

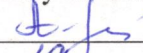


**INTERNATIONAL
UNIVERSITY**

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University of Applied Sciences

AGREED

Chairman of the Educational and
Methodological Council of JSC «International
University of Information Technologies»


«19» 03 2024 A.K. Mustafina

APPROVE

Chairman of the Board – Rector of
JSC «International University
of Information Technologies»




«20» 03 2024 A.K. Khikmetov


**DOUBLE DEGREE EDUCATIONAL PROGRAM
6B06304 «Computer security»**

Education Area Code and Classification: 6B06 – Information and Communication Technologies
Code and classification: 6B063 – Information security
Group of educational programs: B058 — Information security
Level according to the International Standard Classification of Education (ISCE): 6
Level according to National Qualifications Framework (NQF): 6
Level according to Industry Qualifications Framework (IQ): 6
Duration of study: 4 years
Credits: 240

AGREED

Director of the Chairman of the ALE
«Kazakhstan Information
Security Association»


_____ 2024 V.V. Pokusov


AGREED

General director of the
«National Innovation
Center»


_____ 2024


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1. Description of the educational program

The program is designed to implement the principles of the democratic nature of education management, expanding the boundaries of academic freedom and the powers of educational institutions, which will ensure the training of elite, highly motivated personnel for innovative and knowledge-intensive sectors of the economy.

The educational program ensures the application of an individual approach to students, ensures the transformation of professional competencies from professional standards and qualification standards into learning outcomes. Student-centered learning is provided - the principle of education, which assumes a shift in emphasis in the educational process from teaching (as the main role of the teaching staff in the "translation" of knowledge) to teaching (as an active educational activity of the student).

The educational program "Computer Security" is to provide practice-oriented training for graduates in the field of creation, use and protection of information technologies designed to work in various industries and in business. This educational program is written based on the recommendations of the Professional Standards of the Republic of Kazakhstan "Information Infrastructure and IT Security Professionals" (Appendix No. 11k to the order of the Acting Chairman of the Board of the National Chamber of Entrepreneurs of the Republic of Kazakhstan "Atameken" No. 222 dated 05.12.2022), follows new trends from the Atlas of New Professions, Regional standards, National Qualifications Framework and The industry qualifications framework according to level 6.

A computer security specialist is an employee engaged in ensuring computer security at an enterprise. The main activity of a computer security specialist is related to secure computer systems and means of processing, storing and transmitting information; information security services; mathematical models of processes occurring during information protection.

The educational program "Computer Security" was developed on the basis of an analysis of the labor functions of professional standards in the field of information security and information and communication technologies for the 6th level of qualification (bachelor, practical experience). The developed EP "Computer Security" meets the needs of stakeholders (students, employers, the state) and external qualification requirements.

2. Purpose and objectives of the educational program

The purpose of the OP is providing practice-oriented training for graduates in the field of creation, use and protection of information technologies designed to work in various industries and businesses.

Tasks of the EP:

1. To prepare graduates for professional activity in the field of protection of applications and programs from modifications.
2. To meet the needs of the market with computer security specialists.
3. Create conditions for continuous professional self-improvement.
4. Create conditions for the development of social and personal qualities of graduates (dedication, organization, hard work, sociability, ability to work in a team, responsibility for the final result of their professional activities, civic responsibility, tolerance), social mobility and competitiveness in the labor market.

3. Requirements for evaluating the learning outcomes of an educational program

The following forms of exams are used as an assessment of learning outcomes: computer testing, written exam (answers on sheets), oral exam, project (passing a course project), practical (open questions on a computer, solving problems on a computer, including in ACM format), complex (test/written/oral + others).

In accordance with table 1, the following ratio of exam forms is recommended:

		<ul style="list-style-type: none"> - Channels for committing cybercrimes - Modern IT <p>The subject of professional activity: Enterprises in various industries, both government and business</p> <p>Types of professional activity of an EP graduate:</p> <ul style="list-style-type: none"> - Blockchain technologist - Cyber Investigator - Cyberprotector <p>The functions of the professional activity of a graduate of the EP:</p> <ul style="list-style-type: none"> - Countering cybercrime in a personalized form to individual users - Ensuring the client's security in all types and forms of interactions in the digital world (PCs, networks, neural networks, etc.), including privacy requests - Identification of cyber-attacks, tracking and searching for their sources, initiators and perpetrators - Organization of constant monitoring of networks and computer systems for external interference - Development and implementation of blockchain networks - Building architectures and organizing the interaction of multiple blocks - Improvement and expansion of PAC in blockchain networks
8	QMSE level	6th level
9	NFQ level	6th level
10	IQF level	6th level
11	<p>List of competencies of the educational program:</p> <p>EC1. The ability to understand the driving forces and patterns of the historical process, the place of man in the historical process and the ability to understand philosophy as a methodology of human activity, readiness for self-knowledge, self-activity, the development of cultural wealth as a factor in the harmonization of personal and interpersonal relations</p> <p>EC2. The ability to form and develop skills and competencies in the field of organization, planning and management of production, the ability to apply the knowledge gained to understand the environmental reality, the ability to generalize, analyze, predict when setting goals in the professional field and choose ways to achieve them using scientific research methodology</p> <p>EC3. The ability to conduct interdisciplinary scientific research using basic knowledge from the fields of economics and law, ecology and life safety. The ability to apply entrepreneurial qualities to the tasks of calculating the profitability of scientific projects. The ability to build personal and interpersonal relationships in compliance with an anti-corruption culture</p> <p>EC4. The ability to write and communicate orally in the state language and the language of interethnic communication, the ability to use foreign sources of information, possess communication skills, public speaking, argumentation, discussion and polemics in a foreign language</p>	

	<p>LO5. Be able to use the principles of construction, types and functions of operating systems and apply existing methods of protection and security of operating systems. Be able to analyze operating systems and various applications for potential vulnerabilities and threats. Be able to implement various mechanisms to protect applications and scripts from modifications using programming and design methods</p> <p>LO6. Apply information security technologies, including various encryption, decryption and cryptanalysis operations, which are based on mathematical research and information theory in the field of information security, as well as apply existing legislation in the field of information security</p> <p>LO7. Be able to program various applications using algorithmization methods, object-oriented programming, web technologies, is able to optimize program code using specialized corporate applications on the Django framework, develop, maintain and test secure applications and programs including mobile technologies and their security. The ability to use interdisciplinary tools for software development and testing</p> <p>LO8. Be able to set up computer networks, knows the routing and switching features of wired and wireless computer networks. Know the architecture features of computing systems and networks. Use DevNet tools related to network programming and scripting for network applications</p> <p>LO9. Apply the principles of organization, management and protection of databases. Apply data protection skills in corporate infrastructure and corporate cybersecurity and use applied AI tools. Apply data mining techniques. Be able to use methods for managing identification and access to applications</p> <p>LO10. Apply digital forensics techniques and have practical pentesting skills. Apply reverse engineering techniques to investigate malicious code. Demonstrate knowledge in modern information recovery technologies in case of failures and attacks</p> <p>LO11. Use cloud technology and intelligent cybersecurity techniques with machine learning. Use blockchain technologies to create secure applications. Apply deep learning tools to create intelligent applications. Be able to use Data Science methodologies to analyze big data. Also apply methods of countering cyber intelligence and is able to minimize the cyber risks of various applications</p> <p>LO12. Be able to apply the acquired knowledge according to the selected additional educational program</p>	
13	The form of education	Full-time
14	The language of education	English
15	Credits	240
16	Academic degree awarded	Bachelor's degree in Information and communication technologies in the educational program 6B06304 «Computer security»
17	Professional standard for the educational program	<ol style="list-style-type: none"> 1. Specialists-professionals in the security of information infrastructure and from 2. Ensuring the security of the information infrastructure and FROM 3. Information security
18	Developer(s) and authors:	<p>JSC International University of Information Technologies, Department of Cybersecurity:</p> <ul style="list-style-type: none"> – Amanzholova S.T., associate professor, c.t.s. – Sagymbekova A.O., senior lecturer – Makilenov Sh.N., senior lecturer – Askarbekova N.Y., senior lecturer

