KAZAKH NATIONAL RESEARCH TECHNICAL UNIVERSITY named after K.I.SATPAYEV

Institute of Automation and Information Technologies
Department of "Cybersecurity, information processing and storage"

GRADUATE MODEL

7M06301 - "COMPREHENSIVE INFORMATION SECURITY SUPPORT"

Degree of the educational program: Master of Technical Sciences

Almaty 2022

The most important priority of the master's degree program in the specialty 7M06301 "Integrated information security" is the formation of a model of a competitive and competent

specialist in the field of information protection and security, with a broad worldview, able to effectively carry out professional activities.

1. The competencies of the graduate in the specialty 7M06301 "Integrated information security", formed as a result of the development of the educational program:

 general cultural;

 professional;

 subject.

1.1 General cultural competencies:

 ability to abstract thinking, analysis, synthesis;

 the ability to develop and improve their intellectual and general cultural level;

the ability to independently acquire new knowledge and solve problems, manifested in the ability to choose the best ways to solve them;

willingness to make decisions in non-standard situations and be responsible for them;

the ability to search and process a large volume of heterogeneous unstructured information obtained from publicly available sources;

 willingness to cooperate and communicate with colleagues, work in a team and independently;

ability to conduct oral and written negotiations, write business letters, work with documentation of various levels of significance.

1.2 Professional competencies.

1.2.1 In teaching activities:

readiness to develop and implement new methods, technologies, teaching methods in the educational process, as well as to evaluate the effectiveness of the use of innovations;

 the ability to lead the research work of students;

 the ability to apply modern methods and technologies of organizing educational activities, diagnostics and evaluation of the quality of the educational process in various educational programs;

the ability to form an educational environment and use professional knowledge and skills in the implementation of the tasks of innovative educational policy.

1.2.2 In research activities:

 the ability to analyze the results of scientific research, apply them in solving research tasks focused on improving and improving methods and means of information protection;

 ability to analyze fundamental and applied problems of information security;

 the ability to issue scientific and technical reports, reviews, abstracts, prepare publications based on the results of research, scientific reports;

willingness to independently carry out scientific research in the field of information security using advanced technologies.

1.2.3 In professional activity:

 readiness to carry out professional communication in oral and written forms in the state, Russian and foreign languages to solve problems in the field of information security;

 the ability to design further individual educational development programs for career advancement;

 willingness to innovate in their professional field;

willingness to participate in project activities, manage commercial projects and interact with partners, customers;

 the ability to design information security management systems taking into account the features of the objects of protection;

 the ability to make and thoroughly argue the choice of structure, principles of organization, a set of solutions and mechanisms to ensure the information security of objects of protection;

 the ability to participate in the development and preparation of special verification programs, to organize the process of testing, debugging and operation of software, hardware and technical solutions for information security;

willingness to use regulatory and legal documents in the field of information security in their professional activities.

1.3 Subject competencies.

1.3.1 As a result of mastering the disciplines of the humanities module:

 the ability to carry out comprehensive research, including interdisciplinary, based on a holistic systematic scientific worldview using knowledge in the field of history and philosophy of science;

 readiness to teach in educational programs of higher education;

ability to work with information in a foreign language: to find, evaluate and use information from various sources necessary for solving scientific and professional tasks.

1.3.2 As a result of mastering the disciplines of the security systems organization module:

 the ability to organize information security systems and maintain a set of measures aimed at ensuring information security, taking into account their legal validity, organizational and technical feasibility and economic feasibility;

 ability to develop proposals for improving the information security management system;

 the ability to prepare and perform certification of objects of protection for compliance with the requirements of state or corporate regulatory documents;

the ability to apply modern methods and advanced means of protecting network operating systems.

1.3.3 As a result of mastering the disciplines of the protection module:

 the ability to apply cryptographic technologies to ensure the protection and security of information in computer systems and networks;

 the ability to apply cryptographic information protection algorithms to solve subject-oriented research and educational tasks;

 ability to apply technologies for building secure networks;

the ability to organize information protection and security systems in databases.

1.3.4 As a result of mastering the disciplines of the module of high-performance technologies:

 the ability to use parallel computing to solve and optimize the tasks of professional activity;

the ability to use modern high-performance computing technologies to implement current information security tasks.

1.3.5 As a result of mastering the disciplines of the security module:

 the ability to ensure and control the security of the infrastructure, analyze and conduct a qualified assessment of the security of the system as a whole;

 the ability to ensure the security and protection of information when using cloud computing technologies;

 ability to carry out management activities, perform information security audits;

 ability to apply artificial intelligence technologies;

 ability to provide security and protection of electronic document flow;

 the ability to ensure the information security of economic systems;

the ability to form a set of measures for information security management.

1.3.6 As a result of mastering the disciplines of the engineering and technical protection module:

 ability to use technologies of engineering and technical protection of information;

 ability to design VLSI of programmable logic for solving professional tasks;

 the ability to use hardware to search for and detect information leakage channels.

1.3.7 As a result of mastering the research module:

 the ability to formulate a scientific concept and justify in detail the choice of research work;

 the ability to conduct qualified scientific research in the field of information security;

 ability to use scientific research methods;

 the ability to process the results of research work, determine the reliability of the results obtained and formalize the results of the study;

the ability to write, publish, and review scientific papers.

