ХАЛЫҚАРАЛЫҚ УНИВЕРСИТЕТІ МЕЖДУНАРОДНЫЙ УНИВЕРСИТЕТ
INTERNATIONAL UNIVERSITY

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INTERNATIONAL UNIVERSITY

AGREED
Chairman of the Educational and Methodological Council JSC «International University of Information Technologies»
_____A.K. Mustafina
_____2023

APROVE
Rector
JSC «International University of Information Technologies»
_____A. Khikmetov
_____2023

EDUCATIONAL PROGRAM
6B06303 «Network 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 (ISCED):6
Level according to National Qualifications Framework (NQF):6
Level according to Industry Qualifications Framework (EQF): 6
Duration of study: 4 years
Credits: 240

AGREED
Director of the Chairman of the ALE «Kazakhstan Information Security Association»
_____V.V. Pokusov
_____2023

AGREED
Director of the National Innovation Center
_____
_____2023

Almaty, 2023

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List of abbreviations and symbols

HE	Higher education
GOSO	State obligatory standard of education
ECR	European Qualifications Framework
ETF	European Education Foundation
ZUN	Knowledge, skills, skills
NKZ	National Classifier of Occupations
NRK	National Qualifications Framework
NSC	National system of qualifications
OGM	General humanitarian module
OM	General module
OP	Educational program
OPM	General professional module
ORC	Sectoral Qualifications Framework
PS	professional standard
air defense	Postgraduate education
PC	Professional competence
PM	Professional module
WG	Working group
RK	The Republic of Kazakhstan
RO	Learning Outcome
CM	Special module
QMS	Quality Management System
SAM	Socio-economic module
TVE	Technical and Vocational Education
TVET	Technical and vocational education and post-secondary education
UNESCO	United Nations Educational, Scientific and Cultural Organization/
UNESCO	specialized agency of the United Nations Educational, Scientific and Cultural Affairs.
Cedefop	European Center for the Development of Vocational Training
DACUM	from English. Developing Curriculum
ECVET	European Credit System for vocational education and training
EQAVET	European Quality Assurance in Vocational Education and Training
ENQA	EuropeanAssociationforQualityAssuranceinHigherEducation/European-Russian Association for Quality Assurance in Higher Education
ESG	Standards and Guidelines for Quality Assurance in the European Higher Education Area
FIBAA	International agency (non-profit foundation) for accreditation and examination of the quality of higher education (Bonn, Germany)
IQM-HE	Internal Quality Management in Higher Education
TACIS	Technical Assistance for the Commonwealth of Independent States
WSI	WorldSkills International

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 implies a shift in emphasis in the educational process from teaching (as the main role of the teaching staff in the "transmission" of knowledge) to learning (as an active educational activity of the student).

Educational program"6B06303-Network Security» developed on the basis of the analysis of labor functions of the professional standard in the field of information security for the 6th level of qualification (bachelor, practical experience). The developed educational program meets the needs of stakeholders (students, employers, the state) and external qualification requirements. The experts of the association "Kazakhstan Information Security Association" participated in the development of the educational program. This educational program was written on the basis of the recommendations of the Professional Standards of the Republic of Kazakhstan "Specialists-professionals in the security of information infrastructure and IT" (**Appendix No. 11 to the order of the Acting Chairman of the Board of the National Chamber of Entrepreneurs of the Republic of Kazakhstan "Atameken"No. 222 of 12/05/2022), follows new trends from the Atlas of new professions, Regional standards, the National Qualifications Framework and the Sectoral Qualifications Framework in accordance with level 6.**

The educational program ensures the application of the principles of student-centered learning, an individual approach to the student, contributes to the formation of general cultural, basic and professional competencies in the direction"B058 - Information security».

On the basis of this educational program, educational organizations can develop working curricula and working curricula (syllabuses) using the relevant methodological recommendations for the development of working educational and methodological documentation.

2. Purpose and objectives of the educational program

Purpose of the OP– providing practice-oriented training of highly qualified specialists in the field of information security audit of enterprises with general cultural and professional competencies in the field of information security, as well as creating conditions for continuous professional self-improvement, development of social and personal competencies of specialists, expanding social mobility and competitiveness in the labor market.

Tasks of the OP:

1) Ensuring the protection of information and informatization objects using standards and protocols for network interaction.
2) Monitoring, analysis and comparison of the effectiveness of software and hardware information protection in operating systems and networks.
3) Carrying out the correctness of the system administration and software and hardware protection.
4) Carrying out continuous monitoring and control of information security.
5) Development, design and maintenance of the organization's network security tools.
6) Assessment of the level of security of computer systems and networks of the organization and preparation of accompanying documentation.

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), complex (test / written / oral + others). In accordance with table 1, the following ratio of exam forms is recommended:

Table 1

No.	Exam form	Recommended share, %
1	Computer testing	20%
2	Writing	10%
3	Oral	5%
4	Project	30%
5	Practical	30%
6	Complex	5%

The final certification ends with the defense of the graduation project.

4. Passport of the educational program

4.1 General information

No.	Field name	Note
1	Code and classification of the field of education	6B06 - Information and communication technologies
2	Code and classification of areas of study	6B063 - Information security
3	Group of educational programs	B058 - Information security
4	Name of the educational program	6B06303 - Network security (Network security)
5	Brief description of the educational program	The educational program "Network security" (Information security audit) includes work on the audit of information security, on an independent and objective assessment of the current level of security Bcomputer systems and networks, to identify existing security problems, to design and develop security systems information security organizations and enterprises.
6	Purpose of the OP	Training of highly qualified personnel with applied knowledge about the integrity, confidentiality, data availability, existing methods for designing and