2	Foreign language	The course includes an intensive English language learning program focused on grammar and speaking skills. The course includes topics reflecting the latest developments in the field of information technology, and the terminology dictionary makes them directly relevant to the needs of students	10	OK4	none	Professionally oriented foreign language
3	Kazakh (Russian) language	The course occupies a special place in the Bachelor's degree program with engineering education. For students of a technical university, learning professional Kazakh/Russian languages is not only the improvement of skills and abilities acquired at school, but also a means of mastering a future specialty	10	EC4	none	Diploma project
4	Sociology-Political science	<p>The course "Sociology" examines various phenomena of social life. At the same time, the research is carried out from various paradigms of public knowledge, using theories and scientific methods.</p> <p>Students who have successfully completed the course will be able to:</p> <ol style="list-style-type: none"> 1. Use qualitative and quantitative research methods that will be useful in the scientific and professional field. 2. Distinguish between scientific and non-scientific knowledge. 3. To understand and analyze social phenomena and problems from different points of view. 4. Be able to work in a team. <p>The Political Science course provides comprehensive coverage of all key elements, the study of sources and political relations, types of political systems, democratic and authoritarian systems, political mechanisms,</p>	4	OK1	none	Cultural studies- Psychology

		The Psychology course presents psychology issues in a broad educational and social context. The knowledge, skills and abilities acquired and formed as a result of mastering the course content give students the opportunity to apply them in practice in various spheres of life: personal, family, professional, business, social, in working with people from different social groups and age categories				
8	Philosophy	The object of study of the discipline is philosophy as a special form of spiritual studies in its cultural and historical development and modern sound. The main directions and problems of world and national philosophy are studied. Philosophy is a special form of cognition of the world, creating a system of cognition of the general principles and foundations of human life, about the essential characteristics of man's attitude to nature, society and spiritual life, in all its main direction	5	OK1	History of Kazakhstan	Research methodology
The cycle of general education disciplines The university component/Component of choice						
9	Economics and Industrial Engineering	New trends in economics and the organization of production are discussed with examples from real life and practice. The structure of the national economy, enterprises and the organization of its production are considered	5	OK2	Mathematical analysis	Diploma project
10	Startups and entrepreneurship	This course is an introduction to what a business is, how it works and how to manage it. Students will identify the forms of ownership and processes used in manufacturing and marketing, finance, personnel and management in business operations		EC 3	Information and Communication Technologies	Diploma project

		development is also a very important aspect. Various areas of practical application of ecology are also considered – natural resources and environmental pollution				
13	Fundamentals of Financial Literacy	The course "Fundamentals of Financial Literacy" is aimed at gaining knowledge and skills in the field of personal finance management. As part of the course, students will learn how to use all kinds of financial tools in practice, protect and increase savings, plan a budget competently, gain practical skills in calculating and paying taxes, and correctly filling out tax reports, learn how to analyze financial information and navigate financial products to choose an adequate investment strategy		EC 3	Mathematical analysis	Diploma project
The cycle of basic disciplines						
The university component						
14	Mathematical analysis	The purpose of the course is to familiarize students with important branches of calculus and its applications in computer science. During the educational process, students should become familiar with and be able to apply mathematical methods and tools to solve various applied problems. Moreover, they study fundamental methods of studying infinitesimal variables using analysis, which is based on the theory of differential and integral calculations	6	PC3 EC5	Algebra and Geometry	Information Theory
15	Algebra and Geometry	The successful application of algebra and geometry to solve specific problems is primarily due to the rapid growth of computing technology. The course includes analytical geometry and linear algebra. Linear algebra is a branch of mathematics that studies matrices, vectors, vector spaces, linear transformations and	4	PC3 EC5	none	Mathematical analysis

23	Basic Circuit Theory	The course was designed to introduce the fundamental principles of electrical circuit theory commonly used in engineering research and scientific applications. Methods and principles of analysis of electrical circuits, including basic concepts such as voltage, current, resistance, impedance, Ohm's and Kirchhoff's law; basic methods of analysis of electrical circuits, resistive circuits, 1st and 2nd order circuits; circuits with DC and AC sources	4	PC6	Physics	Digital circuit design
24	Basics of the Linux operating system	The course provides students with basic Linux knowledge and basic Linux command line skills	4	PC4	Information and Communication Technologies	Security of operating systems
25	Professionally oriented foreign language	It includes a grammar course, lexical material of a professional nature and texts of a professional orientation	4	EC4	Foreign language	Diploma project
26	Switching, Routing, and Wireless Essentials	Teach students how to configure routers and switches for advanced functionality, configure aggregation, redundancy and routing protocols, troubleshoot device problems and fine-tune routing protocols	6	PC5	Computer Networking Basics	Security of operating systems
27	Web technologies	This course teaches the basics of website development using HTML, Cascading Style Sheets (CSS), JavaScript and jQuery. Teaches you how to use the PHP programming language, master the basics of the MySQL database and develop secure server-side client web applications	4	PC7	Object-oriented programming (Java)	Design Pattern
28	Information Theory	The course aims to study noise-tolerant codes, taking into account the information redundancy limit. Evaluate sampling and quantization errors	4	PC3, PC5	Algebra and Geometry	Basic Circuit Theory
29	Organization and architecture of computing systems	The course presents the basic principles of hardware concepts of computer hardware elements and methods for evaluating computer performance, which are	4	PC5	Basics of the Linux operating system	Security of operating systems

