

**NJC «Kazakh national research technical University named after K. Satbayev»
Institute of Cybernetics and Information Technology
Department of «Cybersecurity, Information Processing and Storage»**

**CURRICULUM PROGRAM
8D06105 – «INFORMATION SECURITY SYSTEMS»**

Doctor of Philosophy (PhD)

1st edition
in accordance with the State Educational Standard of Higher Education 2018

Almaty 2020

Разработано:	Рассмотрено: заседание УС Института	Утверждено: УМС КазННТУ	Страница 1 из 23
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The program was drawn up and signed by the parties:

About KazNRTU named after K.I. Satpayev:

Director of the Institute of Cybernetics and Information Technology



N.A. Seilova

Head of the Department of Cybersecurity, processing and storage of information *(CPaSI)

N.A. Seilova

Chairman of the UMG of the Department of CPaSI

E.Zh. Aytkhozhayeva

From employers:

Department Director of Kazteleport LLP S. Toleuliv

From partner university:

National Aviation University (NAU, Kiev, Ukraine)

Approved at a meeting of the Educational and Methodological Council of the Kazakh National Research Technical University named after K.I. Satpayev. Minutes No. 3 dated 15.12.2020

Qualification:

Level 8 of the National qualifications framework:

8D061 Information and Communication Technologies (PhD):

Professional competences: Information Protection and Security, Information Security Systems

Short description of the program:

1.Objectives.

The objective of the educational program is to train doctoral candidates in basic and specialized disciplines in the field of information security systems, acquisition by doctoral candidates of competencies that allow them to conduct professional and research activities, preparation and defense of a thesis with the achievement of relevant competencies.

2. Types of work activities.

Professional activity of the graduates includes: science, education, state and departmental structures, economy and industry of the state, health care.

3. Objects of professional activity.

The objects of professional activity of graduates of doctoral programs in the educational program – “Information Security Systems” are:

- government bodies;
- information security departments and departments of departmental organizations;
- information security departments, IT departments and departments of financial organizations;
- information security departments, IT departments and departments of industrial enterprises;
- higher education institutions and scientific institutions;
- information security departments and departments of state organizations and commercial structures.

The basic functions of professional activity of doctoral candidates are: carrying out of research works in the field of protection and security of the information; audit, the analysis of vulnerabilities and investigation of incidents in information security systems; designing, introduction, operation, administration, support and testing of systems of information security of the enterprises.

Areas of professional activity are as follows:

- design, development, implementation and operation of information security systems;
- analysis, testing and identification of system vulnerabilities;
- information security audit.

PASSPORT OF THE EDUCATIONAL PROGRAM

1 Scope and content of the program

The educational program of the Doctor of Philosophy (PhD) has a scientific and pedagogical orientation and assumes fundamental educational, methodological and research training and in-depth study of disciplines in the relevant areas of science for the system of higher and postgraduate education and scientific sphere.

The educational programs for doctoral studies in terms of professional training are developed on the basis of the experience of foreign universities and research centers that implement accredited programs for training PhD.

The main criterion for completion of the educational process for the preparation of PhD is the mastery of at least 180 academic credits by a doctoral candidate, including all types of educational and scientific activities.

Term of training in doctoral studies is defined by volume of mastered academic credits. At mastering the established volume of academic credits and achievement of expected results of training for reception of a degree of the PhD the educational program of doctoral studies is considered completely mastered.

Training in doctoral studies is carried out on the basis of educational programs of the magistracy:

- scientific and pedagogical with a term of study of at least three years;

The professional activities of the program graduates cover information security and safety, information security systems and Cybersecurity.

Program direction of the specialty refers to information and communication technologies.

The objective of the educational program is to train doctoral candidates in basic and specialized disciplines in the field of information security systems, acquisition by doctoral candidates of competencies that allow them to conduct professional and research activities, preparation and defense of a thesis 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”.

The professional activity of the graduates includes: science, education, state and departmental structures, public administration and local government, economy and finance, industry, agriculture, culture, health care.

The objects of professional activity of graduates of doctoral programs in the educational program – “Information Security Systems” are:

- government bodies;
- information security departments and departments of departmental organizations;
- information security departments, IT departments and departments of financial organizations;
- information security departments, IT departments and departments of industrial enterprises;
- higher education institutions and scientific institutions;

– information security departments and departments of state organizations and commercial structures.

