

Institute of Technical Automation and Information TechnologiesКафедра ''Cybersecurity, information processing and storage''

EDUCATIONAL PROGRAM

8D06103 «Management Information Systems Doctor of Philosophy (PhD) in the field of Information and Communication Technologies

Code and classification of the field of education: 8D06 - Information and communication technologies Code and classification of training areas: 8D06103 Management Information Systems Group of educational programs: D094 Information Technology NRK Level: 8 ORC Level:: 8 Duration of study: 3 года olume of credits: 180

Aimaty, 2024

The educational program 8D06103 - "Management Information Systems" was approved at the meeting of the Academic Council KazNTU of after K.I.Satpayev.

Protocol no. №3 from "_27__" __10__2022 ..

Reviewed and recommended for approval at a meeting of the Educational and Methodological Council KazNITU of after K.I.Satpayev.

Protocol no.№2 from "_21__"_10___ 2022

The educational program "8D06103 - "Management Information Systems" was developed by the academic committee in the direction D094 – "Information Technology".

Full name	Academic degree/ academic title	Position	Workplace	Signature
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List of abbreviations and designations

US Information Systems **IEP** individual training plan **EP** Educational Program **NQF** National Qualifications Framework **IQF** Industry Qualifications Framework

1. Description of the educational program

The professional activities of graduates of the program cover the field of information systems, artificial intelligence, Big Data and Database Design. The direction of the specialty and specializations program relates to engineering and engineering.

The purpose of the educational program is to train doctoral students in basic and specialized disciplines, prepare and defend a dissertation with the achievement of relevant competencies.

In case of successful completion of the full course of doctoral studies, defense and approval of a scientific dissertation in the Ministry of Education and Science of the Republic of Kazakhstan, the graduate is awarded the degree of "Doctor of Philosophy".

Graduates' professional activities include: science, education, public administration and local government, economics and finance, industry, agriculture, culture, and healthcare. The objects of professional activity of graduates of doctoral programs in the specialty 6D070300 - "Information Systems" are:

IT departments and departments of public authorities;

- IT departments and departments of industrial enterprises;
- IT departments and departments of financial organizations, etc.;
- information services of scientific institutions;
- information services of public authorities;
- academic institutions.

The main functions of graduates' professional activities are:

design, operation, administration, maintenance, testing, provision of hardware and software protection of information systems for various purposes.

The areas of professional activity are as follows:

- development, implementation and operation of information retrieval systems;

- development, implementation and operation of information management systems;

- development, implementation and operation of expert systems;

- development, implementation and operation of information and organizational systems.

In the process of mastering the educational program, a PhD in information systems must acquire the following key competencies.

A PhD doctor should:

-have an idea: on modern methods of building and developing information systems, from the point of view of current trends, trends and patterns of development of domestic and foreign science in the context of globalization and internationalization;

- about modern software tools for research and modeling and for designing information systems;

- about modern technical means used to build information systems;

- about the main stages of development and paradigm shift in scientific knowledge;

- about the subject, methodological specifics of technical sciences in the field of information systems;

- about scientific schools in the field of information systems, their theoretical and practical developments;

- about scientific concepts of world and Kazakh science in the field of information systems be able to:

- to organize, plan and implement the scientific research process;

- analyze, evaluate and compare various theoretical concepts in the field of information systems research and draw conclusions;

- analyze and process information from different sources;

- to conduct independent scientific research that characterizes academic integrity based on modern theories and methods of analysis;

- generate your own new scientific ideas;

- bring your knowledge and ideas to the scientific community, expanding the boundaries of scientific knowledge;

- choose and effectively use a modern research methodology;

- plan and predict their further professional development

- to analyze, formulate problem statements, develop athematic models, conduct modeling to study the functioning of information systems using modern software products;

- carry out analysis, formulate problem statements, develop algorithmic and software for information systems;

o know:

- current trends, directions and patterns of development of Russian science in the field of information systems in the context of globalization and internationalization;

