main tasks solved with their help. Classification of data analysis	4	

		problems. Generalized architecture of the decision support system. Databases are the basis of a decision support system. OLTP systems. Inefficiency of using OLTP systems for data analysis.		
	Large Database Design	The study of the fundamental principles of storage, processing and transmission of information in automated systems, based on the concept of databases, which is a determining factor in the creation of modern efficient systems for automated information processing. Particular attention in this course is paid to the design of systems in the field of big data.	4	
	Automated design of tools and control systems	Introduction to computer-aided design. General information about objects and design tasks. Basic concepts of CAD. Technical support of CAD. Mathematical support for the analysis of design solutions. CAD system environments. Mathematical support for the synthesis of design solutions. Methods for designing automated systems.	5	PC2
	Modern business intelligence tools	Business intelligence functions: identification, modeling, forecasting, decision optimization, sensitivity analysis. Business analytics methods. New knowledge search models, regression, time series forecasting, clustering, associations, sequences. Business intelligence technologies: OLAP technologies, DM technologies, data visualization systems and solutions, report generators. Evaluation of the effectiveness of business intelligence systems.	5	
	Technologies for the development of information and intellectual systems	Basic concepts of information and intellectual systems. Intelligent systems and their types. Basic concepts of intelligent systems and decision support systems. Basic concepts for the development of technologies of information and intelligent systems (IIS). IMS design stages. Stages of existence of IMS. Modern methodology and design tools CASE IMS. Methodology of functional analysis and design. The main provisions of the SADT concept (IDEF0). Methodology of object-oriented analysis and design. Basic provisions of the OOP concept. Unified modeling language UML. The main types of UML diagrams used in the design of information systems. Modeling database. Basic designations. Diagrams IDEF1X. Data Mining Technology, Data Mining. Problems of data mining.	5	
	Ontology of Information Systems Design	Introduction to ontological engineering. Ontology as specification of conceptualization. Types of ontologies Designing ontologies. Ontology creation life cycle Manual development of ontologies. Reuse of existing ontologies. Description logics as formal models of ontologies. semantic web.	5	
	IT project management	Analysis of requirements for information systems (IS). Analysis of the tasks facing the IS. The degree of automation of business processes. Modern ERP, CRM systems. The main characteristics of systems of classes ERP, CRM. A brief overview of the ERP-systems market. Examples of implementation of ERP-systems. Basic information systems. IP infrastructure, its elements; list of IP infrastructure components. The totality of computer technology.	5	PC4
	Information resource management	Modern methods of analysis and modeling of a modern corporation, domestic and foreign software for enterprise resource management. Construction of	5	

		document management systems for geographically distributed organizations and enterprises.		
	Design of complex information security systems	Essence, tasks and principles of organization design of complex information security systems at the enterprise. Factors influencing the organization design of complex information security systems in the enterprise. Definition of objects of protection. Destabilizing influences on information and their neutralization. Determining the possibilities of unauthorized access to protected information. Determination of the components of the design of complex information security systems in the enterprise. Development of a model of complex information security systems. General characteristics of the problems of modeling complex information security systems. Methods and models for evaluating the effectiveness of complex information security systems in an enterprise.	5	
	Security of regional enterprises	Basic standards governing information security management; principles for developing information security management processes; approaches to the integration of information security management systems into the overall enterprise management system.	5	
	Internship	The practice focuses undergraduates on the acquisition of practical skills, competencies and professional experience in the field of information systems and technologies, as well as on the development of best practices and the latest technologies	6	
	Experimental research work of a master student	The experimental research work is aimed at preparing the undergraduate for independent experimental research work related to scientific research, conducting applied scientific research and experiments focused on solving urgent practical issues and making independent management decisions in the field of information systems and technologies.	18	OK1, OK2, PC1, PC2, PC3, PC4