		maintaining computer networks, security issues associated with the operation of local and global networks.
7	ISCED level	6
8	NQF level	6
9	ORC level	6
10	**List of competencies of the educational program:**	
11	List of competencies of the educational program: OK1. 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 relationships OK2. The ability to form and develop skills and competencies in the field of organization, planning and management of production, the ability to apply the acquired knowledge to comprehend 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 OK3. 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. OK4.Ability for written and oral communication in the state language and the language of international communication, the ability to use foreign sources of information, to have communication skills, to public speaking, argumentation, discussion and polemics in a foreign language OK5.The ability to be competent in choosing methods of mathematical modeling for solving specific engineering problems, the ability to be ready to identify the natural scientific essence of problems that arise in the course of professional activity, and the ability to involve the appropriate mathematical apparatus to solve it PC1. The ability to find organizational and managerial solutions in non-standard conditions and in the conditions of different opinions and the willingness to bear responsibility for them, the ability to systematize knowledge about the world and Kazakhstan legislation in the field of information security PC2. The ability to use programming languages and tools for developing secure software, the ability to find coding errors in the information and computing system being developed, the ability to create, test, debug and execute programs in different programming languages PC3. The ability to apply the theory and methods of mathematics to build qualitative and quantitative models of objects and processes in the natural sciences, the ability to select and apply appropriate equipment, tools and research methods to solve problems in the chosen subject area, the ability to configure and adjust software and hardware systems, the ability to match hardware and software as part of information and automated systems PC4. The ability to apply the theory and principles of design, organization and administration of operating systems, the ability to install, debug software and configure hardware for putting information systems into operation, the ability to maintain the operability of information systems and technologies in the specified functional characteristics and compliance with quality criteria	

	PC5. The ability to design distributed information systems, their components and protocols for their interaction, the ability to administer local and remote network resources, the ability to use methods and tools for troubleshooting in networks PC6. The ability to apply equipment diagnostics and testing tools, the ability to take into account modern trends in the development of electronics, measuring and computer technology, information technology in their professional activities, the ability to calculate and design electronic devices, circuits and devices for various functional purposes in accordance with the terms of reference using automation tools design PC7. The ability to develop user interfaces for web applications and mobile applications, the ability to develop models of information system components, including database models, the ability to develop components of software systems and databases, use modern programming tools and technologies, the ability to organize the interaction of devices connected via the Internet, in order to solve the stated problem, as well as organize the necessary data processing and visualization for this PC8. The ability to use the methodology for developing measures to protect confidential information, the ability to draw up technical specifications in accordance with the requirements of state, industry and corporate standards, to comply with work time standards, the ability to prepare materials for presentation to the customer, the ability to use modern information and communication technologies in subject activities, the ability to own project management methods and implement them using modern information and communication technologies, the ability to use an information approach to assessing the quality of information security systems functioning PC9. The ability to analyze and identify network vulnerabilities, identify network threats, apply response methods to them, ensure the safe operation of the business network infrastructure.
12	LO1. Apply knowledge and understanding of facts, phenomena, theories and complex dependencies in the field of legislation of the Republic of Kazakhstan and countries of the world, as well as digital investigation, standardization and certification procedures in the field of information security, master the methods of forensics and information protection. LO2. Apply knowledge about the architecture of computer systems, manage operating systems, system parameters and security of operating systems as well as host security and network monitoring analysis. LO3. Apply knowledge of the hardware element base and their physical properties. LO4. Apply data protection technologies in computer systems and networks, as well as own blockchain technologies and cloud services for secure data storage. LO5. Apply knowledge in the field of cryptography and various methods of information security using theoretical mathematical solutions LO6. Develop an enterprise information security policy, apply project management tools, apply mathematical modeling methods, perform a qualitative and quantitative assessment of project risks, determine the economic efficiency of a project. LO7. Apply software development skills to work with various applications, be able to develop mobile applications and work with databases. LO8. Collect and interpret information to form judgments, taking into account social, ethical and scientific considerations, possess the skills of speaking in foreign languages and be able to work with projects in the field of information security. LO 9. Know the methods of scientific research and academic writing and apply them in the field of study. LO10. Apply theoretical and practical knowledge to solve practical and professional tasks in the field of implementing network connections between devices, calculate and apply addressing schemes, set up and configure network devices. LO11. Develop secure server client web applications and mobile applications.

	LO12. Collect and process information from various sources, including in a foreign language. Be able to apply the knowledge gained to study and develop projects, as well as analyze and implement the developed projects in practice. LO13. Own a mathematical apparatus for solving engineering problems and know the basic physical properties of objects. LO14. To be able to apply the acquired knowledge in the chosen additional educational program.	
13	Form of study	full-time
14	Languages of instruction	English
15	Volume of loans	240
16	Awarded Academic Degree	Bachelor in Information Security Educational Program"6B06303-Network Security"
17	Developer(s) and authors:	JSC "International University of Information Technologies", department cybersecurity: - Amanzholova S.T. assistant professor, Ph.D. - Sagymbekova A.O. senior lecturer - Makilenov Sh.N. senior lecturer

4.2 Matrix for correlating the learning outcomes of the educational program with the competencies being formed

List of competencies of the educational program	LO1	LO2	LO3	LO4	LO5	LO6	LO7
Humanitarian module				✓			
Language module				✓			
ICT module			✓				
Natural science module	✓						
Programming languages module			✓				
Hardware module		✓					
Computer Network Fundamentals Module					✓		
OS security module						✓	
Module of scientific activity and project management							✓
Information security technology module						✓	
Network security module						✓	
Cyber security module							✓
Final assessment module	✓	✓	✓	✓	✓	✓	✓