- methodology of scientific knowledge in the field of information systems;

- achievements of world and Kazakh science in the field of information systems;

- modern methods of building and analyzing the functioning of information systems in various industries;

- current development trends, forecast estimates of the use of technical means and systems;

- standards, methodological and regulatory materials accompanying the conduct of scientific research, design, commissioning and operation of information systems;

- modern methods of building and analyzing the functioning of information systems in various industries;

- current development trends, forecast estimates of the use of technical means in information systems;

- standards, methodological and regulatory materials accompanying research, design, commissioning and operation of information systems in various industries.

have the skills:

- critical analysis, evaluation and comparison of various scientific theories and ideas;

- analytical and experimental research activities;

- planning and forecasting of research results;

- public speaking and speaking at international scientific meetings, conferences and seminars;

- scientific writing and scientific communication;

- planning, coordination and implementation of the research process;

- systematic understanding of the research area and demonstration of the effectiveness of selected qualitative and scientific methods;

- organization of scientific research in the field of information systems; - organization of work on the collection, storage and processing of information used in the field of information systems.

Graduates' professional activities include: science, education, public administration and local government, economics and finance, industry, agriculture, culture, and healthcare.

Doctor of Philosophy 8D06103 - specialty "Information Systems" can provide services to government agencies, industrial enterprises, financial organizations and academic institutions.

The objects of professional activity of graduates are:

- computer services of public authorities;

- computer services of industrial enterprises;

- computer services of financial organizations, etc.;

- information services of scientific institutions;

- information services of public authorities;

- academic institutions; The main functions of graduates' professional activities are:

design, operation, administration, maintenance, testing, provision of hardware and software protection of information systems for various purposes.

The areas of professional activity are as follows:

- development, implementation and operation of information retrieval systems;

- development, implementation and operation of information management systems;

- development, implementation and operation of expert systems;

- development, implementation and operation of information and organizational systems.

A PhD in information systems should solve the following tasks in accordance with the types of professional activity.

in the field of organizational and managerial activities:

- be the head of an IT department, department;

in the field of experimental research activities:

- to be the head of a scientific laboratory for conducting theoretical and experimental research of IT facilities;

in the field of scientific research and teaching activities:

- be a leading researcher or head of a scientific laboratory for the research and development of modern information technologies and systems;

- to be a teacher of bachelor's, master's and doctoral studies in special disciplines in the field of information systems;

in the field of design and engineering activities:

- be the head of the information systems development and design department in various industries. Scientific internships are provided during the training:

University of Ottawa, Canada; National Aviation University, Kiev, Ukraine; Faculty of Engineering, University Putra Malasia.

The purpose and objectives of the educational program

The purpose of the educational program is to train doctoral students in basic and specialized disciplines in the field of information systems, prepare and defend a dissertation with the achievement of relevant competencies.

2. Types of work. Graduates' professional activities include: science, education, public administration and local government, economics and finance, industry, agriculture, culture, and healthcare.

3. Objects of professional activity. The objects of professional activity of graduates of doctoral programs in OP are:

- IT departments and departments of public authorities;

- IT departments and departments of industrial enterprises;

- IT departments and departments of financial organizations;
- information services of scientific institutions;
- information services of public authorities;

- academic institutions.

The main functions of graduates' professional activities are: design, operation, administration, maintenance, testing, and operation of information systems for various purposes. The areas of professional activity are as follows:

- development, implementation and operation of information retrieval systems;

- development, implementation and operation of information management systems;

- development, implementation and operation of expert systems;

development, implementation and operation of information and organizational systems.