4. Competences and learning outcomes of the educational program

4.1 List of competencies and learning outcomes in the scientific direction

Competence code	Content of competence	Learning outcome code	The content of the learning outcome of the educational program
OK1	Understanding the psychological foundations of management and pedagogical activity, research methodology and readiness for communication in a multilingual environment	PO1	Knows the structure, stages and methods of scientific research, the psychological foundations and patterns of pedagogical activity and management
		PO2	Possesses the skills of social interaction, interpersonal, intercultural andprofessional and pedagogical, in oral and written forms in the state, Russian and English languages
OK2	Implementation of research	PO3	Able to organize, plan and carry out

	work and professional and pedagogical activities using modern educational technologies, mastering the skills of academic literacy, designing application development		research and teaching activities in the field of information systems
		PO4	Possesses knowledge and skills of academic writing, owns methodologyapplication development design
PC1	Ability to master knowledge in the field of analysis, modeling and design of information systems, technologies for the development of intelligent information systems	RO5	Knows design automation systems, has the skills to solve practical problems of data analysis that arise in the course of professional activity. Uses methods of work on IT project management.
		RO6	Knows how to use modern models, methods and tools of business intelligence when creating information systems.
PC2	Ability to design complex information systems, develop software applications to manage complex systems	RO7	Develops code using cross-platform application development tools
		RO8	Has programming skills in computing systems of parallel architecture and distributed systems
PC3	The ability to manage big data, analyze it, manage the strategy for the development of IP and information resources, know the methods, means of information protection	RO9	Organizes the security of the database management system and applies existing technologies and methods of information protection.
		RO10	Possesses skills in the technology of creating and maintaining big data, forms and uses information resources for IP management.
PC4	The ability to integrate knowledge and formulate judgments in the field of information systems and technologies to expand professional skills and abilities in the framework of self-study.	RO11	Able to independently carry out scientific, pedagogical and research activities in the field of information systems and technologies. Applies the latest theoretical, methodological and technological achievements of domestic and foreign science.

4.1 List of competencies and learning outcomes in the core area

Competence code	Content of competence	Learning outcome code	The content of the learning outcome of the educational program
OK1	Ability to make managerial decisions in various activities and in a multilingual environment	PO1	Demonstrates knowledge of the psychological mechanisms of managerial activity in a constantly changing social reality
		PO2	Implements managerial and communication skills in the professional field and in a foreign language environment

OK2	Ability to manage complex systems based on the principles of constructing mathematical models of objects and processes under development	PO3	Demonstrates the skills of analyzing scientific research and its results, forecasting and evaluating, formalizing subject areas. Knows how to use models, methods and tools when creating information systems.
PC1	Knowledge of designing complex information systems, developing software applications and intelligent information systems. Demonstration of skills in designing and managing big data in IS, building and organizing data warehouses	PO4	Uses visual application development tools when designing complex IS and intelligent information systems, knows how to program tasks in various subject areas.
		RO5	Applies knowledge of data analysis at a professional level to justify and select decisions. Uses software tools to build modern data warehouses.
PC2	Demonstration of knowledge on the analysis and preparation of information when making decisions using modern tools and specialized software packages in various fields of application.	RO6	Possession of methods of analysis and design of IS applications, technologies for the development of intelligent information systems.
		RO7	Carries out the implementation of Data Mining methods for data mining, solves practical problems using tools for developing artificial intelligence systems.
PC3	Ability to organize and manage IT projects, strategies for the development of information systems and innovation management in companies based on ICT.Understanding and using new methods for solving problems in the field of marketing, being able to solve modern scientific and practical problems in the field of information systems, formulating one's own conclusions and ideas	RO8	Develops and implements strategies for the development of information systems to provide decision support, knows modern approaches and methods for managing the development of information systems. Owns modern business intelligence tools and makes effective decisions.
		RO9	Able to develop IT projects, analyze the software and hardware market, implement information and software products. Has knowledge of information security.
PC4	The ability to plan and conduct scientific, applied and experimental research in the field of information systems and technologies, to integrate knowledge within the framework of independent autonomous learning	RO10	Able to independently integrate, systematize, update knowledge and apply it at a professional level in research and management activities in the field of information systems and technologies

4.2 Matrix for correlating learning outcomes in the educational program as a whole with the competencies being formed in the scientific direction