The basic functions of professional activity of doctoral candidates are: carrying out of research works in sphere of protection and safety of the information; the analysis of vulnerabilities; audit of information safety; investigation of incidents of information safety; designing of systems of protection of the information; introduction and operation; administration, support and testing of systems for maintenance of system of information safety of the enterprises.

Areas of professional activity are as follows:

- organizational and managerial;
- industrial-technological;
- exploitation;
- design-engineering;
- research and development.

PhD in the field of information security should acquire the following key competencies while mastering the educational program.

PhD should:

have an idea:

- about modern methods of construction and development of information security systems from the point of view of modern trends, directions and regularities of development of domestic and foreign science in conditions of globalization and internationalization;

- about modern software tools for research, modeling and design of information security systems;

- about modern technical means used for analysis, revealing of vulnerabilities of systems;

- on the main stages of development and paradigm change in scientific knowledge;

- on the subject, methodological specifics of the information security direction;

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

- on scientific concepts of world and Kazakhstan science in the field of information security and safety;

- on organization of information protection and security in database management systems;

- on modern means of cryptosystems;

- on methods of information protection in network technologies;

- on research of information security problems using modern research methods;

- on teaching in higher educational institutions, on application of innovative methods in practice.

know:

- modern trends, directions and regularities of development of domestic science in the field of information protection and security in conditions of globalization and internationalization;

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

- achievements of world and Kazakhstan science in the field of protection and security of information;
- modern methods of construction and analysis of functioning of information security systems in different branches of industry;
- standards, methodological and regulatory materials accompanying research, design, testing, audit and operation of information security systems in various industries;
- modern trends of development, forecast estimates of application of technical means in information security provision;
- methodology of information security management.
- modern methods of organization of information protection and security in database management systems;
- tendency of development of modern means of cryptosystems;
- methods of information protection in network technologies;
- methods of teaching in higher education institutions and application of modern teaching methods in practice.

be able to:

- organize, plan and implement the process of scientific research;
- analyze, evaluate and compare various theoretical concepts in the field of research of information security systems and draw the necessary conclusions;
- analyze and process information from different sources;
- conduct independent scientific research characterizing academic integrity on the basis of modern theories and methods of analysis;
- generate their own new scientific ideas;
- convey their knowledge and ideas to the scientific community, expanding the boundaries of scientific knowledge;
- select and effectively use modern research methodology;
- plan and predict their further professional development;
- analyze, form tasks, develop mathematical models, carry out modeling for research of information security systems functioning using modern technologies;
- carry out analysis and audit of information security;
- identify system vulnerabilities and ensure timely system protection;
- develop and research models and methods of information security management;
- apply technical means of counteraction to espionage to ensure and evaluate information security;
- organize information protection and security in database management systems;
- analyze and synthesize modern means of cryptosystems;
- apply methods of information protection in network technologies;
- formulate, research and solve information security problems using modern research methods;
- develop, research and apply modern technologies in the field of information security provision;
- teach in higher educational institutions, to apply innovative methods in practice.

have skills:

- critical analysis, evaluation and comparison of various scientific theories and ideas;
- analytical and experimental research activities;
- planning and forecasting of research results;
- speaking and public 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 research works in the field of information security;
- conducting analysis, evaluation and audit of information security.
- organization of works on collection, storage and processing of information used to ensure protection and security of information;
- building information security management models;
- application of technical means of counteraction to espionage to ensure and evaluate information security;
- organization of system protection and information security in database management systems;
- analysis and synthesis of modern means of crypto systems;
- application of methods of information protection in network technologies;
- research and solution of information security problems using modern research methods;
- development, research and application of modern technologies in the field of information security provision;
- teaching in higher educational institutions, application of modern methods of scientific research in practice.

Doctor of Philosophy of the educational program “Information Security Systems” may provide services to state and departmental bodies, industrial enterprises, financial organizations and academic institutions.

The objects of professional activity of the graduates are:

- all spheres of the Republic of Kazakhstan, where it is necessary to ensure information security;
- complex provision of information security of industrial enterprises;
- research and development and design work in higher educational institutions and scientific institutions;
- information security systems of government agencies ;
- academic institutions.