		job opportunities. At the heart of all these concepts is the recognition of globalization as a driving force for change in all aspects of the modern world, as well as the importance of graduates being able to participate and act globally.				
34	Advanced Software Engineering	This course is devoted to the study of team programming, proper load and task distribution, modular project implementation and methods of integration of separately implemented modules	5	PC7, PC3	Object-oriented programming (Java)	Pre-graduate practice
35	Research methodology	The course is devoted to the study of activities aimed at developing students' ability to make independent theoretical and practical judgments and conclusions, the ability to objectively evaluate scientific information, freedom of scientific search and the desire to apply scientific knowledge in educational activities, including for the completion of a thesis project (work)	3	EC3	Philosophy	Writing and defending diploma project
The cycle of basic disciplines Component of choice						
36	Subject-specific elective module 1	The elective is selected from the following subjects <ul style="list-style-type: none"> - Data Analysis and Data Mining (FWPM) - Deep Learning for Natural Language Understanding (FWPM) - Digital Technology (FWPM) - Embedded Systems (FWPM) - Industry 4.0 in Planning and Production (FWPM) - Industrial Data Analysis (FWPM) - Cryptology (FWPM) - Project Management (FWPM) - - RESTful Web Services (API) - - Corporate Governance (FSUE) 	5	PC2	Object-oriented programming (Java)	Subject-specific elective module 2
The cycle of core disciplines The university component/Component of choice						

42	Data Science	This course is devoted to the study of methods for processing and extracting useful information from arrays of structured or unstructured data. During the course, a set of Cyber Threat Hunting techniques and techniques are considered, with the help of which Hunting is carried out and which carry specific principles of working with data	5	PC7	Organization of database management systems	Applied AI
43	Applied AI	An introduction to the field of applied AI. The basic principles are taught, and the selected methods and approaches are theoretically explained and evaluated in practice.	5	PC2	Data Science	Diploma project
44	Pre-graduate practice	Collecting material for writing a thesis project	5	EC2	Industrial practice	Diploma project
45	Minor 1	An additional educational program (Minor) is a set of disciplines and (or) modules and other types of educational work determined by the student for study in order to form additional competencies	5	PC2, PC9	Computer Information Protection Technologies	Minor 2
46	Subject-specific elective module 2	The elective is selected from the following subjects - Data Analysis and Data Mining (FWPM) - Deep Learning for Natural Language Understanding (FWPM) - Digital Technology (FWPM) - Embedded Systems (FWPM) - Industry 4.0 in Planning and Production (FWPM) -Industrial Data Analysis (FWPM) - Cryptology (FWPM) - Project Management (FWPM) - - RESTful Web Services (API) - - Corporate Governance (FSUE)	5	PC2	Subject-specific elective module 1	Subject-specific elective module 3
47	Subject-specific elective module 3	The elective is selected from the following subjects: - Programming .NET in C# (FWPM) - Artificial Intelligence in Robotics (FWPM)	5	PC2	Subject-specific elective module 2	Subject-specific elective module 4

		environment (sandbox) or debugger and analyzes the code dynamically				
50	Cyber risk and cyber intelligence	The discipline is designed to teach students the basics of cybersecurity and countering cyber threats. During the course, students study modern technologies and methods of protecting information from cyber threats, including access control mechanisms, firewalls, attack detection and prevention systems, antivirus programs and others. The course includes the study of the concept of cyber risks and their management methods, students analyze cyber risks, use tools to assess them and create risk management plans		PC9	Identity and access management	Diploma project
51	Blockchain technology	The course is dedicated to learning the basics of blockchain technologies. The course examines the practice of using blockchain technologies in the bitcoin and Ethereum cryptocurrencies, as well as other industries. The discipline is based on cryptographic knowledge and includes materials on the development of smart contracts, various consensus algorithms, etc.		PC9	Cryptographic methods of information security	Diploma project
52	DevNet	The course is aimed at understanding the meaning, configuration and use of software concepts, as well as tools related to network programming (scripting in Python, Git, JSON, Postman, API). Description of the proprietary software-defined Network (SDN) approach, including centralized application policy management	5	PC7, PC9	Computer Networking Basics	Diploma project
53	Protection of applications and scripts from modifications	The course "Protection of applications and scripts from modifications" is designed to study the issues of choosing and using tools for disassembling, debugging		PC8, PC9	Corporate Cyber Security	Diploma project