The global goal of the educational program is to contribute to the achievement of the Sustainable Development Goals (SDGs):

- Goal 4: Quality education (Ensuring inclusive and equitable quality education and promoting lifelong learning opportunities for all);

- Goal 8: Decent work and economic growth (Promoting sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all);

- Goal 9: Industrialization, Innovation and Infrastructure (Building resilient infrastructure, promoting inclusive and sustainable industrialization and innovation);

3 Requirements for the assessment of learning outcomes of an educational program

Requirements for key competencies of doctoral graduates:

1) have an idea of: - the main stages of development and paradigm shift in the evolution of science;

- on the subject, ideological and methodological specifics of the natural (social, humanitarian, economic) sciences;

- about scientific schools of the relevant branch of knowledge, their theoretical and practical developments;

- about scientific concepts of world and Kazakh science in the relevant field;

- on the mechanism of implementation of scientific developments in practical activities;

- on the norms of interaction in the scientific community;

- about the pedagogical and scientific ethics of a research scientist;

2) know and understand:

- current trends, trends and patterns of development of Russian science in the context of globalization and internationalization;

methodology of scientific knowledge;

- achievements of world and Kazakh science in the relevant field;

- (realize and accept) the social responsibility of science and education;

- perfect foreign language for scientific communication and international cooperation;

3) be able to:

- to organize, plan and implement the scientific research process;

- analyze, evaluate and compare various theoretical concepts in the field of research and draw conclusions;

- analyze and process information from various sources;

- to conduct independent scientific research, characterized by academic integrity, based on modern theories and methods of analysis;

- generate your own new scientific ideas, communicate your knowledge and ideas to the scientific community, expanding the boundaries of scientific knowledge;

- to choose and effectively use modern research methodology;

- plan and predict your further professional development;

4) have the skills:

- critical analysis, evaluation and comparison of various scientific theories and ideas;

- analytical and experimental scientific activities;

- planning and forecasting of research results;

- public speaking and public speaking at international scientific forums, conferences and seminars;

- scientific writing and scientific communication;

- planning, coordinating and implementing scientific research processes;

- a systematic understanding of the field of study and demonstrate the quality and effectiveness of selected scientific methods;

- participation in scientific events, fundamental scientific domestic and international projects;

- leadership management and team management;

- responsible and creative attitude to scientific and scientific-pedagogical activities;

- conducting patent search and experience in the transfer of scientific information using modern information and innovative technologies;

- protection of intellectual property rights for scientific discoveries and developments;

- free communication in a foreign language;

5) be competent:

- in the field of scientific and scientific-pedagogical activity in conditions of rapid updating and growth of information flows;

- in carrying out theoretical and experimental scientific research;

- in setting and solving theoretical and applied problems in scientific research;

- to conduct a professional and comprehensive analysis of problems in the relevant field;

- in matters of interpersonal communication and human resource management;

- in matters of university training of specialists;

- in carrying out the expertise of scientific projects and research;

- to ensure continuous professional growth.

Requirements for the research and development of a student in the Doctor of Philosophy (PhD) program:

1) compliance with the main issues of the educational program of the doctoral program, according to which the doctoral thesis is being defended;

2) relevant and contains scientific novelty and practical significance;

3) it is based on modern theoretical, methodological and technological achievements of science and practice;

4) it is based on modern methods of data processing and interpretation using computer technology;

5) performed using modern scientific research methods;

6) contains research (methodological, practical) sections on the main protected provisions.

3.3 Requirements for the organization of practices:

The practice is conducted with the aim of developing practical skills in scientific, scientific, pedagogical and professional activities.

The educational program of the doctoral program includes:

1) pedagogical and research practice – for students of the PhD program;

2) industrial practice – for students of the specialized doctoral program.

During the period of pedagogical practice, doctoral students, if necessary, are involved in conducting undergraduate and graduate studies.

The doctoral student's research practice is conducted with the aim of studying the latest theoretical, methodological and technological achievements of domestic and foreign science, as well as consolidating practical skills, applying modern research methods, processing and interpreting experimental data in dissertation research.

The doctoral student's internship is conducted in order to consolidate the theoretical knowledge gained during the training process and improve his professional level.

The content of research and production practices is determined by the topic of the doctoral thesis.