4.3. Information about modules / disciplines (if there are modules, it is necessary to highlight them)

No.	Name of the discipline	Brief description of the discipline (30-50 words)	Number of credits	Formed competencies (codes)	Prerequisites	Post-requisitions
		Cycle of general education disciplines Required Component				
1	History of Kazakhstan	The course "History of Kazakhstan" is the most important general educational discipline of the university component, studied by 1st year students of all educational programs. The history of Kazakhstan is an integral and integral part of world history, all events and cultural monuments are an important component of world history and culture. In the course of studying this course, students will acquire knowledge, skills and abilities in all major periods and sub-periods of the history of Kazakhstan, which include the period of antiquity and the first state formations on the territory of Kazakhstan, the Middle Ages with the study of the era of the Turkic states, the Mongol invasion and a key point in our history - the emergence and flourishing of the Kazakh Khanate, the period of confrontation with the Dzhungars and the colonial period, the Soviet period and, finally, the modern era of the development of Kazakhstan, as an independent sovereign state. The task of teaching the discipline is to trace the continuity of the idea of statehood through all the above periods of history and to transfer the rich historical and cultural heritage through the centuries to the current generation. Located in the center of Eurasia, Kazakhstan found itself at the crossroads of the most ancient civilizations of the world, at the intersection of transport arteries, social and economic, cultural and ideological ties between East and West, South and North, between Europe and Asia, between the largest state formations of the Eurasian continent. At various stages of history, states with an original cultural history arose and developed on the territory of Kazakhstan, the heir of which was modern Kazakhstan. The task of teaching the discipline is to trace the continuity of the idea of statehood through all the above periods of history and to transfer the rich historical and cultural heritage through the centuries to the current generation. Located in the center of Eurasia, Kazakhstan found itself at the crossroads of the most ancient civilizations of the world, at the intersection of transport arteries, social and economic, cultural and ideological ties between East and West, South and North, between Europe and Asia, between the largest state formations of the Eurasian continent. At various stages of history, states with an original cultural history arose and developed on the territory of Kazakhstan, the heir of which was modern Kazakhstan. The task of teaching the discipline is to trace the continuity of the idea of statehood through	5	OK1	No	Philosophy

		all the above periods of history and to transfer the rich historical and cultural heritage through the centuries to the current generation. Located in the center of Eurasia, Kazakhstan found itself at the crossroads of the most ancient civilizations of the world, at the intersection of transport arteries, social and economic, cultural and ideological ties between East and West, South and North, between Europe and Asia, between the largest state formations of the Eurasian continent. At various stages of history, states with an original cultural history arose and developed on the territory of Kazakhstan, the heir of which was modern Kazakhstan.				
2	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 domestic philosophy are studied. Philosophy is a special form of knowledge of the world, creating a system of knowledge of the general principles and foundations of human life, about the essential characteristics of a person's relationship to nature, society and spiritual life, in all its main direction.	5	OK1	History of Kazakhstan	Research methodology
3	Foreign language	The course includes an intensive English language program focused on grammar and speaking skills. The course includes topics reflecting the latest developments in information technology, and a terminological dictionary makes them directly relevant to the needs of students.	10	OK4	No	Professional foreign language
4	Kazakh (Russian) language	The course occupies a special place in the system of training bachelors with an engineering education. For students of a technical university, the study of professional Kazakh / Russian languages is not only the improvement of the skills and abilities acquired at school, but also a means of mastering the future specialty.	10	OK4	No	Office work in Kazakh
5	Information and Communication Technologies	In the course, information and communication technologies are considered as modern methods and means of communication between people in ordinary and professional activities using information technologies for searching, collecting, storing, processing and disseminating information.	5	PC6	No	Fundamentals of computer networks, Fundamentals of Linux operating systems
6	Political science	The course provides a comprehensive coverage of all key elements, the study of sources and political relations, types of political systems, democratic and authoritarian systems, political mechanisms, political competition and power, political capital and values, survival of political ideas, nationalism, analysis of domestic and foreign policy, political growth , public policy in the world political system.	2	OK1	No	Culturology

7	Sociology	The course "Sociology" is 2 credits. It involves lectures, practical work, independent work of the student. During the course, various phenomena of social life are studied. At the same time, the study is carried out from various paradigms of social knowledge, using theories and scientific methods. Students who successfully complete the course will be able to: 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. Understand and analyze social phenomena and problems from different points of view. 4. Ability to work in a team.	2	OK1	No	Psychology
8	Psychology	This course presents the issues of psychology in a broad educational and social context. The knowledge, abilities and skills acquired and formed as a result of mastering the course content give students the opportunity to apply them in practice in various areas of life: personal, family, professional, business, public, in working with people - representatives of different social groups and age categories .	2	OK1	Sociology	Research methodology
9	Cultural studies	Knowledge in the field of cultural studies can serve as a basis for studying the entire complex of social and human sciences. At the same time, the discipline of cultural studies can serve as an addition to general courses in history and philosophy. The course material can serve as a methodological guide for a number of special disciplines: for example, ethics, cultural history, art styles, national management schools, negotiation strategy and tactics, cultural management. Teaching methods and technologies used in the process of program implementation: role-playing games and educational discussions of various formats; case study (analysis of specific situations); project method.	2	OK1	Sociology	Research methodology
10	Physical Culture	The course is devoted to the formation of personal physical culture and the ability to use various means of physical culture for the preservation and promotion of health.	8	OK1	No	
Cycle of general education disciplines University Component/Elective Component						
11	Economics and Industrial Engineering	New trends in economics and organization of production are discussed with examples from real life and practice. The structure of the national economy, the enterprise and the organization of its production are considered.	5	OK2	Algebra and geometry	Diploma design