4.4. List of modules and learning outcomes

Name of the educational program: 6B06304 «Computer Security»

Qualification: Bachelor of Information Security

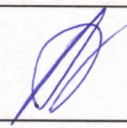


Module Code / Module Name	Learning outcomes	Criteria for evaluating learning outcomes	Disciplines forming the module Code / Name
		GENERAL EDUCATION MODULES	
Humanitarian module	LO 1, LO 4	$S = (A/F) * 100\%$, where S is the assessment of academic performance (learning, productivity); A is the actual amount of acquired knowledge, skills; F is the full amount of knowledge, skills proposed for assimilation	History of Kazakhstan Philosophy Sociology-Political science Cultural studies-Psychology Intercultural Competence
Language module	LO 2	$S = (A/F) * 100\%$, where S is the assessment of academic performance (learning, productivity); A is the actual amount of acquired knowledge, skills; F is the full amount of knowledge, skills proposed for assimilation	Foreign language Kazakh (Russian) language Foreign Language 1 (German) Professionally oriented foreign language
The ICT module	LO 5	$S = (A/F) * 100\%$, where S is the assessment of academic performance (learning, productivity); A is the actual amount of acquired knowledge, skills; F is the full amount of knowledge, skills proposed for assimilation	Information and Communication Technologies
		BASIC MODULES	
Natural Science module	LO 3	$S = (A/F) * 100\%$, where S is the assessment of academic performance (learning, productivity); A is the actual amount of acquired knowledge, skills; F is the full amount of knowledge, skills proposed for assimilation	Algebra and Geometry Mathematical analysis Physics Information Theory Mathematical foundations of information security
Programming Languages Module	LO 7	$S = (A/F) * 100\%$, where S is the assessment of academic performance (learning, productivity); A is the actual amount of acquired knowledge, skills; F is the full amount of knowledge, skills proposed for assimilation	Algorithmization and Programming Object-oriented programming (Java) Design Pattern Web technologies Organization of database management systems Data Science Subject-specific elective module 1 Subject-specific elective module 2 Subject-specific elective module 3

PROFESSIONAL MODULES			
Hardware Security Module	LO 11, LO 13	<p>where S is the assessment of academic performance (learning, productivity); A is the actual amount of acquired knowledge, skills; F is the full amount of knowledge, skills proposed for assimilation</p> $S = (A/F) * 100\%$	Applied AI
Data and Application Protection module	LO 6, LO 9, LO 12	<p>where S is the assessment of academic performance (learning, productivity); A is the actual amount of acquired knowledge, skills; F is the full amount of knowledge, skills proposed for assimilation</p> $S = (A/F) * 100\%$	Protection of applications and scripts from modifications
Security Threat Research Module	LO 9, LO 10	<p>where S is the assessment of academic performance (learning, productivity); A is the actual amount of acquired knowledge, skills; F is the full amount of knowledge, skills proposed for assimilation</p> $S = (A/F) * 100\%$	Introduction to Cybersecurity Incident Investigation Reverse engineering Cyber risk and cyber intelligence
The module of Final certification	LO 1 - LO 13		Writing and defending a diploma project

6	Additional courses		Number of credits	Academic period	Number of hours	Number of weeks
7	Module of final certification (MoFC)		8		240	
	Total including FCS		240		7200	

7. List of approvals with developers

Name of the educational program:
6B06304 «Computer Security»

No.	Position, academic degree and surname, first name, patronymic of the developer of the educational program	Date	Signature	Note
1	Amanzholova Saule Toksanovna Candidate of Technical Sciences Associate Professor			
2	Sagymbekova Azhar Oryngalievna Master of Technical Sciences Senior Lecturer			
3	Makilenov Shakirt Nurlybekuly Master of Technical Sciences Senior Lecturer			
4	Askarbekova Nesibeli Yerkinzyzy Master of Technical Sciences Senior Lecturer		