NPJSC «Kazakh National Research Technical University named after K.Satbayev»
Institute of Information and Telecommunication Technologies
«Cybersecurity, Data Processing and Information Storage» Department

CURRICULUM PROGRAM

«INFORMATION SECURITY»
(“System and Network Security”, “Cryptographic Information Protection”, “Technical Information Protection”)

Bachelor in field of information communication technology of the curriculum program «6B06301 -Information Security»

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

Almaty 2018

The Program is compiled and signed by the parties:

from KazNRTU named after K.Satbayev

1. Head of Institute «C&IT», PhD — T.Umarov
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from employers

Chairman of the Kazakhstan Association of Information Security — V.Pokusov

Lead Radio Engineer of the LLP «Scientific and Production Enterprise ASKB Alatau» — S.Shaldanbayev

Approved at the meeting of the Educational and Methodological Council of the Kazakh Research Technical University named after K.Satbayev. Minutes #3, dated 19.12.2018

Qualification: Level 6 of the National Qualifications Framework

Professional competence: Information Security, Security of Network Technology, Cryptographic Information Protection, Technical Information Protection

1 Brief program description

The purpose of the educational program is to train students in general, basic and specialized disciplines with the achievement of the relevant competencies.

The professional activity of the graduates of the program is directed to the field of information protection and security, namely, the network and system security, cryptographic information protection, technical information protection.

Information security specialists will be trained according to the new educational program (EP) "Information Security". The content of the disciplines of the educational program will be developed taking into account the relevant educational programs of the leading universities in the world and the international classifier of professional activities in the direction of information security.

In addition, the educational program "Information Security" is developed on the basis of the main regulatory documents:

- Law of the Republic of Kazakhstan "On Education" dated July 27, 2007, No. 319-III with amendments and additions dated October 24, 2011, No. 487-VI ЗРК;
- Rules for organizing the educational process on credit technology of education, approved by the Order of the Minister of the Ministry of Education and Science of the Republic of Kazakhstan No. 152 dated April 20, 2011 (the last changes were introduced by the Order of the Minister of the Ministry of Education and Science of the Republic of Kazakhstan No. 90 dated January 28, 2016);
- State compulsory standard of education at all levels of education, order No. 604 dated 31.10.2018.
- National qualifications framework. Approved by the protocol of March 16, 2016 by the Republican Tripartite Commission on Social Partnership and Regulation of Social and Labor Relations;
- Sectoral Qualifications Framework (SQF). Approved by the protocol of November 17, 2016 No. 12-03-333 of the Sectoral Commission on Social Partnership and Regulation of Social and Labor Relations in the Electric Power Industry;
- Typical curriculum 5B100200 - Information security systems, approved by the Order of the Minister of the Ministry of Education and Science of the Republic of Kazakhstan No. 425 dated 07/05/2016 (Appendix 109).
- International Association for Computing Machinery (ACM) Curriculum Guidelines for Computer Science (CC2005 Series).

Graduates of the educational program "Information Security" are focused on the organization, design and development of systems for the protection and security of information for applied purposes for all sectors of the economy, government organizations and other areas of activity.

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

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

The educational program provides for the training of specialists in the field of information security in 3 areas:

- Security of systems and networks. Training of specialists providing security of systems and network technologies of a wide range. The educational program provides the acquisition of knowledge on technologies for protecting computer information, network technologies, the organization of computer systems and networks, administration of systems and networks, security of cloud technologies, the acquisition of skills in the design and development of intrusion prevention and detection systems.

- Cryptographic information protection. Training of specialists in cryptographic information protection. The educational program provides the acquisition of knowledge on the mathematical foundations of cryptography, various models, methods and means of cryptographic information protection, technologies for protecting computer information, the development and design of cryptographic information security tools, the basics of standardization and certification of information security tools, the acquisition of skills in building cryptographic information security tools.

- Technical protection of information. Training of specialists in technical protection of information. The educational program provides the acquisition of knowledge in the field of electronics, digital circuitry, microprocessor technology, programming of microcontrollers, knowledge of various methods and means of technical protection of information, organization and management of the information security service, ensuring the continuous functioning and operational activities of IT support.

The educational program was developed based on the analysis of the labor functions of information security engineers, system administrators, information security specialists, declared in professional standards.

Representatives of Kazakhstani companies and associations, specialists of departmental structures in the field of protection and security participated in the development of the educational program.

The objectives and content of the EP are given in section 9 "Description of disciplines".

In case of successful completion of the full bachelor's degree course, the graduate is awarded a bachelor's degree in information and communication technologies in the educational program "Information Security".

2 Educational program passport

Specialty: Information Security.

The purpose of the educational program:

- Provide practice-oriented training of specialists in the field of information security, ensuring the security of systems and networks, cryptographic and technical protection of information to perform operational and project activities.
- To prepare graduates for production and technological activities related to the process of organization, design, provision, database management, network technologies, cloud technologies, intrusion prevention and detection systems, organizational and legal aspects of information security, focused on meeting user expectations and requirements; to organizational and management activities related to the maintenance, organization and management of information security.
- Create conditions for continuous professional self-improvement, development of social and personal competencies of graduates (broad cultural outlook, active civic position, commitment, organization, hard work, communication skills, ability to reason and make organizational and managerial decisions, knowledge of modern information technologies, fluency in several languages , the desire for self-development and adherence to ethical values and a healthy lifestyle, the ability to work in a team, responsibility for the end result of their professional activities, civic responsibility, tolerance), social mobility and competitiveness in the labor market.

Objectives of the educational program:

- training a competitive generation of technical specialists in the field of information security and safety for the labor market, proactive, able to work in a team, possessing high personal and professional competencies;
- integration of educational and scientific activities;
- establishing partnerships with leading universities in the near and far abroad in order to improve the quality of education;
- expanding relations with customers of educational services, employers in order to determine the requirements for the quality of training specialists, conducting courses, seminars, master classes, internships, industrial practices.

The content of the educational program "Information Security" is implemented in accordance with the credit technology of education and is carried out in the state and Russian languages.

The educational program will make it possible to implement the principles of the Bologna Process. Based on the choice and self-planning by students of the sequence of studying disciplines, they independently form an individual training plan (IEP) for each semester according to the Working Curriculum and the Catalog of elective disciplines. The educational program has increased the volume of mathematical, natural science, basic and language disciplines. The following disciplines are studied: "Fundamentals of Electronics", "Algorithmization and Fundamentals of Programming", "Information Basics

of Information Security", "Mathematics of Cryptography", "Security of Operating Systems", "Cryptographic Methods of Information Security", "Security of Cloud Technologies", "Computer networks "," Security of systems and networks "," Technologies for protecting computer information "," Organization and security of databases "," Social engineering and ethical hacking "," Technical means and methods of information security "," Design and protection of Web applications "and etc.

Students undergo practical training in banking structures, government and departmental structures, in such companies as National Information Technologies JSC, Pacifica LLP - an integrator in the field of information security, Galaktika LLP, Vella IT LLP, etc.

According to the academic mobility program, the best students have the opportunity to study at leading foreign universities in the corresponding EP.

Education level: higher

NQF / QQF qualification levels: Covers the basic 6 levels but is not limited.

Professional area *: engineering science and technology.

The sphere of professional activity of a bachelor is state and private enterprises and organizations that develop, implement and use organizational, hardware and software methods and means of protecting information systems in all spheres of human activity, operating with critical information.

The subjects of the professional activity of the bachelor are: mathematical, informational, technical, organizational and legal support of information security systems.

Labor activities:

- design and engineering;
- production and technological;
- experimental research;
- organizational and managerial;
- operational;
- scientific.

Objects of professional activity: The objects of professional activity of a bachelor are: organization and technology of information protection; cryptography; security of infocommunication systems; organization of information protection of automated control systems; organization and design of database protection; organization of comprehensive information protection.

Features of the program **:** academic exchange program / credit training system / distance learning

Form of education: full-time

Duration: from 4 to 7 years

Language: Kazakh, Russian, English (30%)

Amount of credits / hours: 240 credits

3 Entry requirements

The admission of students is carried out according to the applications of the applicant, who has completed in full secondary, secondary special education on a competitive basis or under a contract on a fee basis in accordance with the Model Rules for Admission to Bachelor. Requirements for the minimum passing score for the results of the Unified National or Comprehensive Testing for admission to a national university is 65 points.

Special requirements for admission to the program if there are, including graduates of 12 summer schools, colleges of applied bachelor programs, etc. Such applicants must pass diagnostic testing in English, Mathematics, Physics and Specialty courses.

Rules for crediting credits for accelerated (reduced) training on the basis of 12-year secondary, secondary technical and higher education

Code	Type of competence	Competency description	Result of competence	Respondent
GENERAL (It implies full training with possible additional depending on the level of knowledge)				
G1	Communication skills	- Fluent monospeaking oral, written and communication skills - Ability to communicate fluently with a second language - Ability to use communicative communication in different situations - There are the basics of academic writing in their native language - Language level diagnostic test	Full 4-year education with the development of at least 240 academic credits (of which 120 contact academic lending) with the possible transfer of credits in the second language where students have advanced level The language level is determined by taking a diagnostic test.	Department of Kazakh and Russian, Department of English
G2	Math literacy	- Basic mathematical thinking at the communication level - The ability to solve situational problems on the basis of the mathematical apparatus of algebra and began mathematical analysis - Diagnostic test for mathematical literacy in algebra	Full 4-year education with the development of at least 240 academic credits (of which 120 contact academic lending). If the diagnostic test is passed positively, the level is Mathematics 1, if it is negative, the level is Algebra and the analysis starts	Department of Mathematics

G3	Basic Literacy in Natural Sciences	- A basic understanding of the scientific picture of the world with an understanding of the essence of the basic laws of science - Understanding of basic hypotheses, laws, methods, formulation of conclusions and estimation of errors	Full 4-year education with the development of at least 240 academic credits (of which 120 contact academic lending). If the diagnostic test passes the positive level, Physics 1, General Chemistry, with a negative level, the level of the Principles of Physics and Basic fundamentals of chemistry	Chairs in the areas of natural sciences
SPECIFIC (implies reduced education due to credit transfer depending on the level of knowledge in competencies for graduates of 12-year schools, colleges, universities, including humanitarian and economic areas)				
S1	Communication skills	- Fluent bilingual oral, written and communication skills - ability to communicate fluently with a third language - writing skills of the text of a different style and genre - skills of deep understanding and interpretation of own work of a certain level of complexity (essay) - basic aesthetic and theoretical literacy as a condition for full perception, interpretation of the original text	Full credit transfer by language (Kazakh and Russian)	Department of Kazakh and Russian language
S2	Math literacy	- Special mathematical thinking using induction and deduction, generalization and concretization, analysis and synthesis, classification and systematization, abstraction and analogy	Transfer credits to the discipline Mathematics (Calculus) I	Department of Mathematics