The main functions of professional activity of graduates are: design, development, operation, administration, analysis, audit, investigation, testing, provision of hardware and software protection of information systems for various purposes.

PhD in the field of information security should solve the following tasks in accordance with the types of professional activities.

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in the field of organizational and management activities:

- be the head of the information security division, department;

in the field of experimental research activities:

- be the head of the scientific laboratory for theoretical and experimental research in the field of information security;

in the field of research and pedagogical activities:

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

- be a teacher of disciplines of a bachelor's degree, a master's degree and doctoral studies in basic and profile disciplines in the field of information security and safety;

in the field of design-engineering activity:

- be the head of the division on development, design, implementation of information security systems in various industries.

During the training there are scientific internships: University Ottawa, Canada; National Aviation University, Kiev, Ukraine; Faculty of Engineering, University Putra Malasia.

2 Entry requirements

The persons having “the magister degree” and work experience not less than 1 (one) year are admitted to the doctorate.

Enrolment in the number of doctoral candidates is carried out by admission commissions of higher education institutions and scientific organizations according to the results of the entrance examination for groups of educational programs of doctoral studies and the certificate confirming the knowledge of a foreign language in accordance with the common European competences (standards) of foreign language proficiency.

At admission to universities, doctoral candidates independently choose an educational program from the appropriate group of educational programs.

Enrolment of persons for the targeted training of PhD by state educational order is carried out on a competitive basis.

The order of reception of citizens in doctoral studies is established according to “Standard rules of reception on training in the organizations of education realizing educational programs of postgraduate education”.

Formation of the contingent of doctoral candidates is carried out by means of placement of the state educational order for preparation of scientific and pedagogical personnel, and also payment of training at the expense of owns means of citizens and other sources. The state provides to citizens of the Republic of Kazakhstan the right to receive on a competitive basis according to the state educational order free postgraduate education if they receive education of this level for the first time.

At the “entrance”, the doctoral candidate must have all the prerequisites necessary to master the relevant professional training program of the doctorate. The list of necessary prerequisites is determined by the institution of higher education independently.

In the absence of the necessary pre-requisites, a doctoral candidate is allowed to master them on a paid basis. In this case, training in doctoral studies begins after full mastering of pre-requisites by a doctoral candidate.

3 Requirements for completing studies and obtaining a diploma

Persons who have mastered the educational program of doctoral studies and defended a doctoral dissertation, in case of a positive decision of the dissertation councils of a university with a special status or the Committee for Control in the Sphere of Education and Science of the Ministry of Education and Science of the Republic of Kazakhstan, according to the results of the expertise, are awarded the degree of PhD and issued a state sample diploma with an application (transcript).

Persons who have received the degree of doctor of PhD, to deepen scientific knowledge, to solve scientific and applied problems on a specialized topic, carry out post-doctoral program or conduct scientific research under the guidance of a leading scientist selected by the university.

3.1 Requirements for key competencies of doctoral graduates

1) *have an idea:*

- on the main stages of development and paradigm shift in the evolution of science;
- the subject, attitudinal and methodological specificity of natural (social, humanities, economic) sciences;
- about scientific schools of the corresponding branch of knowledge, their theoretical and practical developments;
- about scientific concepts of world and Kazakhstan science in the relevant field;
- on the mechanism of implementation of scientific developments in practice;
- on norms of interaction in the scientific community;
- on pedagogical and scientific ethics of a research scientist;

2) *know and understand:*

- modern trends, directions and regularities of development of domestic science in conditions of globalization and internationalization;
- methodology of scientific cognition;
- achievements of world and Kazakhstan science in the corresponding area;
- (to realize and accept) social responsibility of science and education;
- in perfection the foreign language for realization of scientific communication and international cooperation;

3) *be able to:*

- organize, plan and implement the process of scientific research;
- analyze, evaluate and compare different theoretical concepts in the field of research and draw conclusions;
- analyze and process information from different sources;
- conduct independent scientific research characterized by academic integrity, based on modern theories and methods of analysis;
- generate their own new scientific ideas, communicate their knowledge and ideas to the scientific community, expanding the boundaries of scientific cognition;
- choose and effectively use modern research methodology;
- plan and predict their further professional development;