	PO1	PO2	PO3	PO4	RO 5	RO 6	RO 7	RO 8	RO 9	RO1 0	RO11
OK1	*	*									
OK2			*	*							
PC1					*	*					
PC2							*	*			
PC3									*	*	
PC4	*	*	*	*	*	*	*	*	*	*	*

4.2.1 Matrix of correlating the learning outcomes of the educational program as a whole with the formed competencies in the profile direction

	PO1	PO2	PO3	PO4	RO5	RO6	RO7	RO8	RO9	RO10
OK1	*	*								
OK2			*							
PC1				*	*					
PC2						*	*			
PC3								*	*	
PC4	*	*	*	*	*	*	*	*	*	*

4.3 Map of the formation of competencies in the scientific direction

	Discipline Code	Name of the discipline		Labor intensity		form of control
			OK/VK/ /KV	KAZ/ECTS loans	academici an watch	
OK1	IFN 5201	History and philosophy of science	VC	5	150	Testing
	FL 5202 IYa 5202	Foreign language (professional) - Foreign language (professional)	VC	4	120	Testing
	PVSh 5203	Pedagogy of higher education	VC	4	120	Testing
	PU 5204	Psychology of management	VC	4	120	Testing
	PP	Teaching practice	OK	3	90	report
	NIRM	Research work of a master student, including an internship and a master's thesis	OK	24	720	report
OK2	OPSR 5205 OPNI 5205	Organization and planning of scientific researches-Organization and planning of scientific research	HF	3	90	Testing
	NNEK 5205	Science in the national economy of Kazakhstan	HF			
	MTOVSh 5206	Methods and technologies of teaching in higher education	HF	4	120	Testing
	KPKKN 5206 OPPO 5206	Kasibi - pedagogical karym-katynas negizideri - Fundamentals of professional and pedagogical communication	HF			
	BAW 5207 AP 5207	Basics of academic writing / Basics of academic writing	HF	4	120	Testing

	ASW 5207 ASP 5207	Academic Style in Writing - Academic style in writing	HF			
	PPIS 5208	Designing Information Systems Applications	HF	4	120	Testing
	GMRPO 5208	Agile software development methodologies	HF			
	NIRM	Research work of a master student, including an internship and a master's thesis	OK	24	720	report
PC1	AMPIS 5301	Analysis, modeling and design of IS	VC	5	150	Testing
	UITP 5304	IT project management	HF	5	150	Testing
	ISPPR 5302	Decision support information tools	HF			
	TRIS 5303	Technologies for the development of information and intellectual systems	HF	5	150	Testing
	OPIS 5303	Ontology of Information Systems Design	HF			
	APSSU 5304	Automated design of tools and control systems	HF	5	150	Testing
	SSBA 5304	Modern business intelligence tools	HF			
	NIRM	Research work of a master student, including an internship and a master's thesis	OK	24	720	report
PC2	PVSPA 6305	Programming in computing systems of parallel architecture	HF	5	150	Testing
	VPRP 6305	Introduction to Parallel and Distributed Programming				
	PPI 6306	Advanced Software Engineering	HF	5	150	Testing
	KPIS 6306	Cross-platform tool systems				
	NIRM	Research work of a master student, including an internship and a master's thesis	OK	24	720	report
PC3	OABD 6307	Big data processing and analysis	HF	5	150	Testing
	IPBABD6307	Big Data Business Intelligence Tools and Applications				
	SMMKZIS 6308	Modern models and methods of cryptographic protection of information systems	HF	5	150	Testing
	BRP 6308	Security of regional enterprises				
	URIS 6309	Information systems development management	HF	5	150	Testing
	UIR 6309	Information resource management				
	NIRM	Research work of a master student, including an internship and a master's thesis	OK	24	720	report
PC4	IP	Research practice	OK	4	120	report
	NIRM	Research work of a master student, including an internship and a master's thesis	OK	24	720	report