4. Passport of the educational program

4.1. General information

N⁰	Field name	Note
1	Code and classification of the field of	8D06 Information and communication technologies
	education	
2	Code and classification of training	8D061 Information and communication technologies
	areas	
3	Group of educational programs	D094 Information technology
4	Name of the educational program	8D06103 Management Information Systems
5	Brief description of the educational program	The educational program "Information Systems Management" (MIS) is aimed at training specialists who are able to effectively manage information technologies and systems in various organizations. The program combines technical and managerial disciplines, providing students with in-depth knowledge of information and communication technologies, as well as their applications in business.
6	Purpose of the EP	Training of competent scientific, pedagogical and managerial personnel, senior managers in information technology who have practical experience, as well as those interested in conducting applied research to master and develop modern concepts and models in information systems
7	Type of EP	Updated EP
8	The NRK level	8
9	ORC Level	8
10	Distinctive features of the EP	
11	List of educational program	have an idea:
	competencies:	 on modern methods of building and developing information systems, from the point of view of current trends, trends and patterns of development of domestic and foreign science in the context of globalization and internationalization; about modern software tools for research and modeling and for designing information systems; about modern technical means used to build information systems; about the main stages of development and paradigm shift in scientific knowledge; about the subject, methodological specifics of technical sciences in the field of information systems; about scientific schools in the field of information systems; about scientific concepts of world and Kazakh science in the field of information systems

process;
- analyze, evaluate and compare various theoretical
concepts in the field of information systems research and
draw conclusions;
- analyze and process information from different
sources;
- to conduct independent scientific research that
characterizes academic integrity based on modern
theories and methods of analysis;
- generate your own new scientific ideas;
- bring your knowledge and ideas to the scientific
community, expanding the boundaries of scientific
knowledge;
- choose and effectively use a modern research
methodology;
- plan and predict their further professional development
- to analyze, formulate problem statements, develop
athematic models, and conduct modeling to study the
functioning of information systems using modern
software products:
- to carry out analysis, formulate problem statements.
develop algorithmic and software for information
systems:
To know:
- current trends, directions and patterns of development
of Russian science in the field of information systems in
the context of globalization and internationalization:
- methodology of scientific knowledge in the field of
information systems;
- achievements of world and Kazakh science in the field
of information systems;
- modern methods of building and analyzing the
functioning of information systems in various industries;
- current development trends, forecast estimates of the
use of technical means and systems;
- standards, methodological and regulatory materials
accompanying the conduct of scientific research, design,
commissioning and operation of information systems;
- modern methods of building and analyzing the
functioning of information systems in various industries;
- current development trends, forecast estimates of the
use of technical means in information systems;
- standards, methodological and regulatory materials
accompanying research, design, commissioning and
operation of information systems in various industries.
have the skills:
- critical analysis, evaluation and comparison of various
scientific theories and ideas;
- analytical and experimental research activities;
- planning and forecasting of research results;

	- public speaking and speaking at international scientific
	meetings, conferences and seminars;
	- scientific writing and scientific communication;
	- planning, coordination and implementation of the
	research process;
	- systematic understanding of the research area and
	demonstration of the effectiveness of selected qualitative
	and scientific methods;
	- organization of scientific research in the field of
	information systems;
	- organization of work on the collection, storage and
	processing of information used in the field of information
	systems.
	Graduates' professional activities include: science,
	education, public administration and local government,
	economics and finance, industry, agriculture, culture, and
	healthcare.
	Doctor of Philosophy 6D070300 - specialty
	"Information Systems" can provide services to
	government agencies, industrial enterprises, financial
	organizations and academic institutions.
	The objects of professional activity of graduates
	are:
	- computer services of public authorities;
	- computer services of industrial enterprises;
	- computer services of financial organizations, etc.;
	- information services of scientific institutions;
	- information services of public authorities;
	- academic institutions; The main functions of graduates'
	professional activities are:
	design, operation, administration, maintenance, testing,
	provision of hardware and software protection of
	information systems for various purposes.
	The areas of professional activity are as follows:
	- development, implementation and operation of
	information retrieval systems;
	- development, implementation and operation of
	information management systems;
	- development, implementation and operation of expert
	systems;
	- development, implementation and operation of
	information and organizational systems.
	A PhD in information systems should solve the
	following tasks in accordance with the types of
	professional activity.
	in the field of organizational and managerial activities:
	- be the head of an 11 department, department,
	aepartment; in the neid of experimental research
	activities:
	- to be the nead of a scientific laboratory for conducting