12	Startups and Entrepreneurship	This course is an introduction to what a business is, how it works and how to manage it. Students will define ownership and processes used in manufacturing and marketing, finance, human resources and management in business operations.		OK 3	ICT	Diploma design
13	Fundamentals of law and anti-corruption culture	The course outlines the legal, economic and social foundations of countering corruption, features of state policy are revealed, international experience in combating with corruption, the specifics of regulation of conflicts of interest, service ethics, methods for detecting corruption violations. As a result of successful completion of the course, students will have the following competencies: 1. Understand the measures of legal liability for participation in corruption violations. 2. Identify conflicts of interest in the activities of organizations that lead to corruption. 3. Analyze the work of organizations using various research methods.		OK 3	Legal basis for information security	Diploma design
14	Fundamentals safety of life activity and ecology	Studying ways of safe human interaction with the environment (industrial, domestic, urban, natural), sustainable operation of business facilities (organizations) in emergency situations, issues of protection from negative factors, prevention and elimination of the consequences of natural and man-made emergencies and the use of modern means defeat. The course also reveals the role of ecology in solving modern economic, social and political problems, as well as the emergence of global environmental problems as a result of human production activities and the responsibility of the world community for them. A very important aspect is also international cooperation to ensure sustainable development. Various areas of practical application of ecology are also considered - natural resources and environmental pollution.		OK 3	ICT	Diploma design
Cycle of basic disciplines Selectable Component						
15	Algebra and geometry	The successful application of algebra and geometry to solve specific problems is primarily due to the rapid growth of computer 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 systems of linear equations. Analytic geometry is a section where the basic concepts are simple geometric shapes (points, lines, planes, curves and surfaces of the second order). The	4	OK5	No	Mathematical analysis

		main means of research in analytic geometry are the method of coordinates and the methods of elementary algebra.				
16	Mathematical analysis	The aim of the course is to introduce students to important branches of calculus and its applications in computer science. During the educational process, students should familiarize themselves with and be able to apply mathematical methods and tools to solve various applied problems. Moreover, they will learn fundamental methods for studying infinitesimal variables using analysis based on the theory of differential and integral calculations.	6	OK5	Algebra and geometry	Information theory
17	Physics	Study the basic laws of classical mechanics, special relativity, electromagnetic phenomena, quantum mechanics, thermodynamics in search of ways to solve physical problems	4	OK5	Mathematical analysis	Theory of electrical circuits
18	Algorithmization and programming	An introductory programming course that studies the linear, conditional, repetitive structures of algorithms; one-dimensional and two-dimensional arrays and strings in the C++ programming language. Programming using procedures, functions and standard modules is considered.	6	PC2	ICT	Object Oriented Programming (Java)
19	Legal basics for information security	A course to study politics and information security on a global scale. Study of Kazakhstani and international laws and regulations in the field of information security.	4	OK1	No	Technologies for protecting computer information
20	Mathematical foundations of information security	The course is aimed at studying the sections of discrete mathematics, as well as the theory of probability and mathematical statistics required to study the processes of information security	6	OK5	Mathematical analysis	Information theory
21	Object Oriented Programming (Java)	A course to learn how to write applications using Java technologies	6	PC2	Algorithmization and programming	Web technologies
22	Computer Networking Basics	The course is aimed at studying the principles of network technologies, gaining access to local and remote network resources.	6	PC4	ICT	Fundamentals of Switching, Routing, and Wireless Networking

23	Professionally oriented foreign language	Includes a grammar course, lexical material of a professional nature and texts of a professional orientation.	2	OK4	Foreign language	Research methodology
24	Business correspondence in the state language	Office work in the state language is a very important subject for students, because. this discipline teaches the preparation, execution of documents in the state language, forms practical skills and abilities to independently compose, translate documents into the Kazakh language.	2	OK4	Kazakh (Russian) language	No
25	Web technologies	This course teaches the basics of web development using HTML, Cascading Style Sheets (CSS), JavaScript and jQuery. Learns to use the PHP programming language, master the basics of the MySQL database and develop secure server-side client web applications.	4	PC2	Object Oriented Programming (Java)	Python programming language
26	Basics of the Linux operating system	The course provides students with basic knowledge of working with Linux and basic Linux command line skills.	4	PC4,PC5	ICT	Operating system security
27	Switching, Routing, and Wireless Essentials	Teach students how to configure routers and switches for advanced functionality, configure aggregation, redundancy, and routing protocols, troubleshoot devices, and fine-tune routing protocols	6	PC4	Fundamentals of computer networks	Introduction to Information Security Incident Investigation
28	Basic Circuit Theory	The study of physical laws and processes occurring in electric circuits of direct, harmonic and non-harmonic current, methods for analyzing transient and steady processes occurring in linear circuits with lumped parameters; modes of operation of quadripoles and filters, physical processes occurring in electrical circuits with distributed parameters and in non-linear DC circuits.	4	PC1	Physics	IoT technologies
29	Information theory	Information theory is a subsection of applied mathematics and cybernetics aimed at the quantitative and qualitative measurement of information. The purpose of this course is to form a system of knowledge about the basics of information theory and its practical application in modern information systems. The objectives of the course are the formation of the concept and types of information systems, entropy and methods for measuring and evaluating it, methods for measuring and evaluating the amount of information, theoretical and practical aspects of effective (optimal) coding, theoretical and practical aspects of noise-resistant coding, data transmission systems, modulation and signal	4	PC6	Mathematical foundations of information security	Cryptographic methods of information protection

		demodulation.				
30	Digital circuit design	During this course, students gain an understanding of the operation of digital devices on integrated circuits, study and design digital logic circuits, and learn to solve problems associated with the operation of logic elements.	5	PC3, PC6	Physics	Theory of electrical circuits
31	Organization of database management systems	The course provides knowledge and skills in database design, from the conceptual stage to physical implementation.	4	PC3	Linux operating system basics	Operating system security
32	Project Management in Information Security	The course teaches to use project management tools at various stages of the project life cycle, to make a qualitative and quantitative assessment of project risks, to determine the effectiveness of the project	4	PC6	Legal basis for information security	Diploma design
33	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 skills of an objective assessment of scientific information, the freedom of scientific research and the desire to apply scientific knowledge in educational activities, including for the implementation of a graduation project (work).	2	OK3	Project Management in Information Security	Diploma design
34	Educational practice	The course is designed to study the basics of information security	2	PC1, PC2	Algorithmization and programming	Diploma design
		Cycle of major disciplines University Component/Elective Component				
35	Industrial practice	Study of information security technologies	4	PC8	2 course: Technologies for protecting computer information 3 course: Industrial practice 2 courses	Diploma design
36	Computer Information Protection Technologies	Basic technologies, methods and principles of information security	4	PC8	Legal basis for information security	Introduction to Information Security