4.4 Map of the formation of competencies in the profile direction

	Discipline Code	Name of the discipline		Labor intensity		form of control
			OK/VK/ /KV	KAZ/ECTS loans	academician watch	
OK1	Iya 5201	Foreign language (professional)	VC	2	60	testing
	men 5202	Management	VC	2	60	testing
	PU 5203	Psychology of management	VC	2	60	testing
	EIRM	Experimental research work of a master student, including an internship and a master's project	OK	18	540	report
OK2	MMPE 5204	Models and methods for planning experiments	HF	4	120	testing
	TOIP 5204	Theoretical foundations of information processes	HF			
	VSRP 5205	Visual Application Development Tools	HF	5	150	testing
	GMRPO 5205	Agile software development	HF			

		methodologies				
	EIRM	Experimental research work of a master student, including an internship and a master's project	OK	18	540	report
PC1	PPI 5301	Advanced Software Engineering	HF	5	150	testing
	KKIS 5301	Cross-platform tool systems	HF			
	OABD 5302	Big data processing and analysis	HF	5	150	testing
	IPBABD5302	Big Data Business Intelligence Tools and Applications	HF			
	HD 5303	Data store	HF	4	120	testing
	PBDBO 5303	Large Database Design	HF			
	EIRM	Experimental research work of a master student, including an internship and a master's project	OK	18	540	report
PC2	PPIS 5304	Designing Information Systems Applications	VC	5	150	testing
	APSSU 5305	Automated design of tools and control systems	HF	5	150	testing
	SSBA 5305	Modern business intelligence tools	HF			
	TRIS 5306	Technologies for the development of information and intellectual systems	HF	5	150	testing
	OPIS 5306	Ontology of Information Systems Design	HF			
	EIRM	Experimental research work of a master student, including an internship and a master's project	OK	18	540	report
PC3	UITP 5307	IT project management	HF	5	150	testing
	UIR 5307	Information resource management				
	PKSZI 5308	Design of complex information security systems	HF	5	150	testing
	BRP 6308	Security of regional enterprises	HF			
	EIRM	Experimental research work of a master student, including an internship and a master's project	OK	18	540	report
PC4	PP	Internship	OK	6	180	report
	EIRM	Experimental research work of a master student, including an internship and a master's project	OK	18	540	report

5 The concept of the development of the educational program target indicators for the development of "Information systems"

Goal 1: Improving educational activities in accordance with the requirements of the external environment	**Target indicator:** functioning of the university in accordance with the main parameters of the Bologna process	units rev.	In the planning period				
			Plan 2018-2019	Plan 2019-2020	Plan 2020-2021	Plan 2021-2022	Plan 2022-2023
1	**2**	**3**	**4**	**5**	**6**	**7**	**8**
	qualitative academic performance of students (the share of students with "good and excellent")	%	59	60	75	75	75
	the number of holders of grants from the rector, social partners, nominal scholarships	people	32	32	-	-	-
	share of students, undergraduates who got a job in their specialty in the first year after graduation	%	75	79	79	80	80
	number of disciplines taught in foreign languages	PC.	4	**5**	5	7	8
Task 1.2	number of MOOCs	PC.	3	1	1	1	1