1.3.8 As a result of mastering the practice-oriented module:

 the ability to teach in higher educational institutions, apply modern methods and software and pedagogical tools for teaching professional disciplines, manage the learning process;

 the ability to select, study and generalize scientific and technical literature, regulatory and methodological materials on information security issues;

the ability to independently carry out practice-oriented research activities in the field of information security, choose research methods, formulate conclusions about the practical significance of the research performed.

1.3.9 As a result of mastering the final certification module:

 the ability to independently create and apply modern solutions in the field of information security;

 the ability to independently design, develop, research, test, operate and manage information security systems and tools.

2. The sphere of professional activity.

The scientific and pedagogical magistracy implements educational programs of postgraduate education for the training of scientific and pedagogical personnel for the system of higher, postgraduate education and the scientific sphere, law enforcement activities with in-depth scientific and pedagogical training.

The specialized magistracy implements educational programs of postgraduate education for the training of managerial personnel for the sectors of economics, medicine, law, education, art, services and business, defense and national security, law enforcement, with in-depth professional training.

3. Requirements for the key competencies of graduates of the master's degree in the profile and scientific and pedagogical direction.

3.1 Graduate of the Master's degree in scientific and pedagogical direction.

3.1.1 The graduate must have an idea:

– on the role of science and education in public life;

– about current trends in the development of scientific knowledge;

– on current methodological and philosophical problems of natural (social, humanitarian, economic) sciences;

– about the professional competence of a high school teacher;

– contradictions and socio-economic consequences of globalization processes;

– on professional competence in the field of information protection and security;

– about the technology of virtualization of resources and platforms;

– on the intellectualization of information security tools;

- about database protection technologies;

– about algorithms of cryptographic protection of information;

– about big data analysis.

3.1.2 The graduate should know:

– methodology of scientific knowledge;

– principles and structure of the organization of scientific activity;

– psychology of cognitive activity of students in the learning process;

– psychological methods and means of improving the effectiveness and quality of training;

– algorithms for cryptographic protection of information;
– information security standards and IT security assessment criteria;
- resource and platform virtualization technologies and virtualization systems from leading manufacturers;
- threats and risks of virtualization systems, principles of building hypervisors and their vulnerabilities;
– organization of IP networks, structure of IP packets and IP protocols;
– internal organization of OS media;
– methods and means of storing key information and encryption;
– varieties and principles of authentication;
– requirements for firewalls and intrusion detection systems;
- database protection technologies and methods of designing secure databases;
- organization of the database protection and security system;
– methods and tools of active audit;
– engineering and technical protection of information.
3.1.3 The graduate should be able to:
– use the acquired knowledge for the original development and application of ideas in the context of scientific research;
– critically analyze existing concepts, theories and approaches to the analysis of processes and phenomena;
– integrate knowledge gained in different disciplines to solve research problems in new unfamiliar conditions;
– by integrating knowledge to make judgments and make decisions based on incomplete or limited information;
– apply the knowledge of pedagogy and psychology of higher education in their teaching activities;
– apply interactive teaching methods;
– to carry out information-analytical and information-bibliographic work with the involvement of modern information technologies;
– to think creatively and creatively approach the solution of new problems and situations;
– be fluent in a foreign language at a professional level, which allows conducting scientific research and teaching special disciplines in universities;
– to summarize the results of research and analytical work in the form of a dissertation, scientific article, report, analytical note, etc.;
– apply algorithms for cryptographic protection of information;
- apply IS standards and conduct an IT security assessment;
- apply virtualization systems from leading manufacturers;
- identify threats and risks of virtualization systems;
– apply methods and means of storing key information and encryption;
– work with firewalls and intrusion detection systems;
– apply database protection technologies and secure database design methods;
– organize a database protection and security system;
– apply methods and tools of active audit;
– apply big data analysis tools.
3.1.4 The graduate must have the following skills:
- research activities for solving current research problems in the field of information security;
- teaching disciplines in accordance with the specialization;
- systematization and processing of a large amount of information from various sources;
- correct and correct presentation of your thoughts orally and in writing;
- expanding the range of knowledge necessary for the implementation of everyday professional tasks and preparation for admission to doctoral studies;
creative approach for solving non-standard tasks;

systematic improvement of their qualifications.
– research activities, solutions of standard scientific tasks;
– implementation of educational and pedagogical activities on credit technology of training;
– methods of teaching professional disciplines;
– the use of modern information technologies in the educational process;
– professional communication and intercultural communication;
– oratory, correct and logical formalization of their thoughts in oral and written form;
– organization and protection of database security;
– conducting an information security audit;
– application of algorithms for cryptographic protection of information;
– identifying threats and countering them;
– working with Big Data;
– expanding and deepening the knowledge necessary for daily professional activities and continuing education in doctoral studies.

4. Qualification.

Graduates of the Master's degree of scientific and pedagogical direction, who have fully completed the educational program of the master's degree and successfully defended their master's thesis, are awarded the academic degree of Master of Technical Sciences in the specialty 7M06301 - "Integrated information security".

Discussed at the meeting of the Department "Cybersecurity, information processing and storage"
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