		- ability to formulate, substantiate and prove provisions - the use of general mathematical concepts, formulas and extended spatial perception for mathematical problems - complete understanding of the basics of mathematical analysis		
S3	Special literacy in the natural sciences (Physics, Chemistry, Biology and Geography)	- A broad scientific perception of the world, providing a deep understanding of natural phenomena - critical perception for understanding the scientific phenomena of the world - cognitive abilities to formulate a scientific understanding of the forms of existence of matter, its interaction and manifestations in nature	Transfer credits for Physics I, General Chemistry, General Biology, Introduction to Geology, Introduction to Geodesy; Educational practice, etc.	Chairs in the areas of natural sciences
S4	English	- Readiness for further self-study in English in various fields of knowledge - readiness to gain experience in project and research work using the English language	Transfer credits of English language above academic to professional level (up to 15 credits)	Department of English
S5	Computer skills	- Basic programming skills in one modern language - use of software and applications for training in various disciplines -the presence of a global standard language level certificate	Transfer credits to the discipline Introduction to information and communication technologies, Information and communication technologies	Department of Software Engineering
S6	Sociohumanitarian competences	- Understanding and awareness of the responsibility of every citizen for the	Transfer credits on modern history Kazakhstan (except for the state exam)	Department of Social Studies

	and behavior	development of the country and the world - Ability to discuss ethical and moral aspects in society, culture and science		
		- Critical understanding and ability to debate for debating on modern scientific hypotheses and theories	Transfer credits in philosophy and other humanitarian disciplines	
PROFESSIONAL (implies reduced education due to credit transfer depending on the level of knowledge in competencies for graduates of colleges, AV schools, universities, including humanitarian and economic areas)				
P1	Professional competencies	- Critical perception and deep understanding of professional competencies at level 5 or 6 - Ability to discuss and argue on professional issues within the framework of the mastered program	Credit transfer in basic professional disciplines, including an introduction to the specialty, engineering ethics, robotic production technology, technological objects of automation, theoretical foundations of electrical engineering, technological measurements and devices, mathematical foundations of control theory, electronic devices of automation.	Graduate Chair
P2	General engineering competence	- Basic general engineering skills and knowledge, ability to solve general engineering tasks and problems - be able to use application packages for processing experimental data, solving systems of algebraic and differential equations	Credit transfer for general engineering disciplines (engineering graphics, descriptive geometry, fundamentals of electrical engineering, fundamentals of microelectronics.)	Graduate Chair
P3	Computer engineering competence	- Basic skills of using computer programs and software systems for	Transfer of credits in the discipline of computer graphics, computer modeling and programming	Graduate Chair

		solving general engineering tasks	in the MatLab environment.	
P4	Socio-economic competence	- Critical understanding and cognitive abilities to argue on contemporary social and economic issues - Basic understanding of the economic evaluation of objects of study and profitability of industry projects	Transfer credits for sociohumanitarian and technical and economic disciplines into the elective cycle	Graduate Chair

The university may refuse to re-calculate credits if a low diagnostic level is confirmed or in the completed disciplines the final grades were lower than A and B.

4 Requirements to complete the course and receive a diploma

Obligatory standard requirements for graduating from a university and awarding an academic bachelor's degree: mastering at least 240 academic credits of theoretical training and final certification, writing and defending a thesis (project) or preparing and passing a comprehensive exam.

Special requirements for graduation in this program.

The bachelor must:

know:

− about the basic laws of the functioning of systems and the possibilities of their system analysis;

− on modern research methods, optimization and design of computer systems for processing critical information and their support;

− about automation of modeling;

− about the possibilities of information technologies and the ways of their application in industry, scientific research, organizational management and other areas of information security;

− about trends in the development of electronics, about promising circuit solutions in the field of computing technology to ensure information security;

about the current state and development trends of computer systems and networks architectures;

- about architecture and the capabilities of microprocessor technology;

- about the use of packages and libraries in programming, about modern algorithmic languages, their areas of application and features;

- on cryptographic protection of information.

The graduate should know:

- English (technical);

− main classes of models and modeling methods, principles of constructing process models, methods of formalization, algorithmization and implementation of system models using computer technology;

− modern element base of computer technology, methods of design and calculation of elements and assemblies of electronic information processing devices;

− basic principles of organization and functioning of individual devices and computing systems in general, as well as computer networks, characteristics;

− principles of building modern operating systems, system software and ensuring its security;

− architecture of database management systems and organization of its protection;

− principles of ensuring life safety conditions in the development and operation of information security systems;

− principles of building cryptographic systems.

A graduate must be able to:

− use a formal apparatus to analyze the organizational, functional and technical structures of information security systems, to determine the composition of tasks solved by the system;

− apply the methods of system modeling in the study and design of systems, schemes of modeling algorithms, modeling languages and software packages for modeling discrete systems;

− use the methods of information technology and its means in the development and design of information security systems;

− design and protect databases;

− to use methods of analysis and synthesis of electronic circuits, microprocessor means when creating hardware and software complexes for information protection;

− use the capabilities of computer systems when building information security systems;

- apply methods and tools for the development of algorithms and programs, methods of structured programming, methods of writing an algorithm in a high-level language, methods of debugging, testing and documenting programs;

− use system software tools, operating systems and shells serving service programs;

− use models of threats, information attacks and countering them;

− use means of cryptographic information protection;

have skills:

− statement of the problem, the use of models, methods and means of information technology in the creation of systems for processing critical information and management;

− using modeling languages for research and design of critical information processing systems;

− analysis of electrical circuits under various influences in the time and frequency domains analytically and numerically on a computer;

− programming in modern operating environments and database management environments;

− analysis of information security conditions and selection of technical and organizational measures to ensure information security at the stage of design, manufacture and operation of critical information processing facilities;

− the use of basic models, methods and tools used in systems to automate the solution of information security problems;

− the use of database technology for the secure processing of critical information;

− work with means of cryptographic information protection.

be competent:

− in modern trends in the development of information security technologies and the ways of their application in experimental research, design, production and technological and organizational and management activities;

− in the application of standards, methodological and regulatory materials that determine the design and development of objects of professional activity;

− in the application of models, methods and tools for analysis and development of mathematical, linguistic, information and software for secure computer systems for processing critical information;

− in methods and means of intellectual property protection;

− in economic, organizational and legal issues of labor organization, organization of production and scientific research;

− in modern trends in the development of cryptography technologies.

5 Curriculum

MAJOR CURRICULUM

Educational program 6B301- "Information security"

Specializations: "Security systems and networks", "Cryptographic protection of information", "Technical protection of information"

Group of Educational programs B058 - "Information Security"

Full-time study Study duration : 4 years Academic degree: bachelor of in Information and Communication Technologies for the Information Security educational program

Year of study	Code	Name of discipline	Cycle	total credits	lec/lab/pr/SIS		pre-requisites
1	**1st semester (autumn 2019)**						
	LNG 1051	Beginner (A1)	G	6	0/0/3/3	S4	Diagnostic test
	LNG 1052	Elementary English (A1)					
	LNG 1053	General English 1 (A2)					
	LNG 1054	General English 2 (A2)					
	LNG 1055	Academic English (B1)					
	LNG 1056	Business English (B2)					
	LNG104.1-2	Kazakh (Russian) A1	G	4	0/0/2/2	S1	Diagnostic test
	LNG101.11-21	General Kazakh (Russian) A2					

Code	Name of discipline	Cycle	total credits	lec/lab/pr/SIS		pre-requisites
2nd semester (spring 2020)						
LNG 1052	Elementary English (A1)	G	6	0/0/3/3	S4	LNG 1051
LNG 1053	General English 1 (A2)					LNG 1052
LNG 1054	General English 2 (A2)					LNG 1053
LNG 1055	Academic English (B1)					LNG 1054
LNG 1056	Business English (B2)					LNG 1055
LNG 1057	Professional English (B2+)					LNG 1056
LNG101.11-21	General Kazakh (Russian) A2	G		0/0/2/3		LNG10121
LNG101.12-22	Academic Kazakh (Russian) B1					LNG101.11-21

	LNG101.12-22	Academic Kazakh (Russian) B1						LNG101. 13-23	Business Kazakh (Russian) B2		4		S1	LNG101.12-22
	LNG101. 13-23	Business Kazakh (Russian) B2						LNG102.1-2, LNG103.1-2	Electives (C1)					LNG101. 13-23
	HUM113	Modern history of Kazakhstan	G	6	1/0/2/3	S6	no	PHY111	Physics I	B	6	1/1/1/3		PHY110
	SEC 114	Introduction to the specialty	B	6	2/1/0/3		no	PHY112	Physics II					PHY111
	MAT100	Algebra and mathematical analysis	B	6	1/0/2/3	S2	Diagnostic test	MAT101	Mathematics I	B	6	1/0/2/3		MAT100
	MAT101	Mathematics I						MAT102	Mathematics II					MAT101
	PHY110	Introduction to physics	B	6	1/1/1/3	S3	Diagnostic test	ECL196	Physical fundamentals of electronics	B	6	1/1/1/3		
	PHY111	Physics I						CSE155	Algorithmization and Programming	B	6	1/1/1/3		
	Total:			**34**	**17**			**Total:**			**34**	**17**		
2	**3rd semester (autumn 2020)**							**4th semester (spring 2021)**						
	LNG 1053	General English 1 (A2)	G	6	0/0/3/3		LNG 1052	LNG 1054	General English 2 (A2)	G	6	0/0/3/3	no	LNG 1053
	LNG 1054	General English 2 (A2)					LNG 1053	LNG 1055	Academic English (B1)					LNG 1054
	LNG 1055	Academic English (B1)					LNG 1054	LNG 1056	Business English (B2)					LNG 1055
	LNG 1056	Business English (B2)					LNG 1055	LNG 1057	Professional English (B2+)					LNG 1056
	LNG 1057	Professional English (B2+)					LNG 1056	2103	Electives (B2+)					LNG 1056
	MAT102	Mathematics II	B	6	1/0/2/3		MAT101	MAT103	Mathematics III	B	6	1/0/2/3		MAT102
	MAT103	Mathematics III					MAT102	MAT105	Ordinary differential equations MatLab					MAT103
	MAT113	Discrete Mathematics	B	6	1/0/2/3		MAT101	HUM124	Phylosophy	G	6	1/0/2/3		no
	CSE127	Object Oriented Programming	B	6	2/1/0/3		CSE155	SEC163	Digital Circuitry	B	6	1/1/1 /3		ECL1