4) *have skills:*

- critical analysis, evaluation and comparison of various scientific theories and ideas;
- analytical and experimental scientific activities;
- planning and forecasting of research results;
- speaking and public speaking at international scientific forums, conferences and seminars;
- scientific writing and scientific communication;
- planning, coordination and implementation of scientific research processes;
- systematic understanding of the field of study and demonstrate the quality and effectiveness of the selected scientific methods;
- participation in scientific events, fundamental scientific domestic and international projects;
- leadership and team management;
- responsible and creative attitude towards scientific and scientific-pedagogical activities;
- patent search and experience of scientific information transfer using modern information and innovative technologies;
- protection of intellectual property rights to 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 formulation and solution of theoretical and applied problems in scientific research;
- in conducting professional and comprehensive analysis of problems in the relevant field;
- in the matters of interpersonal communication and human resources management;
- in the matters of university training of specialists;
- in the expertise of scientific projects and research;
- in ensuring continuous professional growth.

3.2 Requirements for research work of a doctoral student studying under the program of doctor of philosophy (PhD):

- 1) compliance with the main problems of the educational program of doctoral studies, on which the doctoral dissertation is defended;
- 2) relevant and contains scientific novelty and practical significance;
- 3) based on modern theoretical, methodological and technological achievements of science and practice;
- 4) based on modern methods of data processing and interpretation using computer technologies;
- 5) performed using modern methods of scientific research;

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

3.3 Requirements for the organization of practices:

The practice is conducted in order to form practical skills of scientific, scientific-pedagogical and professional activities.

The educational program of the doctoral program includes:

- pedagogical and research practice – for students on the program of the doctor of philosophy;

During the period of pedagogical practice, doctoral students, if necessary, are involved in conducting classes in the bachelor's and master's programs.

Practice doctoral research is to study the latest theoretical, methodological and technological advances domestic and foreign science and consolidate practical skills of application of modern methods of scientific research, processing and interpretation of experimental data in this thesis.

Production practice of a doctoral student is carried out in order to consolidate the theoretical knowledge obtained in the course of training, and improve the professional level.

The content of research and production practices is determined by the theme of the doctoral dissertation.

4 The working curriculum of the educational program

4.1. Duration of study: 3 years

Working curriculum of the educational program Education program: 8D06105 – «Information Security Systems»

Form of education: Full-time

Duration: 3 years

Academic degree: Doctor of philosophy PhD

Year of study	Code	Name of discipline	Component	Credits		lc/lab/pr/ IWS	Prerequisite	Code	Name of discipline	Component	Credits		lc/lab/pr/ IWS	Prerequisite	
				ECTS	RK						ECTS	RK			
1	1 term							2 term							
	MET 321	Research methods	BD UC	6	3	2/0/1/3		AAP304	Teaching practice	BD	10				
	LNG 304	Academic writing	BD UC	6	3	2/0/1/3		AAP330	Doctoral research work, including internships and doctoral dissertations	MRW	24				
		Elective	BD CO	6	3										
		Elective	SD CO	6	3										
		Elective	SD CO	6	3										
	Total:			30				Total:			34				
2	3 term							4 term							
	AAP3 30	Doctoral student research, including internships and doctoral dissertations	MRW	24				AAP33 0	Doctoral student research, including internships and doctoral dissertations	MRW	25				
	AAP3 06	Research practice	SD	10											
	Total:			34				Total:			25				
2	5 term							6 term							
	AAP 330	Doctoral student research, including internships and doctoral dissertations	MRW	25				AAP330	Doctoral student research, including internships and doctoral dissertations	MRW	25				
								ECA 303	Writing and defending a doctoral dissertation	FE	12				
	Total:			25				Total:			37				
											Total:		185		

ELECTIVE DISCIPLINE CATALOG
Education program: 8D06105- «Information Security Systems»

BD Choice component - 6 credits					
	Code	Name of disciplines	Credits	Lec/lab/prac/IWS	Semester
	CSE314	Information Security Management Systems	6	2/0/1/3	1
	CSE306	Big Data Storage Systems & Computations	6	2/0/1/3	1
		Total	6		
PS CC Choice component - 12 credits					
	CSE315	Information security in database management systems	6	2/0/1/3	1
	CSE316	Technical means of countering espionage	6	2/0/1/3	1
	CSE317	Quantum cryptography	6	2/1/0/3	1
	CSE318	Information security methods in network technologies	6	2/1/0/3	1
		Total	12		