						Incident Investigation
37	Python programming language	The course teaches how to use data structures, functions, modules, classes when programming in Python.	4	PC2, PC7	Web technologies	Operating system security
38	Enterprise Networks, Security, and Automation	The course describes the architecture and provides knowledge related to the design, protection, operation and troubleshooting of an enterprise network, including wide area network (WAN) technologies and quality of service (QoS) mechanisms for secure remote access, along with software-defined concepts of networking, virtualization and automation, digitization-enabled networks	5	PC5	Routing and Switching Fundamentals	DevNet
39	Network Security	Basic and auxiliary network tools and services for ensuring network security	5	PC9	Technologies for protecting computer information	Diploma design
40	Cryptographic methods of information security	The course provides knowledge of the principles of cryptology, cryptography, cryptanalysis. mathematical foundations of algorithms for asymmetric and symmetric cryptosystems, electronic digital signature. Be able to apply cryptography in the development of information systems	4	PC8	Technologies for protecting computer information	Corporate cybersecurity
41	Protection of database management systems	The course provides an overview of various concepts and techniques for securing a database management system. Topics cover advanced SQL, transaction management language, data management language, functions and triggers, database management and monitoring, database backup and restore, SQL injection, etc. During the course, students will solve various tasks using PostgreSQL DBMS .	5	PC3	Organization of database management systems	Diploma design
42	Digital forensics of network infrastructure	This course teaches to apply special techniques, methods and tools of digital forensics. The course is designed to study methods for detecting and investigating computer crimes, the rules for collecting, securing and presenting evidence on them. The course reviews popular tools for conducting forensic analysis and collecting digital evidence. The course provides an overview of utilities, frameworks and tools for forensic analysis.	5	PC9	Corporate cybersecurity	Practical Pentesting
43	Practical Pentesting	The course is designed to study the methods of pentesting, pentesting tools. Carrying out attacks on the basis of various protocols, operating systems.	6	PC9	Digital forensics	Diploma design
44	Industrial practice	Application of knowledge in the protection of computer facilities	4	PC6,PC7,PC8,PC9	2 course: Technologies for	Diploma design

					protecting computer information 3 course: Industrial practice 2 courses	
45	Pre-graduate practice	Collecting material for writing a graduation project	5	PC6,PC7,PC8,PC9	Disciplines 3 and 4 courses	Diploma design
46	Introduction to Intelligent Cybersecurity	The course contains lecture and laboratory material on knowledge management for cybersecurity purposes and on the use of software agents and other tools and systems for deep modeling of the environment and the agent itself, followed by machine learning, in particular deep learning and reinforcement learning and the practical application of predicate and non-classical logics to build reasoning machines.	4	PC9	Corporate cybersecurity	Mobile technology security
47	Mobile security technologies	The discipline provides knowledge on the use of tools for programming and designing mobile applications, on the development of user interfaces for mobile applications, on the use of software functions that provide support for telephony, sending / receiving SMS, managing connections via Wi-Fi, Bluetooth, programming background services, notification mechanisms and signaling, interaction of applications with geolocation and mapping services	4	PC2	Python programming language	Diploma design
48	Introduction to cloud technology	The course is aimed at studying the technology of creating a cloud service, working with existing cloud services, using cloud computing technology in solving cybersecurity problems.	4	PC6	Data Analytics	Diploma design
49	Development of corporate applications on the Django framework	This course provides an opportunity to create business automation systems, Internet projects, services, startups. Creation of large online stores or corporate portals with the introduction of services for interacting with visitors and with elements of business automation.	6	PC2	Python programming language	Diploma design
50	DevNet	The course aims to understand the meaning, configuration and use of software concepts, as well as tools related to network programming (scripting in Python, Git, JSON, Postman, API). Describe your own software-defined networking (SDN) approach, including centralized application policy management.	5	PC9	Digital forensics	Diploma design
51	Analytics of Information Security Center	The course is devoted to the study of methods for analyzing a system for potential vulnerabilities and creating recommendations for eliminating vulnerabilities	4	PC8, PC9	Practical Pentesting	Diploma design

52	WLAN Enterprise Technologies	The course is devoted to studying the technologies of local wireless networks of the IEEE 802.11 standard, approaches to designing Wi-Fi networks, acquiring skills in working with telecommunications equipment that can be applied at the beginning of work as a network specialist.	6	PC5	Fundamentals of Switching, Routing, and Wireless Networking	Diploma design
53	Intrusion detection and prevention systems	The course focuses on the technologies and methodologies of Intrusion Detection and Prevention Systems (IDPS), covering network traffic monitoring, anomaly detection, and incident response. Students will gain practical skills in configuring IDPS tools and analyzing security data, applicable in roles like network security specialist.	6	PC5	Network Infrastructure Design	Diploma design
54	Managing network infrastructure vulnerabilities	The course centers on addressing network infrastructure weaknesses, exploring strategies for detecting, evaluating, and reducing security threats. Participants will acquire hands-on experience in vulnerability assessment and threat mitigation, relevant to roles like network security expert.	5	PC4	Intrusion detection and prevention systems	Network Interconnection
55	Blockchain technology	The course covers blockchain technology, focusing on its architecture, functionality, and security aspects. It provides practical experience in developing blockchain solutions and working with decentralized applications, applicable in roles such as blockchain developer or cybersecurity expert	4	PC2	Analytics of Information Security Center	Diploma design
56	Network Interconnection	The course is devoted to studying network interconnection technologies, focusing on the principles of linking different network systems and protocols. It provides practical experience in configuring routers, switches, and gateways, applicable in roles such as network engineer or system administrator.	4	PC3	Managing network infrastructure vulnerabilities	Diploma design
57	Minor 1	Interdisciplinary program that includes courses in mathematical and computer modeling, as well as computer engineering and software development. Students study mathematical modeling methods and their applications in computer systems, alongside the fundamentals of computer system operations and software development	5	PC2	Programming	Diploma design
58	Minor 2	Interdisciplinary program that includes courses in mathematical and computer modeling, as well as computer engineering and software development. Students study mathematical modeling methods and their applications in computer systems, alongside the fundamentals of computer system operations and software development	5	PC2	Programming	Diploma design
59	Minor 3	Interdisciplinary program that includes courses in mathematical and computer modeling, as well as computer engineering and software development. Students study mathematical modeling methods and their applications in computer systems, alongside the fundamentals of computer system operations and software development	5	PC2	Programming	Diploma design