Creation and development of information infrastructure	number of developed media courses	PC.	23	25	1	1	1
	the number of developed electronic textbooks with the copyright certificate of the Ministry of Justice of the Republic of Kazakhstan	PC.	22	22	1	1	1
Task 1.3 Increasing the professional level of teaching staff	share of full-time teaching staff with academic degrees and titles	%	53	54	55	55	55.5
	number of full-time PhDs	people	5	2	-	-	-
	the number of teachers implementing major disciplines in foreign languages	people	4	5	5	6	7
	the number of teaching staff, holders of state awards, prizes, grants	people	1	-	-	-	-
	the number of teaching staff who have completed advanced training	people	9	7	7	8	8
	the number of teaching staff who have completed international internships	people	12	1	1	1	1
	number of teaching staff participating in academic mobility	people	1	1	1	1	1
Task 1.4 Improving the qualitative composition of the contingent of students	number of secondary school graduates, holders of the “Altyn belgi” badge, diploma with honors, winners of competitions and olympiads	people	-	-	-	1	1
	the number of KEU graduates who continued their studies in the master's program	people	12	14	15	16	17
	number of applicants with a high GPA	people	3	2	2	3	3
	share of students who speak a foreign language at the intermediate level	%	7	7	7.5	8	8.5
Task 1.5 The introduction of modern forms of practice oriented training in priority areas of the SE FIID RK	the number of practical workers involved in conducting training sessions, reading elective disciplines	people	3	4	4	5	5
	the number of graduation projects commissioned by enterprises	people	13	15	17	20	22
	Off-site classes for students at the practice bases for potential employers		65	75	80	85	90
	the number of annual memorandums concluded with leading enterprises and organizations	PC.	7	2	2	2	2
	number of operating branches of the department	PC.	4	5	6	7	8
	number of MOOCs	PC.			1		
Goal 2: Sustainable development of the research activities of the University by ensuring the effective integration of education and science	**Target indicator**: increasing the amount of funding for scientific and innovative activities of departments and research institutes of the university at the expense of external sources of funding						

Task 2.1 Increasing research university potential	the number of scientific publications of the teaching staff of the department	PC.	31	31	32	33	34
	share of teaching staff of the department participating in the implementation of research topics	%	70	70	73	73	74
	number of scientific publications in journals with a non-zero impact factor (ThomsonReuters, SCOPUS, RSCI)	PC.	3	3	3	4	4
	the number of textbooks published under the stamp of the Ministry of Education and Science of the Republic of Kazakhstan	PC.	-	1	1	-	-
	number of inventions, patents, licenses	PC.	9	1	1	1	1
Task 2.2 Creation of a multi-channel system of research funding	the number of scientific topics carried out based on the results of budget competitions for research projects	PC.	1	1	1	1	1
Task 2.3 Integration of scientific activity and educational process	number of SSS members	people	35	35	35	36	37
	number of scientific publications of students, undergraduates and PhD students	PC.	16	16	17	18	19
	the number of scientific and innovative projects of students, undergraduates and PhD students	PC.	1	1	1	1	1
	the number of research workers who received diplomas and awards for participation in international competitions, conferences	PC.	3	3	3	3	4
	the number of research workers who received diplomas and awards for participation in republican competitions	PC.	4	4	4	4	4
	the number of joint publications of teaching staff and students, undergraduates, PhD students	PC.	7	7	9	10	10
Task 3.2 Ensuring student mobility in accordance with the requirements of the Bologna Process	Number of students participating in academic mobility programs	people		1	2	2	3
Task 6.1 Implementation a set of measures for patriotic education and the formation of civic engagement of youth	share of students involved in public events of a patriotic nature	%	85	85	86	86	87
	the number of events for patriotic education (curator hours, conferences, thematic lectures, etc.)	PC.	12	12	12	13	14
Task 6.2 Implementation of a set of measures for the formation of socially significant and individual qualities, personality traits	share of youth participating in various forms of student self-government	%	18	20	100	100	100
	participation of students in the construction and labor teams "Zhasyl el", etc.	people	3	3	18.5	19	19.5
	number of student members of the Alliance of Students of	people	3		3	4	4

	Kazakhstan						
Task 6.3 Implementation of a set of measures to form and develop a system of spiritual and moral knowledge and values	proportion of young people participating in the public life of the university	%	55	55	56	58	59

5 Approval sheet of the educational program

Job title	Signature	Full name
Vice-Rector for Academic Affairs and Strategic Development, Ph.D., Professor		Bugubaeva R.O.
Vice-Rector for Research and Integration Activities, Doctor of Economics, Professor		Nakipova G.E.
Director of the Department of Postgraduate Education PhD, Associate Professor		Omarova A.T.
Dean of the Faculty of Finance, Logistics and Digital Technologies, Ph.D., prof.		Serikova G.S.
Director of Strategic Development Department		Glazunova S.B.
Head of the Department of CI and ITA, Ph.D., Associate Professor		Tazhbaev N.M.
Ch. Specialist of the Department of Postgraduate Education		Bezler O.D.