		theoretical and experimental research of IT facilities;
		in the field of scientific research and teaching activities:
		- be a leading researcher or head of a scientific laboratory
		for the research and development of modern information
		technologies and systems;
		- to be a teacher of bachelor's, master's and doctoral
		studies in special disciplines in the field of information
		systems; in the field of design and engineering activities:
		- be the head of the information systems development and
		design department in various industries.
12	Learning outcomes of the educational	PO1 To recognize and interpret human emotions using
	program:	artificial intelligence methods. Know modern software
		tools for effective data mining.
		PO2 Be able to organize, plan and implement the
		scientific research process, analyze, evaluate and
		compare various theoretical concepts in the field of
		information systems research and draw conclusions.
		Master foreign languages at a professional level for
		partnership in the interests of sustainable development.
		Implementation of scientific and methodological work in
		the field of information systems management.
		PO3 Have an idea of modern methods of building and
		developing information systems, from the point of view
		of current trends, directions and patterns of development
		of domestic and foreign science in the context of
		globalization in order to promote innovation. Be able to
		apply modern software and hardware tools for research
		and modeling and for designing information systems.
		Coordinate work on OT projects.
		PO4 Develop and implement information retrieval
		systems. Analyze technical capabilities, apply algorithms
		and methods to search, process, and store information.
		PO5 Have the skills of critical analysis, evaluation and
		comparison of various scientific theories and ideas;
		analytical and experimental research activities; planning
		and forecasting research results. They should also be
		able to develop mathematical models and methods for
		constructing optimal control systems under random
		external influences, as well as justify the choice of entimization algorithms depending on the specifies of
		the production process
		PO6 Development and optimization of afficient
		algorithms for processing big data taking into account
		the features of distributed systems and resource
		constraints Knowledge of tools and technologies for
		processing hig data
		PO7 Apply machine learning and statistical analysis
		methods to solve various data analysis problems. Work
		with various software tools and libraries program data
		analysis algorithms, apply them to real datasets and

		evaluate their results.
13	The form of education	full-time
14	Duration of training	3 years
15	Volume of loans	180 credits
16	Languages of instruction	Kazakh, Russian
17	Academic degree awarded	Doctor of Philosophy PhD
18	Developer(s) and authors:	Satybaldieva R.J. Zhumagaliev B.I. Baymataeva S.M.

N⁰	Name of the	Brief description of the discipline	Numbe	(Generat	ed lear	ning ou	itcomes	s (codes	5)
	discipline		r of	NO1	NO2	NO3	NO4	NO5	NO6	NO7
			credits							
1	Scientific research	Purpose: to acquire knowledge about the laws, principles,	5	v	v			v		
	methods	concepts, terminology, content, and specific features of								
		the organization and management of scientific research								
		using modern methods of scientometry. Contents: the								
		structure of technical sciences, the application of general								
		scientific, philosophical and special methods of scientific								
		research, the principles of scientific research organization,								
		methodological features of modern science, ways of								
		development of science and scientific research, the role of								
		technical sciences, computer science and engineering								
		research in theory and practice.								
2	Academic writing	Objective: to develop academic writing skills and writing	5		v					
		strategies for doctoral students in engineering and natural								
		sciences. Content: fundamentals and general principles of								
		academic writing, including: writing effective sentences								
		and paragraphs, writing an abstract, introduction,								
		conclusion, discussion, conclusion, used literary sources;								
		quoting in the text; preventing plagiarism, as well as								
		making a presentation at a conference.								
3	Intellectual	Purpose: to train specialists in the field of intellectual	5	v	v			v		
	property and the	property law who are able to analyze and predict trends in								
	global market	its development in the global market, develop strategies								
		for the protection and commercialization of intellectual								
		property. Contents: global aspects of intellectual property								
		and its role in international trade and economics, analysis								
		of international agreements and conventions, IP								