	PHY112	Physics II	B	6	1/1/1/3		CSE616
	CSE109	Introduction to Web-programming			2/1/0/3		CSE155
	SEC 174	Basics of cryptographic protection of information	B	6	2/0/1/3		MAT101,102,SEC 114
	Total:			**36**	**18**		
3							
	5th semester (autumn 2021)						
	MAT105	Ordinary differential equations MatLab	B	6	1/0/2/3		MAT103
	SEC129	Differential equations. MatLab					MAT105
	CSE122	Computer Networks	B	6	2/1/0/3		
	SEC173	Digital Device Design	B	6	2/0/1/3		SEC114,SEC163
	SEC135	Designing secure Web-based applications	B	6	2/1/0/3		SEC 114
	SEC126	Organization and securing databases	B	6	2/1/0/3		SEC 114
		Electives	G	6	1/0/2/3		
	Total:			**36**	**18**		
4	**7th semester (autumn 2022)**						

	SEC 118	Information basis of information protection	B	6	2/0/1/3		SEC 114
	SEC 106	Operating System Security	B	6	2/1/0/3		SEC 114
	Total:			**36**	**18**		
	6th semester (spring 2022)						
	HUM126	Social & Political Knowledge	G	8	4/0/0/4	S6	no
	CSE607	Computer Architecture and Concurrency	B	6	1/1/1/3		
	SEC121	Cryptographic Information Security Systems	S	6	2/1/0/3		
	SEC143	Technologies of protection of computer information	S	6	2/0/1/3		CSE620
	SEC116	Identify and analyze vulnerabilities	S	6	2/1/0/3		CSE122
	SEC171	Social engineering and ethical hacking	S	6	2/1/0/3		SEC163
	SEC160	Security of networking technologies	S	6	2/1/0/3		SRC106,CSE122
	SEC122	Mathematics of cryptography			2/0/1/3		SEC147
	SEC151	The organization of microprocessor systems			2/1/0/3		SEC163,SEC173
	Total:			**44**	**22**		
	8th semester (spring 2023)						

SEC136	Development and protection of server databases	S	6	2/1/0/3		SEC126
SEC111	Securing cloud technologies	S	6	2/1/0/3		SEC114,SEC106
SEC	Intrusion Prevention Systems	S	6	2/1/0/3		SEC143,SEC160
SEC169	Standardization and certification of cryptographic tools			2/0/1/3		SEC143,SEC121
SEC142	Technical means and methods of information protection			2/1/0/3		ELC 1,SEC163
CSE411	System and Network Administration	S	6	2/1/0/3		SEC106,CSE122
SEC168	Technologies for building cryptographic information security					SEC147,SEC121
SEC152	Microcontrollers					SEC163,CSE127
ECA101	State examination in the specialty	FA	4			
Total:			**28**	**12**		

SEC172	Organizational and legal aspects of information security and computer forensics	S	6	2/0/1/3		SEC114,SEC118
SEC113	Biometric and neural networks	S	6	2/1/0/3		MAT101,CSE155,SEC118
SEC	internet of things security	S	6	2/1/0/3		SEC160,CSE122
SEC170	Designing cryptographic information security systems			2/1/0/3		SEC147,SEC121,SEC168
SEC166	Organization and management of information security service			2/0/1/3		SEC114,SEC143
ECA101	State Examination in the Speciality	FA	4			
ECA102	Defence of Thesis	FA	6			
Total:			**28**	**9**		

Additional academic programes (AAP)				
Year of study	**Code**	**Name of discipline**	**Credits**	**Semester**

Total number of credits			
Cycle of disciplines	**Credits**		
	compul-sary	**elective**	**total**

2	AAP122,132	Physical training	0	3-4
2-3	AAP500	Military training	0	3-6
	AAP 106, 118	Physical training	4	1-2
	AAP101	Training Practice	2	2
	AAP109	Field Practice I	2	4
	AAP103	Field Practice II	4	6

Cycle of general disciplines (G)	52	6	**58**
Cycle of basic disciplines (B)	126	0	**126**
Cycle of special disciplines (S)	54	24	**78**
Total of theoretical study	**232**	**30**	**262**
Additional academic programes	12	2	**14**
Final attestation (FA)	14	0	**14**
Total:	26	2	**28**
Total:	**258**	**32**	**290**

6 Descriptors of the level and volume of knowledge, skills, abilities and competences

In the process of mastering the educational program, the bachelor of engineering and technology must have the following key competencies.

A – knowledge and understanding:

A1 – scientific principles underlying the study of general professional and special disciplines, containing both basic and advanced courses for fundamental training in the field of information security and protection.

A2 – organization of computing systems and networks; digital device design; application of programming languages and technologies; knowledge of the mathematical foundations of cryptography; principles of operation and technical characteristics of the used means of technical and cryptographic protection of information, standards and protocols for the security of systems and networks, security of databases, cloud technologies and operating systems.

A3 – system analysis methodology; design and decision making in complex and professional situations; ways of communication and coordination of points of view; preparation and presentation of analytical and project documentation.

B – application of knowledge and understanding:

B1 - to analyze the subject area, determine goals and ways to achieve them;

B2 - for self-development and promotion of various options for solving professional problems using theoretical and practical knowledge;

B3 – for designing information security systems taking into account real constraints; design and protection of server databases; designing and protecting Web applications; design of technical means of information protection, including cryptographic;

B4 – to organize and ensure information security of the enterprise; to organize work on the collection, storage and processing of information used in professional activities.

C – forming judgments:

C1 - about modern trends in the field of information security, about new technologies in the development of means of protection and security of information;

C2 - about modern approaches in information security to ensure and organize the protection of information, while being able to compare, form conclusions, build your own argumentation, express and substantiate your position;

C3 – about modern technical, cryptographic, integrated support of information protection and security systems, which allows creating optimal options for solving professional problems.

D – personal abilities:

D1 - awareness of the social significance of the profession, adherence to the principles of professional ethics, improvement of the professional and personal qualities of a specialist in the field of information protection and security;

D2 - striving to develop intellectual, moral and ethical, communication, organizational and management skills;

D3 - the ability to listen, persuade and argue, the ability to find a compromise, to correlate one's opinion with the team, the ability to communicate professionally in public;

D4 - the ability to organize work on the collection, storage and processing of information used in the field of professional activity, in global computer systems, networks, in library funds and other sources of information.

7 Competences to complete training

Competence profile	
Purpose of learning: Specialists in this educational program should be able to use the formal apparatus to analyze the organizational, functional and technical structures of information security systems; determine the composition of tasks to be solved by the system; use the methods of information technology and its means in the development and design of information security systems; design and secure databases; to use methods of analysis and synthesis of electronic circuits, microprocessor means when creating hardware and software complexes for information protection; use the capabilities of computer systems when building information security systems; use system software tools, operating systems and shells that serve service programs; use models of threats, information attacks and countering them. The development of technology in the field of information security requires constant changes in the quantity and quality of knowledge and skills from a graduate. Graduates of the direction of information security and protection should be ready, if necessary, to study new technologies in the field of information security. Professional standards should reflect the requirements for continuous professional development of information	After completing the educational program, depending on the chosen track, the graduate is able to: - use the formal apparatus to analyze the organizational, functional and technical structures of information security systems, to determine the composition of tasks solved by the system; - apply methods of system modeling in the study and design of systems, schemes of modeling algorithms, modeling languages and packages of applied programs for modeling discrete systems; - use information technology methods and its means in the development and design of information security systems; - design and secure databases; - to use methods of analysis and synthesis of electronic circuits, microprocessor means when creating hardware and software complexes for information protection; - use the capabilities of computer systems when building information security systems; - apply methods and tools for the development of algorithms and programs, methods of structured programming, methods of writing an algorithm in a high-level language, methods of debugging, testing and documenting programs;

security specialists, especially in connection with career growth and transition to new skill levels.	- use system software, operating systems and shells serving service programs; - use models of threats, information attacks and countering them.
Title of section, section ORK, State compulsory standard of higher education	Information and communication technologies
Areas of competence (labor functions)	A specialist in technology of the educational program "Information Security" can work in the direction: - Information Security Auditor - Information Security Engineer - Information Security Administrator - System Administrator - Information security specialist - Database Analyst - Researcher Heads of services and departments in the field of information and communication technologies and information security. A specialist in technology of the educational program "Information Security" must perform: Information security audit. Organization of an information security system. Design of information protection and security systems. Organization, design and protection of server databases. Analysis and Penetration Testing Administration of systems and networks. Protection against unauthorized access to information. Carrying out works on standardization and certification of cryptographic information protection. Organization of technical protection of information. Providing cryptographic protection of information. Ensuring the safe and smooth operation of systems and networks.

List of competencies within the academic degree

Competence code	Competency	
General competences		
GC1	Knowledge of the historical, cultural and scientific achievements of the Republic of Kazakhstan; use data from historical sources and special literature; analyze and evaluate historical facts and events	
GC2	Possession of a broad social, political and professional outlook	
GC3	Have an idea of the subject, functions, main sections and directions of philosophy; the place and role of philosophy in the life of society and man, apply knowledge of philosophical and methodological principles of cognition in professional activity	
GC4	Think logically, master the methods of induction and deduction, determine cause-and-effect relationships; own methods of decomposition, analysis and synthesis of systems	
GC5	Knowledge of Kazakh, Russian, foreign languages. Ability to work with scientific and technical literature in Kazakh, Russian and foreign languages; search for scientific and technical information; understand the information provided at a normal pace, with the subsequent transfer of its content. Conduct an intercultural dialogue, develop and deepen their knowledge, be open to new information; establish professional contacts and develop professional communication in a foreign language; carry out business contacts in a foreign language; know the terminology, read literature on the specialty in a foreign language	
GC6	Plan the stages of scientific research, organize searches and select relevant information	
GC7	To structure and edit information, prepare technical and scientific documentation in accordance with existing requirements;	
GC8	Ability to reasonably and clearly build oral and written speech, to clarify your view of the problem.	
GC 9	Ability to analyze, model, design, implement, test, and evaluate information and communication technology systems.	
Basic competencies		
BC1	Use the fundamental concepts of mathematics in professional activities; to prove mathematical statements, to solve mathematical problems and problems, to reveal their essence, to translate into mathematical language problems posed in terms of other subject areas, in particular IT technologies; set math problems; build mathematical models; select suitable mathematical methods and algorithms for solving problems; conduct high-quality mathematical research.	

BC2	Apply the basic methods of formalizing reasoning, the basic concepts of the theory of logical functions, the theory of algorithms, the theory of graphs, the theory of coding; to use the conceptual apparatus and methods of discrete mathematics to analyze mathematical models in solving problems of professional activity.	
BC3	Apply theoretical knowledge to solve generalized typical physical problems in mechanics, molecular physics and thermodynamics, electricity; conduct a physical experiment; calculate, analyze and process the results of a physical experiment.	
BC4	Select elements of electronic circuits, make the necessary calculations, compile a mathematical description of the functioning of devices and determine their characteristics; determine the parameters of semiconductor devices and circuitry elements.	
BC5	Formulate technical requirements taking into account the functions performed by computing systems; justify architecture; define tools for assessing the performance of systems.	
BC6	Use methods for constructing various models of data types, information processing algorithms; rationally use the opportunities provided by the algorithmization technique for solving practical problems.	
BC7	Use a unified modeling language, implement a structured and object-oriented approach to working with tools.	
BC8	Perform typical tasks of design, deployment and technical support of local and global networks; administer networks in modern operating systems.	
BC9	Analyze the principles of building cryptoalgorithms; develop and apply cryptographic systems; analyze and solve the issues of cryptographic protection of information and the use of modern cryptographic methods of information protection.	
BC10	Be competent in the application of information theory to ensure the protection and security of information.	
BC11	Be competent in creating, developing, and designing secure Web applications.	
BC12	Apply the professional, managerial and communication skills obtained in the study of the discipline, namely, to practically apply the principles of building operating systems and ensure its security.	
Professional competences		
PC1	Apply database technology to securely organize, receive, store, process and transmit information.	