MODULAR CURRICULUM

Education program: 8D06105- «Information Security Systems»

Form of education: Full-time

Duration: 3 years

Academic degree: Doctor of philosophy PhD

The cycle	code	Name of disciplines	Semester	Acad. credits	lec.	lab.	prac	IWS	Type of control	Chair
Profile training module										
Basic disciplines (BD)										
University component										
BD	MET321	Research methods	1	6	2	0	1	3	Exam	G
BD	LNG304	Academic writing	1	6	2	0	1	3	Exam	EL
Choice component										
Information Security Management System Module										
BD	CSE314	Information Security Management Systems	1	6	2	0	1	3	Exam	CIPaS
BD	CSE306	Big Data Storage Systems & Computations	1	6	2	0	1	3	Exam	CIPaS
Practice-oriented module										
BD	AAP350	Pedagogical practice	2	10					Report	
Major disciplines (MD)										
Choice component										
Research and Information Security Module										
MD	CSE315	Information security in database management systems	1	6	2	0	1	3	Exam	CIPaS
MD	CSE316	Technical means of countering espionage	1	6	2	0	1	3	Exam	CIPaS
	CSE317	Quantum cryptography	1	6	2	1	0	3	Exam	CIPaS
MD	CSE318	Information security methods in network technologies	1	6	2	1	0	3	Exam	CIPaS
Practice-oriented module										
MD	AAP349	Research scientific training	3	10					Report	
Research Module										
DSRW	AAP345	Doctoral student research work, including internships and doctoral dissertations	2	24					Report	
DSRW	AAP345	Doctoral student research work, including internships and doctoral dissertations	3	24					Report	
DSRW	AAP346	Doctoral student research work, including internships and doctoral dissertations	4	25					Report	
DSRW	AAP346	Doctoral student research work, including internships and doctoral dissertations	5	25					Report	
DSRW	AAP346	Doctoral student research work, including internships	6	25					Report	

		and doctoral dissertations							
Final attestation module									
FA	ECA303	Writing and defending doctoral dissertation	6	12					
		Total		185					

5 Descriptors of the level and volume of knowledge, skills, competencies

The third level descriptors within the Comprehensive Qualifications Framework of the European Higher Education Area (RK-EHEA) reflect the learning outcomes that characterize the student's abilities:

- 1) demonstrate a systematic understanding of the field of study, mastering the skills and methods of research used in the field of information security systems;
- 2) demonstrate the ability to think, design, implement and adapt a significant research process with a scientific approach;
- 3) to contribute their own original research to expanding the boundaries of the scientific field, which deserve to be published at the national or international level;
- 4) critically analyze, evaluate and synthesize new and complex ideas;
- 5) communicate their knowledge and achievements to colleagues, the scientific community and the general public;
- 6) to promote, within the academic and professional context, the technological, social and cultural development of a knowledge-based society.

6 ECTS Diploma Supplement

The application is developed according to the standards of the European Commission, Council of Europe and UNESCO / CEPES. This document is for academic recognition only and is not an official confirmation of an educational certificate. Without a diploma of higher education is not valid. The purpose of filling out the European application is to provide sufficient data on the holder of the diploma, the qualification obtained, the level of this qualification, the content of the training program, the results, the functional purpose of the qualification, as well as information on the national education system. The application model for which the estimates will be translated uses the European transfer or credit transfer system (ECTS).

The European Diploma Supplement gives the opportunity to continue education in foreign universities, as well as to confirm national higher education for foreign employers. When traveling abroad for professional recognition will require additional legalization of the diploma of education. The European supplement to the diploma is filled in English upon individual request and is issued free of charge.

7 Description of the disciplines

Information Security Management Systems

CODE – CSE314

CREDIT – 6

PREREQUISITE – no

PURPOSE AND OBJECTIVES OF THE COURSE

The purpose of the discipline is to train doctoral students to study the principles of development and research models and methods of information security management.