60	Network Infrastructure Security	The course focuses on securing network infrastructure, covering methods to protect against threats and vulnerabilities in network systems. It provides practical knowledge in configuring firewalls, intrusion detection systems, and secure network protocols, applicable in roles such as network security engineer or cybersecurity specialist.	4	PC9	Network Security	Diploma design

4.4. List of modules and learning outcomes

Name of the educational program: _____Network security _____

Qualification: _____ Bachelor of Information Security _____

Module code / Module name	Direction Learning Outcomes	Criteria for evaluating learning outcomes	Disciplines forming the module Code / Name
GENERAL EDUCATIONAL MODULES			
Humanitarian module	LO4	O = (F / P) * 100%, where O - assessment of academic performance (training, productivity), F - the actual amount of acquired knowledge, skills; P - the full amount of knowledge, skills, proposed for assimilation.	History of Kazakhstan
			Philosophy
			Political science
			Sociology
			Psychology
			Culturology
Language module	LO4	O = (F / P) * 100%, where O - assessment of academic performance (training, productivity), F - the actual amount of acquired knowledge, skills; P - the full amount of knowledge, skills, proposed for assimilation.	Foreign language
			Kazakh (Russian) language
			Office work in the state language
			Professionally oriented foreign language
ICT module	LO3	O = (F / P) * 100%,	Information and Communication Technologies

		where O - assessment of academic performance (training, productivity), F - the actual amount of acquired knowledge, skills; P - the full amount of knowledge, skills, proposed for assimilation.	
BASIC MODULES			
Natural science module	LO1	O = (F / P) * 100%, where O - assessment of academic performance (training, productivity), F - the actual amount of acquired knowledge, skills; P - 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	LO3	O = (F / P) * 100%, where O - assessment of academic performance (training, productivity), F - the actual amount of acquired knowledge, skills; P - the full amount of knowledge, skills, proposed for assimilation.	Algorithmization and programming
			Object Oriented Programming (Java)
			Development of corporate applications on the Django framework
			Web technologies
			Organization of database management systems (cw)
			Python programming language

Hardware module	LO2	O = (F / P) * 100%, where O - assessment of academic performance (training, productivity), F - the actual amount of acquired knowledge, skills; P - the full amount of knowledge, skills, proposed for assimilation.	Digital circuitry
			Theory of electrical circuits
Computer Network Fundamentals Module	LO5	O = (F / P) * 100%, where O - assessment of academic performance (training, productivity), F - the actual amount of acquired knowledge, skills; P - the full amount of knowledge, skills, proposed for assimilation.	Fundamentals of computer networks
			Fundamentals of Switching, Routing, and Wireless Networking
			Enterprise WLAN Technologies
OS security module	LO6	O = (F / P) * 100%, where O - assessment of academic performance (training, productivity), F - the actual amount of acquired knowledge, skills; P - the full amount of knowledge, skills, proposed for assimilation.	Linux operating system basics
			Operating system security
Module of scientific activity	LO7	O = (F / P) * 100%, where O - assessment of academic performance (training, productivity), F - the actual amount of	Research Methodology
			Project Management in Information Security (cw)

and project management		acquired knowledge, skills; P - the full amount of knowledge, skills, proposed for assimilation.	Economics and organization of production
Information security technology module	LO5	O = (F / P) * 100%, where O - assessment of academic performance (training, productivity), F - the actual amount of acquired knowledge, skills; P - the full amount of knowledge, skills, proposed for assimilation.	Technologies for protecting computer information
			Cryptographic methods of information protection
PROFESSIONAL MODULES			
Network security module	LO6	O = (F / P) * 100%, where O - assessment of academic performance (training, productivity), F - the actual amount of acquired knowledge, skills; P - the full amount of knowledge, skills, proposed for assimilation.	Security and automation of corporate networks
			DevNet
			Mobile technology security
			Network Security
Cyber security module	LO7	O = (F / P) * 100%, where O - assessment of academic performance (training, productivity), F - the actual amount of acquired knowledge, skills; P - the full amount of knowledge, skills, proposed for assimilation.	Introduction to Intelligent Cybersecurity
			Information Security Center Analytics
			Practical Pentesting
			Protection of applications and scripts from modifications

			Database management systems protection (cw)
			Digital forensics
			Reverse engineering
Final assessment module	LO1 – LO7		Writing and defense of the graduation project

5. Curriculum of the educational program

Module code	Module name	Discipline cycle	Discipline component	Code of subject	Subject name	Academic credits	Academic study period	Control in the academic period			Number of hours							Distribution of credits per academic period							
												Classroom work					Independent work of students		1 course		2 course		3 course		4 course	
								Exams	Differentiated test	Term	Total	Lectures	Laboratory trainings	Practice	Studio	Practice	Independent work of	Independent work of	1	2	3	4	5	6	7	8
																			Number of weeks in the academic period							
																			15	15	15	15	15	15	15	15
General modules																										
Modules of specialty/education programm																										
Additional modules beyond qualification																										
Modules of choice																										