PC2	Ensure the integrity and reliability of data in databases using integrity constraints, views, triggers, and stored procedures. Perform backup, restore, monitoring and audit of database systems. Use the capabilities of the SQL language to protect database systems, manage access rights, encrypt database objects.	
PC3	Create and program microcontroller and microprocessor systems. Organize microprocessor systems, inter-module communications in the system. Use typical design solutions for microprocessor systems.	
PC4	Work in CAD for electrical schematic diagrams and printed circuit boards. Participate in the development of projects for various electrical units and assemblies using microcontrollers. Program in C language.	
PC5	The ability to identify possible channels of information leakage, to carry out technical protection measures. Apply passive and active methods and means of protecting information. To carry out engineering and technical measures to protect and practically apply measures to protect objects and information from technical means of reconnaissance.	
PC6	Ability to determine the optimal structure of the information security service. Organize and carry out all types of work of the information security service. Develop normative and methodological documents for the organization and functioning of the information security service.	
PC 7	Be able to put into practice secure technologies (virtual private networks, wireless networks). Configure wireless means of transmitting information and understand the devices of workstations and servers, telecommunication devices for data transmission.	
PC 8	Ability to perform hands-on analysis and use data loss prevention systems. Manage security policies within the DLP system, as well as monitor and control data.	
PC 9	The ability to ensure the security and resiliency of the network and servers.	
PC 10	Ability to apply the mathematical foundations of asymmetric and symmetric cryptosystems algorithms. Build models of encryption systems, as well as be competent in the basic principles of building cryptoalgorithms.	
PC 11	Ability to apply modern information technologies in standardization and certification systems.	
PC 12	Ability to build and design cryptographic information security tools. Use the implementation of algorithms for cryptographic protection of information to solve practical problems.	

PC 13	Ability to apply knowledge and skills to apply legal and organizational measures to protect information. Put into practice knowledge of computer forensics and cybercrime investigation.	
PC 14	The ability to assess the scale of potential attacks. Counteract unauthorized collection of information about the organization's network and understand the attacker's strategy. Be able to identify a socially engineered attack and counter intrusion.	
PC 15	Ability to understand IoT systems that can solve global manufacturing problems, as well as be able to design and build an IoT prototype on real devices.	
PC 16	Ability to apply biometric information security technologies. Be able to use a number of algorithms implementations to solve practical problems.	
PC 17	Ability to apply virtualization systems and cloud technologies to solve practical problems and find vulnerabilities in virtual machines. Be able to apply standard cloud security best practices.	

Special and management competencies	
SC 1	Ability to lead the process of designing and organizing information security systems using technical and cryptographic information security tools.
SC 2	Application of theoretical knowledge to develop and present your own conclusions when solving production problems in the field of IT and information security. Ability to make decisions in complex and non-standard situations in the field of organization and management of the enterprise.

B – Basic knowledge and skills:

B1- be able to analyze current problems of the modern history of Kazakhstan;

B2 - know and apply in practice the fundamentals of engineering professional ethics;

B3 - know modern and promising directions for the development of information security, cryptographic protection of information, computer security, modern trends in information protection.

P – Professional competencies, including in accordance with the requirements of industry professional standards:

P1 - a wide range of theoretical and practical knowledge in the professional field;

P2 - the ability to organize, provide, design information security systems; work with various means and methods of information protection; configure, administer and secure systems, networks, databases, cloud technologies and operating systems;

Р3 - ability to provide organizational, cryptographic, technical and complex user support.

О – Universal, social and ethical competences

О1 - ability for continuous learning, for concentration of attention; to be self-confident in the face of uncertainty; have a high level of spatial and logical thinking;

О2 - the ability to work in a team, have organizational skills, set priorities, quickly master new knowledge and skills, and apply them in practice;

О3 - be result-oriented, effectively plan and streamline your development;

О4 - the ability to freely use English as a means of business communication, a source of new knowledge in the field of information security.

С – Special and managerial competences:

С1 - independent management and control of the processes of labor and educational activities within the framework of the strategy, policy and goals of the organization, critical discussion of the problem, reasoning of conclusions and competent handling of information;

С2 - the ability to motivate to solve certain problems, the ability to take responsibility for the result of work performed at the level of a department or enterprise;

С3 - the ability to demonstrate a set of skills in managing the work process, the ability to choose methods, techniques and evaluation criteria for obtaining results, to distribute and delegate authority, to form teams, and also to make decisions during the production process.

8 Minor Education Policy

When mastering at least 12 credits in the disciplines of the program, including the following mandatory disciplines:

М1- English language;

М2- Kazakh (Russian) language

М3 - Modern history of Kazakhstan;

М4 – Physics 1 and 2;

М5 - Mathematics 1,2,3;

М6 – Information Communication Technology;

М7- Basic Principles Of Information Protection;

М8- Digital Circuits;

М9- Operating system security,

An additional Minor specialty is assigned with the issuance of an application to the diploma of the established sample.

9 ECTS Diploma Supplement

ECTS – European Credit Transferand Accumulation System (European system of transfer and accumulation of points) a pan-European system of accounting for student academic work in the development of an educational program or course. In practice, the ECTS system is used when students move from one educational institution to another throughout the European Union and other European countries that have adopted this system, including the Republic of Kazakhstan. One academic year corresponds to 60 ECTS credits (36 credits of the Republic of Kazakhstan), which is about 1500-1800 academic hours.

To take a bachelor's degree, you need to collect 240 in academic credits.

The application consists of 8 mandatory items in English / Kazakh / Russian. It is a standardized text that confirms the compliance of the developed application with European standards. The form of the European Diploma Supplement is given in Appendix A.

Section 1 Information about the holder of the qualification: the last name, first name (as recorded in the passport), date and place of birth, identification number or student code are indicated.

Section 2 Information about the qualification obtained: name of qualification, major major, minor minor (if any), name and status of the higher education institution that awarded the qualification in its native language, name and status of the higher education institution that awarded the qualification in English, language of instruction and knowledge control.

Section 3 Information on the level of qualification: the level of qualification is indicated - bachelor's (master's, doctoral), duration of study, admission requirements.

Section 4 Information on the content of training and the results obtained: the form of training is indicated - full, distance, abbreviated complete, the requirement of the program (the required volume for mastering the program), the content of the educational program (compulsory and elective disciplines, coursework completed by the student, internships completed, protected diploma work with an indication of the labor intensity of disciplines, practices, term papers and theses, status (mandatory, optional, optional), final grades) in loans of the Republic of Kazakhstan and ECTS, the national rating scale approved by the order of the MONRK and its description, the mechanism for transferring grades into the European system, general classification of qualifications.

Section 5 Professional characteristics of qualifications: does the acquired qualification make it possible to move to the next stage of education and what requirements must be met for this, professional status (what professional rights students acquire with the qualification).

Section 6 Additional information: additional information about the university, additional sources of information.

Section 7 Certification of the application: the date of awarding the qualification, date of issue, surname, name of the official certifying the diploma supplement, signing the diploma itself is indicated; all this information is certified by a seal.

Section 8 Information on the national higher education system.

This application is issued only upon graduation from the university at the request of a graduate on a reimbursable basis in accordance with the norms established by the university.

To receive the application, you must submit a written (electronic) application to the university office with a copy of the payment receipt attached.

The application is issued by the Office by the registrar within 15 working days from the date of application and is registered in the journal for issuing and registering diplomas and applications. Application forms are kept at the Registrar's Office. An electronic record of the issuance of this Diploma Supplement is generated in the graduate's personal portfolio on the university's portal.

10 List of modules and learning outcomes

EP – Information Security
Qualification: Bachelor in Information and Communication Technologies for the educational program "Information Security"

Module name	Learning outcomes (in accordance with professional objectives)	Criteria for assessing learning outcomes	Disciplines, forming the module
General education modules (OOM)			
OOM1 Module of social sciences	**To have an idea** of individual phenomena and events of the historical past with the general paradigm of the world-historical development of human society **Able** to comprehend objectively and comprehensively the immanent advantages, features and significance of the Kazakhstani development model	Oral survey, testing, report, midterm control, semester work	**DOOM1.1.** Modern history of Kazakhstan
	To have an idea of the subject, functions, main sections and directions of philosophy; place and role of philosophy in the life of society and individuals; the main stages of the development of world and Kazakh philosophical thought; **Able** to identify correct and incorrect forms of argumentation; analyze the meaning and forms of knowledge; master the methods of decomposition of systems and objects, analysis and synthesis of complex systems.	Oral survey, testing, report, midterm control, semester work	**DOOM1.2.** Philosophy
OOM2 Module of language training	**Able** to conduct a dialogue in a foreign language, using the rules of speech etiquette; establish professional contacts and develop professional communication in a foreign language; receive information from the media, listen to and analyze news and reports on current events;	Oral survey, testing, report, midterm control, semester work	**DOOM2.1.** Foreign Language Beginner (A1) Elementary English (A1)

	conduct interviews, clarify and confirm information, developing the most interesting points; explain your point of view on a topical issue, expressing all the arguments "for" and "against", defend your position during debates, discuss; express your point of view in writing, keeping the structure of the written response; write business letters, annotations, detailed messages on a given topic, reports, analyze charts, briefly describe the main idea of articles or texts.		General English 1 (A2) General English 2 (A2) Academic English (B1) Business English (B2) Professional English (B2+)
	Able to conduct a dialogue in the Kazakh language, using the rules of speech etiquette; establish professional contacts and develop professional communication in the Kazakh language; receive information from the media, listen to and analyze news and reports on current events; conduct interviews, clarify and confirm information, developing the most interesting points; explain your point of view on a topical issue, expressing all the arguments "for" and "against", defend your position during debates, discuss; express your point of view in writing, keeping the structure of the written response; write business letters, annotations, detailed messages on a given topic, reports, analyze charts, briefly describe the main idea of articles or texts.	Oral survey, testing, report, midterm control, semester work	**DOOM2.2.** Kazakh (Russian) Language Kazakh (Russian) Language (A2) Academic Kazakh (Russian) Language (B1) Business Kazakh (Russian) Language (B2)
OOM3 Module of Information and communication technology	**To have an idea** of the computer device; architecture of computing systems; information and communication technology infrastructure; about the interface of modern operating systems; about	Oral survey, testing, report, midterm control, semester work	**DOOM2.3.** Information and communication technologies