The objectives of the study of the discipline are to master the models and methods of information security management to ensure information security of enterprises.

BRIEF DESCRIPTION OF THE COURSE

The content of the discipline includes modern practice of applying information security management models and methods, methodology of analysis and research of information security management models and methods in practice and research.

KNOWLEDGE, ABILITIES, SKILLS AT THE END OF THE COURSE

As a result of studying the discipline should know:

- information security management methodology;
- basic theoretical concepts and methodology for analysis and research of information security management models and methods in various fields;
- modern software and hardware for effective application of information security management systems.

As a result of studying the discipline should be able to:

- conduct research of information security management models and methods;
- develop methods of information security management;
- apply modern technologies in solving tasks of information security provision and use the results in their professional activity.

Big Data Storage Systems & Computations

CODE – CSE306

CREDIT – 6

PREREQUISIT –no

OF THE COURSE

The aim of the discipline is to master the principles and acquire practical skills in the organization and technologies of storage, transformation and analytical processing of big data. Construction of algorithms and models for big data processing. The objectives of the course are to develop skills in researching the use of tools for working with big data in information systems for solving practical problems.

SHORT DESCRIPTION OF THE COURSE

The discipline examines the theoretical and practical aspects of using big data technologies in information systems. The lecture course examines the development trends of infrastructure solutions for processing and storing big data.

KNOWLEDGE, ABILITY, SKILLS TO COMPLETE THE COURSE

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- the basic principles of using big data in enterprise architecture;
- basic methods of analytical processing of big data; should be able to:
- use MapReduce technologies and software packages built on the basis when working with big data.

Information security in database management systems

CODE – CSE315

CREDIT – 6

PREREQUISITE – no

PURPOSE AND OBJECTIVES OF THE COURSE

The purpose of the discipline is to form professional competences in the field of information security in database management systems (DMS).

The objectives of the discipline study are the issues related to the theory and practice of organizing the system protection and information security in the DMS.

BRIEF DESCRIPTION OF THE COURSE

Methods of database protection and security taking into account the model of the threat and model of the information security violator. Organization of information protection and security system in database management systems using built-in DMS mechanisms and external tools.

KNOWLEDGE, ABILITIES, SKILLS AT THE END OF THE COURSE

As a result of studying the discipline should know:

- modern methods of information protection and security organization in database management systems;
- basic concepts and methodology of organization of protection and security of information in database management systems for different areas;
- modern software tools to ensure the protection and security of information in database management systems.

As a result of studying the discipline should be able to:

- organize protection and security of information in database management systems;
- conduct researches of models and methods of protection and security of information in database management systems.
- apply modern technologies in solving problems of protection and security of information in database management systems and use the results in their professional activities.
- apply in practice technology to ensure the safety and security of information in database management systems and use the results in their professional activities;
- apply in practice the built-in DMS mechanisms for data protection and security.

Technical means of countering espionage

CODE – CSE316

CREDIT – 6

PREREQUISITE – no

PURPOSE AND OBJECTIVES OF THE COURSE

Purpose: Training of highly qualified personnel possessing the competence to use technical means of countering espionage to ensure and evaluate information security.

BRIEF DESCRIPTION OF THE COURSE

The content of the discipline “**Technical means of countering espionage**” includes the study of engineering methods and means to ensure the protection of information, counteraction to computer intelligence. Application of technical means of counteraction to espionage to ensure and evaluate information security is considered.

KNOWLEDGE, ABILITIES, SKILLS AT THE END OF THE COURSE

As a result of studying the discipline should know:

- engineering methods and means to provide information security, counteraction to computer intelligence;
- technical channels of information leakage and information security threats as a result of unauthorized access;
- principles of construction and work of schemes of electronic devices applied in technical means of information security;
- technical means of countering espionage.

As a result of studying the discipline should be able to:

- develop mathematical models and methods of constructing optimal counteraction systems for computer intelligence;
- substantiate the choice of engineering methods and means depending on the peculiarities of the production process;
- distinguish types of protected information, to identify its sources and carriers;
- identify the main threats to information security and assess their degree;
- apply technical means of counteraction to espionage to ensure and evaluate information security.