1		GER	CS	LAN6001A	Foreign language	5	1	1			5/150			45			15	90	5.0							
2		GER	CS	LAN6001KR	Kazakh (Russian) language	5	1	1			5/150			45			15	90	5.0							
3		GER	CS	HK 6002	History of Kazakhstan	5	1	1			5/150	15		30			15	90	5.0							
4		GER	CS	SPS6005	Psychology	2	2	2			2/60	15		15			15	15		2.0						
5		GER	CS	LAN6002A	Foreign language	5	2	2			5/150			45			15	90		5.0						
6		GER	CS	LAN6002KR	Kazakh (Russian) language	5	2	2			5/150			45			15	90		5.0						
7		GER	CS	ICT6001	Information and Communication Technologies	5	2	2			5/150	15	30.0				15	90		5.0						
8		GER	CS	SPS6004	Cultural studies	2	2	2			2/60	15		15			15	15		2.0						
9		GER	CS	PhC6005	Physical Culture	4	2	2			4/120			45			15	60		4.0						
10		GER	CS	SPS6003	Political science	2	3	3			2/60	15		15			15	15			2.0					
11		GER	CS	SPS 6002	Sociology	2	3	3			2/60	15		15			15	15			2.0					
12		GER	CS	PhC6006	Physical Culture	4	3	3			4/120			45			15	60			4.0					
13		GER	CS	SPS6001	Philosophy	5	5	5			5/150	15		30			15	90					5.0			
14		GER	ES	JUR 6507	Fundamentals safety of life activity and ecology	5	8	8			5/150	15		30			15	90								5.0

15		GER	ES	ECO6004	Economics and Industrial Engineering						5/150	15		30			15	90								
16		GER	ES	MGT6706	Startups and entrepreneurship						5/150	15		30			15	90								
17		GER	ES	JUR 6470	Fundamentals of law and anti-corruption culture						5/150	15		30			15	90								
18		BS	UC	MAT6002	Mathematical analysis	6	1	1			6/180	30		30			15	105	6.0							
19		BS	UC	SEC6217	Legal Basics of Information Security	4	1	1			4/120	15		30			15	60	4.0							
20		BS	UC	MAT6001	Algebra and Geometry	4	2	2			4/120	15		30			15	60		4.0						
21		BS	UC	SFT6201	Algorithmization and Programming	6	2	2			6/180	15	30.0	15			15	105		6.0						
22		BS	UC	PP6205	Educational practice	2	2				2/60					60	0	0		2.0						
23		BS	UC	PHY6001	Physics	4	3	3			4/120	15	30.0				15	60			4.0					
24		BS	UC	MAT6018	Mathematical foundations of information security	6	3	3			6/180	30		30			15	105			6.0					
25		BS	UC	SFT6207	Object-oriented programming (Java)	6	3	3			6/180	15	30.0	15			15	105			6.0					

26		BS	UC	NET6201	Computer Networking Basics	6	3	3			6/180	15	30.0	15			15	105			6.0					
27		BS	UC	LAN6004PA	Professionally oriented foreign language	2	4	4			2/60	15		15			15	15				2.0				
28		BS	UC	SFT6208	Web technologies	4	4				4/120	15	15.0	15			15	60				4.0				
29		BS	UC	EGR6201	Basics of the Linux operating system	4	4	4			4/120	15	15.0	15			15	60				4.0				
30		BS	UC	NET6202	Switching, Routing, and Wireless Essentials	6	4	4			6/180	15	30.0	15			15	105				6.0				
31		BS	UC	EEC6001	Basic Circuit Theory	4	4	4			4/120	15	30.0				15	60				4.0				
32		BS	UC	LAN6007K	Business correspondence in the state language	2	4	4			2/60	15		15			15	15				2.0				
33		BS	UC	EGR6202	Information Theory	4	5	5			4/120	15	30.0				15	60					4.0			
34		BS	UC	SFT6211	Organization of database management systems	4	5	5			4/120	15	15.0	15			15	60					4.0			
35		BS	UC	EEC6661	Digital circuit design	4	5	5			4/120	15	30.0				15	60					4.0			
36		BS	UC	SEC6204	Project Management in Information Security	4	6	6			4/120	15	30.0				15	60						4.0		

37		BS	UC	RM6202	Research metodology	2	8	8			2/60	15		15			15	15							2.0
38		BS	ES	SEC6247	Network infrastructure security	4	6	6			4/120	15	15.0	15			15	60						4.0		
39		BS	ES	SEC6233	Introduction to Intelligent Cybersecurity						4/120	15	15.0	15			15	60								
40		AS	UC	IP6202	Industrial practice	4	4				4/120					120	0	0				4.0				
41		AS	UC	SEC6201	Computer Information Protection Technologies	4	4	4			4/120	15	15.0	15			15	60				4.0				
42		AS	UC	SFT6210	Python programming language	4	5	5			4/120	15	15.0	15			15	60					4.0			
43		AS	UC	NET6203	Enterprise Networks, Security, and Automation	5	5	5			5/150	15	15.0	15			15	90					5.0			
44		AS	UC	IP6203	Industrial practice	4	6				4/120					120	0	0						4.0		
45		AS	UC	SEC6202	Security of operating systems	4	6	6			4/120	15	30.0				15	60						4.0		
46		AS	UC	SEC6206	Cryptographic methods of information security	4	6	6			4/120	15	15.0	15			15	60						4.0		
47		AS	UC	SEC6209	Network Security	4	6	6			4/120	15	15.0	15			15	60						4.0		
48		AS	UC	SEC6208	Practical pentesting	6	7	7			6/180	15	30.0	15			15	105							6.0	