	types of information security threats, principles, tools and methods of data protection. **Able** to work with interfaces of modern operating systems and application software; apply modern social, cloud, email platforms to organize business processes; program in an algorithmic programming language; analyze, model, design, implement, test and evaluate information and communication technology systems.		
Basic modules (BM)			
BM1 Module of Physics and Mathematics	**To have an idea** of the differential calculus of functions of several variables, ordinary differential equations, multiple integrals, numerical and functional series. **Able** to use knowledge about the basic principles of the theory of differential and integral calculus of functions of several variables, the theory of differential equations, the theory of series.	Oral survey, testing, midterm control, semester work	**D**BM1.1. Mathematicss Algebra and an introduction to calculus Mathematics I Mathematics II Mathematics III Ordinary differential equations in Matlab Partial differential equations in Matlab Theory of Probability and Mathematical Statistics Discrete Math
	To have an understanding of the basic concepts, laws and models of mechanics, molecular physics, electricity, magnetism, thermodynamics and statistical physics **Able** to apply theoretical knowledge to solve generalized typical physical problems in mechanics, molecular physics and	Oral survey, testing, midterm control, semester work	**D**BM1.2. Physics Fundamentals of physics Physics I Physics II

	thermodynamics, electricity; work with measuring instruments; conduct a physical experiment; calculate, analyze and process the results of a physical experiment.		
BM2 Module of programming	**To have an idea** of the concepts of a program, an algorithm, types of processes, formal rules for describing algorithms. **Able** to compose algorithms for solving problems; develop programs using the means of C, Python; organize the necessary data structures; analyze and fix errors in the program; write programs in good style.	Oral survey, testing, report, midterm control, semester work	**D**BM2.1. Algorithmization and programming basics
	To have an understanding of the principles of object-oriented programming: encapsulation, inheritance, polymorphism, abstraction, relationships between classes. **Able** to perform task decomposition; create abstractions of data and their interactions; use polymorphism tools to implement complex solutions; apply design patterns correctly	Oral survey, testing, report, midterm control, semester work	**D**BM2.2. Object Oriented Programming
BM3 Module of computing systems architecture	**To have an idea** of the architecture of a computer; principles of organization of multiprocessor and multi-machine computing systems; directions of development of computers with traditional, parallel and non-traditional architecture; principles of building data transmission networks. **Able** to: formulate technical requirements taking into account the functions performed by	Oral survey, testing, report, midterm control, semester work	**D**BM3.1. Fundamentals of Electronics Digital circuitry Computer architecture and concurrency Design of digital devices

	computer systems; justify architecture; define tools for assessing the performance of systems.		
	To have an understanding of modern computer networks, network models, principles of administration of network devices under the Cisco operating system, operating systems of mobile devices, principles of functioning of the main OSI levels, methods of transmission, storage, search, processing and presentation of information. **Able to**: perform typical tasks of design, deployment and technical support of local and global networks; administer networks in modern operating systems.	Oral survey, testing, report, midterm control, semester work	**DBM3.2.** Computer networks
BM4 Module of information security	**To have an idea:** - about the basic concepts, terms and concepts of cryptography, cryptology and cryptanalysis; modern cryptographic methods of information protection; basic principles of building cryptoalgorithms; **Able** to analyze the principles of building cryptoalgorithms; apply the mathematical foundations of algorithms; analyze and solve the issues of cryptographic protection of information and the use of modern cryptographic methods of information protection.	Oral survey, testing, report, midterm control, semester work	**DBM4.1.** Fundamentals of cryptographic information protection
	To have an understanding of the basic concepts of information theory; about the problems of transferring discrete information;	Oral survey, testing, report, midterm control, semester work	**DBM4.2.** Information bases of information protection

	about the problems of coding and encryption of information; about the main trends in the development of Web-technologies; about the principles of construction and development about designing Web-applications and organizing the security of Web-applications. **Able** to use measures and forms of representation of discrete information, number systems to represent numbers; encode information using correction codes; use simple cryptographic ciphers. Competent in the application of information theory to ensure the protection and security of information; in the creation, development and design of secure Web-applications.		
	To have an idea of the principles of building operating systems; about the architecture of operating systems; about process and memory management; on the organization of input-output processes; about file systems and network management; about the organization of protection of the operating system. **Able** to apply professional, managerial and communication skills acquired during the study of the discipline; practically apply the principles of building operating systems, create and use processes; use and allocate operating system resources; organize I / O processes and manage memory; organize virtual memory, work in the	Oral survey, testing, report, midterm control, semester work	**D**$_{\text{ВМ4.3}}$. Operating system security Designing secure web applications

	network, the ability to work with technical literature, acquire new knowledge.		
Professional modules (PM)			
PM1 Module of Database Security	**To have an understanding** of the basics of a secure database organization and database architecture; basic data models and data operations; on the language means of describing and manipulating data in the DBMS; about the standard SQL relational query language; on the principles of building database applications. **Able** to work with databases; create objects, queries, applications in databases; be competent in the application of database technologies for the secure organization, receipt, storage, processing and transmission of information.	Oral survey, testing, report, midterm control, semester work	**DPM1.1.** Organization and security of databases
	To have an idea of the criteria for evaluating reliable databases; on methods of designing secure databases; on the built-in mechanisms of database management systems and their security; access control strategy in database management systems; about the principles of managing transactions and locks; on the principles of using the built-in cryptographic capabilities of database management systems for encrypting databases. **Able** to apply the ER-method of relational database design and perform database engineering; ensure the integrity and reliability of data in databases using integrity constraints,	Oral survey, testing, report, midterm control, semester work	**DPM1.2.** Designing and securing backend databases

	views, triggers and stored procedures; perform backup, recovery, monitoring and audit of database systems; leverage the power of SQL to secure database systems and manage access rights and encrypt database objects.		
PM2 Module of Hardware and technical information security	**To have an idea** of the architecture, types of microprocessor systems; on the principles of operation and programming of microprocessor and microcontroller systems; about terminology, classifications and basic types of microprocessors; about the concepts of microprocessor architecture; on hardware and software for supporting the design of microprocessor systems; on the construction of digital control systems for technical systems. **Able** to create and program microcontroller and microprocessor systems; organize microprocessor systems, inter-module connections in the system; use standard design solutions for microprocessor systems; create programs for microprocessor systems in high and low level languages.	Oral survey, testing, report, midterm control, semester work	**D**PM2.1. Organization of microprocessor systems
	To have an understanding of the basics of the functioning of semiconductor components and their practical application; on the rules for the execution and design of electrical schematic diagrams using CAD "Altium Designer" and the preparation of design and text documents established by GOST; about the internal	Oral survey, testing, report, midterm control, semester work	**D**PM 2.2. Microcontrollers

	structure of microcontrollers and the principles of operation of components and interfaces. **Able** to work in CAD Altium Designer for drawing up electrical schematic diagrams and printed circuit boards; work with the CooCox development environment for programming STM32 microcontrollers; participate in the development of projects for various electrical components and assemblies using microcontrollers; program in C language.		
	To have an understanding of the basics of technical aspects of information security; the types of methods and means used to counter technical intelligence, technical methods of information protection; about technical means of unauthorized information retrieval. **Able** to identify possible channels of information leakage; carry out technical protection measures; apply passive and active methods and means of information protection; carry out engineering and technical protection measures; practically apply measures to protect objects and information from technical means of reconnaissance.	Oral survey, testing, report, midterm control, semester work	**DPM 2.3.** Technical means and methods of information protection

	To have an idea of the main tasks and functions of the information security service; the types of organizational structures of information security services; on the procedures and technologies for the creation and reorganization of the information security service; about the basic methods and technologies of information security service management. **Able** to determine the optimal structure of the information security service; organize and ensure the creation of an information protection service; carry out the selection, placement of personnel and training of employees of the information security service; organize and carry out all types of work of the information security service; to manage and control the activities of employees of the information security service; to develop normative and methodological documents for the organization and functioning of the information security service.	Oral survey, testing, report, midterm control, semester work	Organization and management of information security service
PM3 Module of system and network security	**To have an understanding** of modern technologies to ensure the protection of data transmission; about wireless data transmission technology; on the relationship between modern hardware and software data protection technologies; on the ways of implementing safe technologies; on the methods of hardware and software protection of wireless information transmission; information transfer protocols;	Oral survey, testing, report, midterm control, semester work	**D**PM 3.1. Network technology security

	about possible threats during wireless transmission of information. **Able** to formalize an abandoned task; to put into practice secure technologies (virtual private, wireless networks); configure wireless means of information transmission; understand the devices of workstations and servers, telecommunication devices for data transmission; make an informed choice of standard peripheral equipment; manage network security; apply the knowledge gained to various subject areas**.**		
	To have an idea of the purpose and principles of DLP systems functioning; about the technical possibilities of obtaining information about user activity; analysis of incidents; on the analysis of information data flows. **Able** to perform practical analysis and use data loss prevention systems; manage security policies within the DLP system; monitor and control data; generate reports on user activity and incidents.	Oral survey, testing, report, midterm control, semester work	**DPM 3.2.** Intrusion prevention and detection systems
	To have an idea of the principles of building cable systems; on issues of administration of systems and networks; on the organization of user access to the Internet, the publication of web servers on the Internet. **Able** to install, configure and administer peer-to-peer and domain-based networks; create and administer file servers, print servers, Internet	Oral survey, testing, report, midterm control, semester work	**DPM 3.3.** Administration of systems and networks

	servers, terminal servers, application servers; organize user access to the Internet, the publication of web servers on the Internet; set up an e-mail system on the network; organize routing between networks, remote user access to the network, VPN access; ensure the safety and resiliency of the network and servers.		
PM4 Module of cryptographic information protection	**To have an idea** of the basic principles of building cryptoalgorithms; about the mathematical foundations of algorithms for asymmetric and symmetric cryptosystems; about the model of encryption systems; about mathematical foundations and algorithms. **Able** to apply the mathematical foundations of algorithms for asymmetric and symmetric cryptosystems; - build models of encryption systems; - be competent in the basic principles of building cryptoalgorithms.	Oral survey, testing, report, midterm control, semester work	**DPM 4.1.** Cryptographic information security systems Crypto mathematics
	To have an understanding of the general issues of theory and practice of standardization and certification; on the development of modern information technologies and their use in standardization and quality management; about systems of standardization and certification; on the problems and trends in the development of standardization and certification in the field of information security and certification of cryptographic means; on the organizational and technical foundations for the creation and	Oral survey, testing, report, midterm control, semester work	**DPM 4.2.** Cryptographic standardization and certification