4.2. The relationship between the achievability of the formed learning outcomes in the educational program and academic disciplines

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		management strategies, cases on protection and infringement of intellectual property rights in various jurisdictions.							
4	Data mining in IS	Data mining as an interdisciplinary discipline, methodology of data mining and processing. Descriptive data analysis. Types, sets, and samples of data. Assessment of data quality. Identification of connections and analysis of connections. Dynamic models and forecasting based on data of various nature. Assessment of the quality of models. Methodology of intellectual analysis of various data in practice and scientific research.	5	v				V	v
5	Big Data Processing	The study of theoretical and practical aspects of the use of big data technologies in information systems. Models with a unified memory access system and a non-unified one are considered. Strongly coupled and weakly coupled distributed computing systems. The problems of stability of such systems and the definition of computing power.	5	v		v		v	v
6	Information search engines	The discipline covers various aspects related to the construction and use of search engines. It includes: the study of indexing algorithms that are used to organize information in search engines; the process of information retrieval; the analysis of user queries, the comparison of queries with indexed information and the ranking of search results; methods and techniques of information retrieval in various sources, including web pages, databases, multimedia resources and other data sources.	5			v			v
7	Computer modeling of processes and systems	Modeling of unstable parameters and processes formalized as continuous, discrete, multidimensional random variables and Markov, Gaussian processes. Modeling of ordinary and extraordinary flows of events. Identification	5		v		v		

		of random patterns. Simulation of queuing systems with							
		waiting. Modeling of investment allocation in conditions							
		of uncertainty and risks. Modeling of inventory							
		management systems.							
8	Applied	The study of methods of classical optimization of	5		v		v		
	optimization	processes described by differentiable functions, modern							
	methods	trends in mathematical programming based on the theory							
		of duality, as well as a wide range of network tasks. The							
		procedures for using standard structures and models for							
		the analysis and optimization of economic, production and							
		organizational processes under accidental external							
		influences and incomplete information about state							
		variables are considered.							
9	Emotional	The discipline includes the study of the basics of artificial	5	v		v		v	
	Artificial	intelligence and their practical application. The collection,							
	Intelligence	analysis, extraction of useful information, and							
		construction of a machine learning model will be							
		considered. The purpose of studying the discipline							
		"Emotional Intelligence" is to provide doctoral students							
		with theoretical and practical knowledge, skills and							
		emotional competence in managing value chains, as well							
		as the formation of emotionally competent behavior							
		necessary for the professional activity of a high-level							
		specialist based on the consideration of the emotional							
		factor in the business processes of modern companies.							
10	Machine Learning	The course is a comprehensive study of a class of machine							v
	& Deep Learning	learning algorithms such as convolutional, recurrent, and							
		recursive neural networks. Combining these methods,							
		complex systems are created that meet various tasks of							
		artificial intelligence. Deep learning is a proven sample							

from a wide family of machine learning methods for				
representing data that best suits the nature of the task.				

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CSE333 E	Big Data Processing	BD			Sec. 1	105	10	84					
SEC302	Data mining in IP	CCH	2	150	2001	10.5							
MNG3491	intellectual property and the global market		-	-	-	-	-	-		-	1	_	
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CSE119	Applied optimization methods	PD,		150		105	÷.	5					
CSE320	Computer modeling of processes and systems	CCH	3	1.20		100	-			_	-		-
CSE338	Enotional Artificial Intelligence and Leadership	PD,		160		105	E	5					Г
CSE337	biformation search engines	CCH	12	1.00		1.127							_
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AAP350	Pedagogical practice	BD UC	10	-	-		-	-	10	10			
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