49		AS	UC	NET6206	WLAN Enterprise Technologies	6	7	7			6/180	15	30.0	15			15	105							6.0	
50		AS	UC	PP6204	Pre-graduate practice	5	8				5/150					150	0	0								5.0
51		AS	ES	MIN601	Minor 1	5	5	5			5/150	15	30.0				15	90					5.0			
52		AS	ES	MIN602	Minor 2	5	6	6			5/150	15	30.0				15	90						5.0		
53		AS	ES	SEC6205	Mobile security technologies	4	7	7			4/120	15	15.0	15			15	60							4.0	
54		AS	ES	SEC6249	Digital forensics of network infrastructure						4/120	15	15.0	15			15	60								
55		AS	ES	MIN603	Minor 3	5	7	7			5/150	15	30.0				15	90							5.0	
56		AS	ES	SEC6211	Protection of database management systems	4	7	7			4/120	15	15.0	15			15	60							4.0	
57		AS	ES	SEC6234	Introduction to Cloud						4/120	15	15.0	15			15	60								
58		AS	ES	SFT6206	Development of corporate applications on the Django framework	6	7	7			6/180	15	30.0	15			15	105							6.0	
59		AS	ES	SEC6248	Intrusion detection and						6/180	15	30.0	15			15	105								

					prevention systems																					
60		AS	ES	NET6207	DevNet	5	8	8			5/150	15	15.0	15			15	90								5.0
61		AS	ES	SEC6250	Managing network infrastructure vulnerabilities						5/150	15	15.0	15			15	90								
62		AS	ES	SEC6238	Blockchain technology	4	8	8			4/120	15	30.0				15	60								4.0
63		AS	ES	SEC6251	Network Interconnection						4/120	15	15.0	15			15	60								
64		AS	ES	SEC6237	Analytics of Information Security Center						4/120	15	30.0				15	60								
Weekly average workload at hours																			0	0	0	0	0	0	0	0
1	**General education subjects(GER)**					**56**		**14**	**0**	**0**	**1680**	**120**	**30**	**420**	**0**	**0**	**210**	**900**	**15**	**23**	**8**	**0**	**5**	**0**	**0**	**5**
	Core subjects(GER/CS)					51		13	0	0	1530	105	30	390	0	0	195	810	15	23	8	0	5	0	0	0
	University component(GER/UC)					0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Electives(GER/ES)					5		1	0	0	150	15	0	30	0	0	15	90	0	0	0	0	0	0	0	5
2	**Base requirements(BS)**					**88**		**19**	**0**	**0**	**2580**	**330**	**330**	**285**	**0**	**60**	**300**	**1335**	**10**	**12**	**22**	**22**	**12**	**8**	**0**	**2**
	Core subjects(BS/CS)					0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	University component(BS/UC)					84		18	0	0	2460	315	315	270	0	60	285	1275	10	12	22	22	12	4	0	2
	Electives(BS/ES)					4		1	0	0	120	15	15	15	0	0	15	60	0	0	0	0	0	4	0	0
3	**Profession requirements(VRS)**					**88**		**16**	**0**	**0**	**2250**	**240**	**360**	**165**	**0**	**390**	**240**	**1245**	**0**	**0**	**0**	**8**	**14**	**21**	**31**	**14**
	Core subjects(VRS/CS)					0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

	University component(VRS/UC)	50		8	0	0	1110	120	165	105	0	390	120	600	0	0	0	8	9	16	12	5
	Electives(VRS/ES)	38		8	0	0	1140	120	195	60	0	0	120	645	0	0	0	0	5	5	19	9
4	**Disciplines for the formation of professional competencies(BDFPC)**	**0**		**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
	Core subjects(BDFPC/CS)	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	University component(BDFPC/UC)	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Electives(BDFPC/ES)	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5	**Disciplines of personal development and the formation of leadership qualities(BDPD)**	**0**		**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
	Core subjects(BDPD/CS)	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	University component(BDPD/UC)	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Electives(BDPD/ES)	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total on curriculum		**232**			**0**	**0**	**6510**	**690**	**720**	**870**	**0**	**450**	**750**	**3480**	**25**	**35**	**30**	**30**	**31**	**29**	**31**	**21**
6	**Additional courses**										**Number of credits**			**Academic period**			**Number of hours**			**Number of weeks**		
7	**Module of final certification (MoFC)**										**8**						**240.0**					
Total including FC											**240**						**7200.0**					

Заведующий кафедрой

Аманжолова Сауле Токсановна

6. Additional educational programs (Minor)

The name of the additional educational program (Minor) indicating the list of disciplines that form the Minor	Total number of credits/number of credits by discipline	Semesters of study	Documents on the results of the development of additional educational programs (Minor)
Data protection	15	5,6,7	Certificate
IoT security technologies	15	5,6,7	Certificate
Operating system security management	15	5,6,7	Certificate
System Administrator	15	5,6,7	Certificate
Robotics	15	5,6,7	Certificate
web programmer	15	5,6,7	Certificate
Modeling and visualization	15	5,6,7	Certificate
BI analytics tools	15	5,6,7	Certificate
Machine learning specialist	15	5,6,7	Certificate
Big data processing and analysis	15	5,6,7	Certificate
Digital Marketing & E-commerce	15	5,6,7	Certificate
Business & Entrepreneurship	15	5,6,7	Certificate
economics	15	5,6,7	Certificate
Management & Leadership	15	5,6,7	Certificate
financial engineering	15	5,6,7	Certificate
Accounting by ACCA	15	5,6,7	Certificate
financial analytics	15	5,6,7	Certificate
Network technologies of telecommunications	15	5,6,7	Certificate
Mobile telecommunication technologies	15	5,6,7	Certificate

7.Approval sheetwith developers

Name of the educational program:6B06303 "Network Security" (Information security audit / Network security)

No. p / p	**Position, scientific or academic degree and Surname I.O. educational program developer**	**date**	**painting**	**Note**
1	Amanzholova Saule Toksanovna PhD Associate Professor	05/21/2023		
2	Sagymbekova Azhar Oryngalievna Master of Engineering Senior Lecturer	05/21/2023		
3	Makilenov Shakirt Nurlubekovich Master of Engineering Senior Lecturer	05/21/2023		