	improvement of control systems and quality assurance systems management; **Able** to apply modern information technologies in standardization and certification systems; apply hardware and software for control, management and quality assurance; manage information security.		
	To have an idea of the main methods and means of cryptographic information protection; about technologies for building cryptographic information protection tools; on the principles of using encryption keys; about new directions in cryptography; about the basic tools, methods and software development tools. **Able** to use means of cryptographic information protection; build virtual private networks; develop platform-independent programs by methods of unification of data types, function calls, the skill of creating interfaces; apply the mathematical apparatus to solve the assigned tasks.	Oral survey, testing, report, midterm control, semester work	**DPM 4.3.** Technologies for building cryptographic information protection systems Programming of information security systems
PM5 Module of biometric information security	**To have an understanding** of the basics of artificial intelligence; about the basics of decision making theory; - about biometrics and biometric information security systems. **Able** to create intelligent systems; use a number of implementations of machine learning algorithms to solve practical problems; understand the basic concepts of decision	Oral survey, testing, report, midterm control, semester work	**DPM 5.1.** Biometrics and neural networks

	theory, vision and language in understanding human intelligence from a computational point of view; use regression, classification and clustering algorithms in order to develop intelligent systems.		
PM6 Module of legal aspects of information security and social engineering	**To have an understanding** of the issues of certification of information security means; on licensing of information protection activities; on issues of certification of objects of protection; about threat models for objects of information activity; Forensics (computer forensics, cybercrime investigation); on the methods of searching, obtaining and securing evidence. **Able** to apply knowledge and skills to apply legal and organizational measures to protect information; apply knowledge in the field of computer forensics and cybercrime investigation; disclose crimes related to computer information, about the study of digital evidence, methods of searching, obtaining and securing such evidence.	Oral survey, testing, report, midterm control, semester work	**DPM 6.1.** Organizational and legal aspects of information security and computer forensics
	To have an understanding of the interconnection of network security components; the sphere of responsibility and influence of each of the nodes; methods of hacking a wireless network; about the most vulnerable places of mobile platforms; on countering cryptographic attacks; on the audit of security systems.	Oral survey, testing, report, midterm control, semester work	**DPM6.2.** Social engineering and ethical hacking

	Able to manage network vulnerabilities; independently discover vulnerabilities; work with tools for hacking networks and systems; know hacker tricks to penetrate systems and networks; test any network components for hacking; assess the scale of potential attacks; counteract unauthorized collection of information about the organization's network; understand the attacker's strategy; define an attack based on social engineering; - to resist the invasion.		
PM7 Module of security	**To have an understanding** of the components of typical IoT devices; about trends for the future; about IoT devices; about the key components of the network for connecting an IoT device to the Internet; about IoT security issues. **Able** to analyze the main building blocks of the IoT; build sensor / actuator systems using the Arduino microcontroller; Create Python programs that provide IoT functionality use Cloud and Fog technologies in the IoT system; design and build an IoT prototype on real devices or in simulation systems.	Oral survey, testing, report, midterm control, semester work	**DPM 7.1.** IoT security
	To have an understanding of the principles of organizing cloud technologies; on the principles of virtualization of resources and platforms; about virtual machine organizations; about the types of clouds and cloud services; about attacks	Oral survey, testing, report, midterm control, semester work	**DPM 7.1.** Cloud security

	on clouds and methods of securing virtualization and cloud technologies. **Able** to create and use virtual machines; apply cloud technologies to solve practical problems; find vulnerabilities when using virtual machines; use protection tools for virtual environments; Apply industry standard cloud security best practices.		

11 Description of disciplines

Algebra and beginning of mathematical analysis
CODE – MAT00120
CREDIT – 6 (1/0/2/3)
PREQUISIT – diagnostic test

PURPOSE AND TASKS OF THE COURSE

The purpose of the course is to acquaint students with the basic ideas and concepts of algebra and mathematical analysis and the formation of the basic knowledge necessary for studying the course "Mathematics 1".

Course objectives - the formation of skills for the study of mathematical disciplines and the effective use of mathematical methods for solving research and practical problems in the professional field.

BRIEF DESCRIPTION OF THE COURSE

The course "Algebra and Introduction to Analysis" gives the basic concepts of algebra, mathematical analysis, differential and integral calculus.

KNOWLEDGE, SKILLS, SKILLS TO COMPLETE COURSE

Student must know:

- the basic concepts of algebra;
- the basic concepts of mathematical analysis;
- basic elementary functions;

should be able to:

- find solutions to equations and inequalities, systems of equations and inequalities;
- convert algebraic and trigonometric expressions;
- solve text problems;
- find the derivative of elementary functions;
- investigate functions using a derivative;
- find indefinite integral of elementary functions;
- find a definite integral;
- find the area of a curvilinear trapezoid.

Mathematics I
CODE – MAT00121
CREDIT – 6 (1/0/2/3)
REQUISIT – Elementary School Mathematics / Diagnostic Test

PURPOSE AND TASKS OF THE COURSE

The main goal of the course is to provide the future specialist with a certain amount of knowledge in the sections of the “Mathematics-I” course, which is necessary for studying related engineering disciplines. Introduce students to ideas and concepts of mathematical analysis. The main attention is paid to the formation of basic knowledge and skills with a high degree of their understanding of differential and integral calculus.

Course objectives:

the acquisition of knowledge necessary for the effective use of rapidly developing mathematical methods; obtaining the skill of building and researching mathematical models; possession of the fundamental sections of mathematics necessary for solving research and practical problems in the professional field.

BRIEF DESCRIPTION OF THE COURSE

In the course “Mathematics-I”, the following sections are presented: introduction to analysis, differential and integral calculus

KNOWLEDGE, SKILLS, SKILLS TO COMPLETE COURSE

The study of this discipline will allow the student to apply the “Mathematics-I” course to solving simple practical problems, to find tools sufficient for their research, and to obtain numerical results in some standard situations.

Mathematics I
CODE - MAT00121
CREDIT - 6 (1/0/2/3)
PREQUISIT - Elementary Mathematics - School Course / Diagnostic Test

PURPOSE AND OBJECTIVES OF THE COURSE

The main goal of the course is to give the future specialist a certain amount of knowledge in the sections of the course "Mathematics-I", which is necessary for the study of related engineering disciplines. Introduce students to the ideas and concepts of calculus. The main attention is paid to the formation of basic knowledge and skills with a high degree of their understanding of differential and integral calculus.

Course Objectives: Acquisition of the knowledge necessary for the effective use of rapidly developing mathematical methods; obtaining the skill of building and researching mathematical models; mastery of the fundamental sections of mathematics necessary for solving scientific research and practical problems in the professional field.

SHORT DESCRIPTION OF THE COURSE

The course "Mathematics-I" provides a presentation of the sections: introduction to analysis, differential and integral calculus

KNOWLEDGE, ABILITY, SKILLS TO COMPLETE THE COURSE

The study of this discipline will allow the student to apply the course "Mathematics-I" to solving simple practical problems, find tools sufficient for their research, and obtain numerical results in some standard situations.

Mathematics II
CODE - MAT00122
CREDIT - 6 (1/0/2/3)
PREREQUISIT - Mathematics 1

PURPOSE AND OBJECTIVES OF THE COURSE

The purpose of teaching the course "Mathematics II" is to form in bachelors ideas about modern mathematics as a whole as a logically harmonious system of theoretical knowledge.

The objectives of the course are to instill in students solid skills in solving mathematical problems with bringing the solution to a practically acceptable result. To develop the primary skills in mathematical research of applied issues and the ability to independently understand the mathematical apparatus contained in the literature related to the student's specialty.

SHORT DESCRIPTION OF THE COURSE

The course "Mathematics-II" provides an accessible presentation of the sections: elements of linear algebra and analytic geometry, differential calculus of functions of many variables, multiple integrals. "Mathematics II" is a logical continuation of the course "Mathematics I".

KNOWLEDGE, ABILITY, SKILLS TO COMPLETE THE COURSE

The study of this discipline will make it possible to apply in practice the theoretical knowledge and skills obtained with a high degree of understanding in the sections of the course, to use them at the appropriate level; translate into mathematical language the simplest problems posed in terms of other subject areas; acquire new mathematical knowledge using educational and information technologies; solve applied problems in the field of professional activity.

Mathematics III
CODE - MAT00123
CREDIT - 6 (1/0/2/3)
PREREQUISIT - Mathematics 1, Mathematics II

PURPOSE AND OBJECTIVES OF THE COURSE

The purpose of teaching the course "Mathematics-III" is the formation of basic knowledge and skills with a high degree of understanding of the sections of the course, helping to analyze and solve theoretical and practical problems.

Objectives of the course: instilling in students the ability to independently study educational literature, carry out probabilistic-theoretical and statistical analysis of applied problems; development of logical thinking and raising the general level of mathematical culture.

SHORT DESCRIPTION OF THE COURSE

The course "Mathematics-III" includes sections: the theory of series, elements of the theory of probability and mathematical statistics and is a logical continuation of the discipline "Mathematics II".

KNOWLEDGE, ABILITY, SKILLS TO COMPLETE THE COURSE

Student
must know:
- the theory of number series;
- the theory of functional series;
- Fourier series;
-elements of the theory of probability and mathematical statistics;
should be able to:
- solve problems in all sections of the theory of series;
- find the probabilities of events;
- find the numerical characteristics of random variables;
- use statistical methods to process experimental data.

Physics I, II
CODE - PHYS111-112
CREDIT - 12 (2/2/2/6)
PREQUISIT - diagnostic test / PHYS110-111

PURPOSE AND OBJECTIVES OF THE COURSE

The main goal of teaching the course Physics I and Physics II is to form ideas about the modern physical picture of the world and the scientific outlook.

SHORT DESCRIPTION OF THE COURSE

The disciplines Physics I and Physics II are the basis of theoretical preparation for engineering and technical activities of graduates of a higher technical school and represent the core of physical knowledge necessary for an engineer operating in the world of physical laws. The course "Physics 1" includes sections: physical foundations of mechanics, structure of matter and thermodynamics, electrostatics and electrodynamics. The discipline

"Physics II" is a logical continuation of the study of the discipline "Physics 1", and forms a holistic view of the course of general physics as one of the basic components of the general theoretical training of bachelors of engineering and technical profile. The discipline "Physics II" includes sections: magnetism, optics, nanostructures, fundamentals of quantum physics, atomic and nuclear physics.

KNOWLEDGE, ABILITY, SKILLS TO COMPLETE THE COURSE

- the ability to use knowledge of fundamental laws, theories of classical and modern physics, as well as the use of methods of physical research as the basis of a system of professional activity.

Modern history of Kazakhstan

CODE - HUM113

CREDIT - 6 (1/0/2/3)

PRE-REQUISIT - no

PURPOSE AND OBJECTIVES OF THE COURSE

The aim of the course is to familiarize students of technical specialties with the main theoretical and practical achievements of domestic historical science on the problems of the history of modern Kazakhstan, a comprehensive and systematic study of the main stages of the formation and development of Kazakhstani society.