Quantum cryptography

CODE – CSE317

CREDIT – 6

PREREQUISITE – no

PURPOSE AND OBJECTIVES OF THE COURSE

The purpose of the course is to train doctoral candidates specializing in the direction of cryptographic security of information, to form a system of professional knowledge regulating the application of cryptographic transformations and algorithms for information protection purposes.

BRIEF DESCRIPTION OF THE COURSE

The program of the educational course “**Quantum cryptography**” is directed on studying of quantum cryptography and quantum protocols of keys distribution, protocols of mathematical problems solving.

KNOWLEDGE, ABILITIES, SKILLS AT THE END OF THE COURSE

As a result of studying the discipline should know:

- modern means of cryptosystems;
- cryptographic methods of information protection;
- mathematical models of cryptographic protocols;

As a result of studying the discipline should be able to:

- use modern means of cryptosystems;
- apply cryptographic methods of information protection;
- perform selection and evaluation of cryptographic protocols while solving applied cryptography tasks.

Information security methods in network technologies

CODE – CSE318

CREDIT – 6

PREREQUISITE – no

PURPOSE AND OBJECTIVES OF THE COURSE

Purpose: Study of basic principles and methods of information security in network technologies. Formation of skills of work with necessary means for solution of applied tasks. Formation of skills of application of methods of protection of the information in network technologies.

BRIEF DESCRIPTION OF THE COURSE

Information security methods in network technologies, based on standard models, methods and tools allow the formulation, setting and implementation of tasks in terms of the subject area of the user. Improvement of methods of protection is directed on maintenance of security of the information.

KNOWLEDGE, ABILITIES, SKILLS AT THE END OF THE COURSE

As a result of studying the discipline should know:

- principles of network technologies construction;
- current state and tendency of network technologies development;
- information security methods in network technologies;
- information security problems using modern research methods.

As a result of studying the discipline should be able to:

- apply information security methods in network technologies;
- formulate, research and solve information security problems using modern research methods;
- protect the information;
- use modern software tools to ensure information protection.

The educational program of doctoral studies includes:

- research practice;
- industrial practice.

The research practice of a doctoral student is carried out 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 the dissertation research.

The industrial practice of a doctoral student is carried out in order to consolidate the theoretical knowledge gained in the learning process and improve the professional level.

The research work of a doctoral student must:

- correspond to the main problems of the specialty in which the doctoral dissertation is being defended;
- be relevant, contain scientific novelty and practical significance;
- be based on modern theoretical, methodological and technological achievements of science and practice;
- be based on modern methods of data processing and interpretation using computer technology;
- carried out using modern scientific research methods;
- contain research (methodological, practical) sections on the main protected provisions.

The experimental research work of a doctoral student should:

- correspond to the main problems of the specialty in which the doctoral dissertation is being defended;
- be relevant, contain scientific novelty and practical significance;
- be based on modern achievements of science, technology and production and contain specific practical recommendations, independent solutions to management problems of an integrated, interfunctional nature;
- performed using advanced information technologies;
- contain experimental and research (methodological, practical) sections on the main protected provisions.

Defending a doctoral dissertation

CODE -ECA 303

CREDIT – 12

The purpose of the doctoral dissertation is to evaluate the scientific-theoretical and research-analytical level of the doctorate candidate, formed professional and managerial competencies, readiness for independent performance of professional tasks and compliance of his training with the requirements of the professional standard and the educational program of doctoral studies.

BRIEF DESCRIPTION

Doctoral dissertation - scientific work of a doctoral candidate, is an independent research that develops theoretical provisions, the totality of which can be qualified as a new scientific achievement, or solved a scientific problem, or set out scientifically sound technical, economic or technological solutions, implementation of which makes a significant contribution to the development of the country's economy.

Doctoral dissertation is a result of scientific research work of the doctoral candidate, which was carried out during the whole period of training of the doctoral candidate.

The defense of a doctoral dissertation is the final stage of doctoral training. The doctoral dissertation must meet the following requirements:

- The topic of the dissertation should be related to priority directions of science development and/or state programs or programs of fundamental or applied research.
- The content of the thesis, set goals and objectives, obtained scientific results should strictly correspond to the thesis subject.
- Dissertation is carried out in compliance with the principles of independence, internal unity, scientific novelty, reliability and practical value.

Content

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