- to analyze the peculiarities and contradictions of the history of Kazakhstan during the Soviet period;
- to reveal the historical content of the foundations of the laws of political, socio-economic, cultural processes at the stages of the formation of an independent state;
- contribute to the formation of students' civic position;
- to educate students in the spirit of patriotism and tolerance, belonging to their people, Fatherland;

SHORT DESCRIPTION OF THE COURSE

The course Modern history of Kazakhstan is an independent discipline and covers the period from the beginning of the twentieth century to the present day. The modern history of Kazakhstan studies the national liberation movement of the Kazakh intelligentsia at the beginning of the 20th century, the period of the creation of the Kazakh ASSR, as well as the process of formation of a multinational society.

KNOWLEDGE, ABILITY, SKILLS TO COMPLETE THE COURSE

- knowledge of events, facts and phenomena of the modern history of Kazakhstan;
- knowledge of the history of ethnic groups inhabiting Kazakhstan;
- knowledge of the main stages of the formation of Kazakh statehood;
- the ability to analyze complex historical events and predict their further development;
- ability to work with all types of historical sources;
- the ability to write essays and scientific articles on the history of the Fatherland;
- the ability to operate with historical concepts;
- the ability to conduct a discussion;
- skills of independent analysis of historical facts, events and phenomena;
- public speaking skills.

Kazakh / Russian language
CODE - LNG1012-1102.1
CREDIT - 8 (0/0/4/4)
PREQUISIT - diagnostic test

PURPOSE AND OBJECTIVES OF THE COURSE

- to teach students to listen to statements on well-known topics related to home, study, free time;
- understand texts on personal and professional topics containing the most common words and expressions;
- be able to conduct a conversation on everyday topics; describe your experiences; tell your opinion; retell and evaluate the content of the book read, the film seen;
- be able to create simple texts on well-known topics, including those related to professional activities.

SHORT DESCRIPTION OF THE COURSE

The language material of the course is selected in such a way that the student, assimilating the lexical and grammatical minimum, had the opportunity to get acquainted with typical communicative situations and himself in such situations found himself, was able to correctly evaluate them and choose the appropriate model (strategy) of speech behavior.

At the same time, the main emphasis of teaching is transferred from the process of transferring knowledge to teaching the ability to use the target language during the implementation of various types of speech activities, which are reading (subject to reading comprehension), listening (under the same condition) and the production of texts of a certain complexity with a certain degree of grammatical and lexical correctness.

The material for classes is selected so that students, while studying the Kazakh / Russian language, acquire the skills of reading, writing and understanding sounding speech based on the simultaneous mastering of the basics of grammar (phonetics, morphology and syntax) and word usage in the course of constant repeated repetition with a gradual complication of tasks.

KNOWLEDGE, ABILITY, SKILLS TO COMPLETE THE COURSE

A student, subject to active organization of work in the classroom and conscientious completion of homework, by the end of the first semester, acquires skills and abilities corresponding to the European level A2 (Threshold according to ALTE classification), that is, is on the threshold of the level of independent language proficiency.

English
CODE - LNG1051-1057
CREDIT - 18 (0/0/12/6)
PREKVISIT - diagnostic test / LNG1051-1056

LNG1051
PURPOSE AND OBJECTIVES OF THE COURSE
The “BeginnerEnglish” discipline is designed primarily for learning from scratch. This course is also suitable for those who have only general elementary knowledge of the language. After passing this level, the student will be able to confidently communicate on basic topics in English, learn the basics of grammar and lay a certain foundation that will allow them to improve their skills at the next stage of learning English.
Course post-requisites: Elementary English.
LNG1052
PURPOSE AND OBJECTIVES OF THE COURSE
The discipline "Elementary English" is the foundation of learning English, which is aimed at developing students' receptive skills (reading and listening) and productive skills (writing and speaking), analyzing basic knowledge, using and memorizing the main grammatical rules and mastering the peculiarities of pronunciation and elementary vocabulary as well as encouraging self-study and critical thinking.
Course prerequisites: Beginner.
Course post-requisites: General 1.
LNG1053
PURPOSE AND OBJECTIVES OF THE COURSE
The aim of the General English 1 course is to provide students with the opportunity to acquire sufficient knowledge to become more free in their everyday social and academic settings. Students are working to improve pronunciation, vocabulary and grammar. At this level, the main task will be to consolidate the skills acquired earlier, to learn how to compose and correctly apply complex syntactic structures in English, as well as to achieve really good pronunciation.
Course prerequisites: Elementary English.
Course post-requisites: General 2.
LNG1054
PURPOSE AND OBJECTIVES OF THE COURSE
The General English 2 course is intended for students who continue to study General English 1. The course is focused on the ability to actively use in practice most aspects of the tenses of the English language, conditional sentences, passive phrases, etc. At this stage, the student will be able to maintain a conversation with several interlocutors or express their point of view. The student significantly expands his vocabulary, which will allow him to freely express his thoughts in any environment. In this case, speech will be replenished with various synonyms and antonyms of already familiar words, phrasal verbs and stable expressions.
Course prerequisites: General 1.
Course post-requisites: Academic English.
LNG1055

PURPOSE AND OBJECTIVES OF THE COURSE

The main goal of the "Academic English" course is to develop academic language skills. The discipline is a language style that is used when writing academic papers (paragraph, abstract, essay, presentation, etc.) This course is designed to help students become more successful and effective in their learning, developing critical thinking skills and independent learning.

Course prerequisites: General 2.

Course post-requisites: Professional English.

LNG1056

PURPOSE AND OBJECTIVES OF THE COURSE

“Business English” is the English language for business communication, business and career. Knowledge of business English is useful for negotiating and business correspondence, preparing presentations and informal communication with business partners.

The peculiarities of training are that it is necessary not only to master the vocabulary, but also to master new skills: presentation, communication, language, professional.

Course prerequisites: IELTS score 5.0 and / or Academic English

Course post-requisites: Professional English, IELTS score 5.5-6.0

LNG1057

PURPOSE AND OBJECTIVES OF THE COURSE

The “Professional English” course is designed for B2 + level students, the purpose of which is to improve the language competence of students in their respective professional fields. The main goal of the course is to teach students to work with texts, both audio and written, in their specialty. The curriculum is built on the necessary vocabulary (words and terms), often used in English for specific purposes. Students will acquire professional English language skills through integrated content and language learning, master vocabulary in order to read and understand original sources with a great degree of independence, and practice different communication models and vocabulary in specific professional situations.

Course prerequisites: Business English.

Course post-requisites: any elective course.

Philosophy

CODE - 124

CREDIT - 6 (1/0/2/3)

PREREQUISIT - Modern history of Kazakhstan

- PURPOSE AND OBJECTIVES OF THE COURSE
- The aim of the course is the formation of cognitive, operational, communicative, self-educational competencies for solving problems:
- contribute to the development of adequate worldview guidelines in the modern world;
- to form creative and critical thinking in students;

- distinguish between the ratio of spiritual and material values, their role in the life of a person, society and civilization;
- contribute to the definition of their attitude to life and the search for harmony with the outside world.
- SHORT DESCRIPTION OF THE COURSE
- "Philosophy" is the formation of a holistic worldview that has developed in the context of the socio-historical and cultural development of mankind. Acquaintance with the main paradigms of the methodology of teaching philosophy and education in the classical and post-classical traditions of philosophy. Philosophy is called upon to develop stable life guidelines, the acquisition of the meaning of one's being as a special form of spiritual production. Contributes to the formation of a moral character of a person with the ability to critical and creative thinking. The theoretical sources of this course are the concepts of Western, Russian, Kazakh scientists on the history and theory of philosophy.
- KNOWLEDGE, ABILITY, SKILLS TO COMPLETE THE COURSE
- knowledge of basic terms, main concepts and problems of philosophy;
- knowledge of the main philosophical ways of solving worldview issues in the context of culture;
- the ability to analyze the history of the development of philosophical thought;
- the ability to identify alternative ways of posing and solving worldview issues in the history of human development;
- the ability to identify the main theoretical approaches in the relationship of a person with society;
- the ability to master the technique of performing independent work;
- search skills for organizing material;
- skills to freely discuss and make rational decisions;
- skills of ethical principles in professional activities.

MatLab Partial Differential Equations

CODE - MAT00125

CREDIT - 6 (1/0/2/3)

PREREQUISIT - Mathematics I-III

PURPOSE AND OBJECTIVES OF THE COURSE

The aim of teaching the course “Partial Differential Equations. Matlab "is the formation of basic knowledge on the sections of the course that help to analyze, model and solve theoretical and practical problems.

Course objectives: apply the theory of partial differential equations to solve and research applied problems from various fields of natural science, economics, medicine, biology and ecology; form ideas about the implementation of numerical methods for solving boundary value problems using Matlab

SHORT DESCRIPTION OF THE COURSE

Basic equations of mathematical physics. Classical boundary value problems for partial differential equations. Analytical and numerical methods for solving classical

boundary value problems. Using Matlab for the numerical solution of boundary value problems.

KNOWLEDGE, ABILITY, SKILLS TO COMPLETE THE COURSE

- to master this mathematical apparatus that allows you to analyze, simulate and solve classical boundary problems;
- master the methods of solving classical boundary value problems;
- to be able to pose a problem, choose methods of solution, both in analytical form and using computer technologies;
- use modern software - Matlab package;
- master the methodology and skills of the numerical implementation of the mathematical model, the analysis of the results obtained, their interpretation to refine the model;
- independently expand their mathematical knowledge.

Physical foundations of electronics

THE CODE - ELC196

CREDIT - 6 (2/1/0/3)

PREREQUISIT - Physics I

PURPOSE AND OBJECTIVES OF THE COURSE

The purpose of the course is to form students' knowledge of the principles of operation, parameters and characteristics of the main classes of modern semiconductor devices and integrated circuits and their modes of operation; formation of students' knowledge of the basics of circuitry of analog electronic devices (AED) and methods of their analysis, as well as skills in the selection and construction of AED units; study of measuring technologies that combine a set of methods, approaches, software and logic support for the organization of measurements; state and development trends of measuring instruments and basic methods of measuring the characteristics of electronic circuits and signals, assessment of their accuracy.

SHORT DESCRIPTION OF THE COURSE

Semiconductor physics. Semiconductor diodes. Transistors. Optoelectronic semiconductor devices. Microelectronics, integrated circuits (ICs). Logic and linear integrated circuits. Indicators and characteristics of analog electronic devices. Principles, purpose and types of feedback (OS). Power amplifiers. Differential cascade. Operational amplifiers. Analog signal processing devices. Inverting and non-inverting op amp amplifiers. Active RC filters. Signal converters. Comparators and generators of electrical oscillations. Metrology. Measurements and measuring technologies. Digital measuring instruments. Standardization and certification. Basic concepts, terms and definitions. Legal basis for certification.

KNOWLEDGE, ABILITY, SKILLS TO COMPLETE THE COURSE

As a result of studying the discipline, the student must:

- know: features, basic parameters and manufacturing technology of electronic devices and microcircuits, the classification of electronic devices and microcircuits; classification and principles of functioning of the main analog devices and their basic elements, features and main parameters of differential and operational amplifiers, linear and nonlinear circuits based on operational amplifiers with feedback, legal and

organizational and methodological foundations of standardization, metrology and certification of products, services and quality systems;

- be able to: build the simplest electronic circuits on electronic devices and microcircuits, choose an element base for a specific field of application of devices, build multistage amplifiers, decisive amplifiers, active filters, generators of sinusoidal and relaxation oscillations, converters, comparators and carry out AEU calculations, determine the main characteristics and parameters of electrical circuits and signals;

- have experience in: removing the main characteristics of electronic devices and microcircuits, the main characteristics of amplifiers (amplitude-frequency, phase-frequency, amplitude) and determining the parameters of various analog circuits, choosing an element base, applying measurement properties in various practical areas;

- have an idea: about the trends and prospects of the development of the element base of micro-, opto- and nanoelectronics, about the principles of operation of modern analog integrated circuits, about the features of circuitry of analog devices, taking into account their implementation using integrated technology and ensuring the stability of their work, about the classification of electrical measuring devices, principles of their operation, peculiarities and basic metrological parameters; on the processing of measurement results, to assess the accuracy of the means and measurement results.

Algorithmization and programming

CODE CSE 155

CREDIT – 6 (1/1/1/3)

PREREQUISIT - Information and Communication Technologies

PURPOSE AND OBJECTIVES OF THE COURSE:

This course aims to explore the effective use of data structures and algorithms to solve various problems. The student will learn to understand the logical connections between data structures related to tasks and their live examples and applications. The course contains topics such as - algorithms, data construction, arrays, search algorithms, stack, queues, one and two linked lists, trees, sorts, hash tables, heaps, arithmetic algorithms, graphs. The course is built on the basis of the C language, as the main high-level language for building applications of a systemic nature and the base language for studying data types, data structures, function call mechanisms and principles of working with memory.

KNOWLEDGE, ABILITY, SKILLS TO COMPLETE THE COURSE

The student will be able to determine the asymptotic complexity of an algorithm. To be able to determine the correct form of data storage depending on the task, to determine the most optimal ways to solve the problem based on the architecture of the computer. The student will become familiar with the most famous data processing algorithms. Learn to use data structures such as array, stack, queue, linked list, hash table, tree, graph.

The student will be able to effectively apply various data structures to find the most optimal solutions to the problem. Program in C language.

Object Oriented Programming
CODE -CSE127
CREDIT - 6 (2/1/0/3)
PREQUISIT - Algorithmization and programming

PURPOSE AND OBJECTIVES OF THE COURSE

The purpose of studying this discipline is the development by students of models for creating software based on high-level languages - object-oriented languages that allow you to operate with custom data topics and set the rules for working on them.

SHORT DESCRIPTION OF THE COURSE

The object-oriented programming paradigm fundamentally defines the principles of creating scalable software using a high-level method of designing business environment concepts in a programming language. Today there are many object and object-oriented programming languages, for an academic course the most suitable languages are Java and C #, on the basis of one of which the discipline's program is built. The principles of abstraction, encapsulation, inheritance, polymorphism are studied. The most commonly used software design patterns are explored.

The main attention is paid to the acquisition of practical skills of creating software products by students. The course is aimed at solving a large number of problems by writing program codes using the OOP paradigm.

KNOWLEDGE, ABILITY, SKILLS TO COMPLETE THE COURSE

As a result of completing the course, students will acquire the necessary knowledge about the object-oriented programming approach. They will learn to highlight abstractions of business processes, mechanisms of interaction of these abstractions. Learn to use the tools of inheritance, data encapsulation, polymorphism. Learn to use effective approaches when writing software code using well-established design patterns.

Microcontrollers
CODE - SEC152
CREDIT - 6 (2/1/0/3)
PREQUISIT - Digital circuitry, Object-oriented programming

PURPOSE AND OBJECTIVES OF THE COURSE

Acquaintance with the basics of the organization and features of the functioning of microcontrollers, as well as the design, development and manufacture of electronic components of devices using a microcontroller to protect information security. Programming microcontrollers using the CooCox development environment.

SHORT DESCRIPTION OF THE COURSE

- Study of the basis of definition, characteristics, scope and features of the operation of microprocessor tools. Varieties and architecture of microprocessors. Organization of microprocessor systems. Designing microprocessor systems using one of a variety of microcontrollers.

- Modes of operation of microcontrollers. Organization of the memory subsystem and interfaces. The main features of RISC processors. Interrupt and exception system, as

well as energy saving modes. Types and characteristics of interfaces, direct memory access (DMA) coprocessors. Development trend of microcontrollers.

- Design and development of circuit solutions based on CAD "Altium Designer", as well as installation, adjustment and manufacture of individual electronic components. Programming the operation of individual blocks of microcontroller systems using the CooCox development environment.

- Formation of programming skills in the C language of microcontrollers for solving various problems with the use of ADC, DAC and other interface capabilities of microcontrollers.

- KNOWLEDGE, ABILITY, SKILLS TO COMPLETE THE COURSE

- As a result of studying the discipline, the student must know:

- fundamentals of functioning of semiconductor components and their practical application;

- rules for the execution and design of electrical schematic diagrams using CAD "Altium Designer" and the preparation of design and text documents established by GOST;

- internal structure of microcontrollers, principles of operation of components and interfaces;

- C programming;

- have skills:

- work in CAD Altium Designer for drawing up electrical schematic diagrams and printed circuit boards.

- working with the CooCox development environment for programming STM32 microcontrollers;

- have the following competencies:

- on the directions of development of modern microelectronics and circuitry;

- the ability to participate in the development of projects of various electrical components and assemblies using microcontrollers.

Discrete Mathematics

CODE MAT113

CREDIT –6 (1/0/2/3)

PREREQUISIT - Mathematics I, Mathematics II

PURPOSE AND OBJECTIVES OF THE COURSE

The purpose of the discipline "Discrete Mathematics" (DM) is to develop students' basic mathematical knowledge underlying computer technologies.

The task of studying the discipline is to study the sections of discrete mathematics necessary for the subsequent development of knowledge on the protection and security of information.

SHORT DESCRIPTION OF THE COURSE

The discipline deals with coding theory, set theory, graph theory, mathematical logic.

KNOWLEDGE, ABILITY, SKILLS TO COMPLETE THE COURSE

As a result of studying the discipline, the student must know:

- Foundations of coding theory, set theory, graph theory;

- theory of logic algebra;
- mathematical apparatus for the synthesis and analysis of digital devices.

As a result of studying the discipline, the student should be able to:
- transform Boolean functions, synthesize minimal combinational circuits;
- perform coding.

Basics of cryptographic protection of information

CODE SEC174

CREDIT – 6 (2/0/1/3)

PREREQUISIT - Mathematics I, Mathematics II, Information and communication technologies.

PURPOSE AND OBJECTIVES OF THE COURSE

The purpose and objectives of the course are to form professional knowledge of the basics of cryptography. Knowledge and application of modern cryptographic methods of information protection. Studying the basic principles of building cryptoalgorithms. Study of methods for researching cryptographic algorithms.

SHORT DESCRIPTION OF THE COURSE

Basic concepts, terms and concepts of the discipline. Cryptology, cryptography, cryptanalysis. Durability, security, imitation durability, authenticity. Modern cryptographic methods of information protection. Basic principles of building cryptoalgorithms.

KNOWLEDGE, ABILITY, SKILLS TO COMPLETE THE COURSE

As a result of studying the discipline, the student must know
- basic concepts, terms and concepts in cryptography, cryptology and cryptanalysis;
- modern cryptographic methods of information protection;
- basic principles of building cryptoalgorithms;

have skills:
- principles of building cryptoalgorithms;
- construction and application of mathematical foundations and algorithms.

Be competent in the issues of cryptographic protection of information and the use of modern cryptographic methods of information protection.

Mathematical bases of cryptography

CODE SEC147

CREDIT – 6 (2/0/1/3)

PREQUISIT - Information and communication technologies, Fundamentals of cryptographic information protection

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PURPOSE AND OBJECTIVES OF THE COURSE

The purpose and objectives of the course are to form professional knowledge in cryptography and cryptanalysis. Knowledge and application of the mathematical foundations of asymmetric cryptosystems algorithms, the mathematical foundations of symmetric cryptosystems algorithms and methods for researching cryptographic algorithms. Studying the basic principles of building cryptoalgorithms. Building models of encryption systems.

SHORT DESCRIPTION OF THE COURSE

Basic concepts, terms and concepts of the discipline. Cryptology, cryptography, cryptanalysis. Durability, security, imitation durability, authenticity. Modern cryptographic methods of information protection. Basic principles of building cryptoalgorithms. Mathematical foundations of algorithms for asymmetric cryptosystems. Mathematical foundations of algorithms for symmetric cryptosystems. Research methods of cryptographic algorithms. Encryption systems models. Mathematical foundations of digital signature algorithms. Cryptographic key management. Steganography. Mathematical foundations and algorithms.

KNOWLEDGE, ABILITY, SKILLS TO COMPLETE THE COURSE

As a result of studying the discipline, the student must know

- basic principles of building cryptoalgorithms;
- mathematical foundations of algorithms for asymmetric and symmetric cryptosystems;
- models of encryption systems;
- mathematical foundations and algorithms.

have skills:

- building the basic principles of building cryptoalgorithms;
- application of the mathematical foundations of algorithms for asymmetric and symmetric cryptosystems;
- building a model of encryption systems;
- construction and application of mathematical foundations and algorithms.

Be competent in the basic principles of the construction of cryptoalgorithms, as well as the application of the mathematical foundations of algorithms for asymmetric and symmetric cryptosystems to ensure cryptographic protection of information.

Ordinary differential equations

CODE - MAT00124

CREDIT - 6 (1/0/2/3)

PREREQUISIT - Mathematics I-III

PURPOSE AND OBJECTIVES OF THE COURSE

The aim of teaching the course “Ordinary differential equations. Matlab "is the formation of basic knowledge on the sections of the course that help to analyze, model and solve theoretical and practical problems both by analytical and numerical methods using Matlab; instilling in students the ability to independently study educational literature.

The objectives of the course are to teach to recognize the types and forms of integrable equations and systems, integrate them and apply differential equations for the mathematical solution of applied problems.

SHORT DESCRIPTION OF THE COURSE

Ordinary differential equations of the 1st order. Ordinary differential equations of higher orders. Systems of differential equations. Linear equations with variable coefficients. Numerical integration of differential equations and systems. Using Matlab to numerically solve differential equations.

KNOWLEDGE, ABILITY, SKILLS TO COMPLETE THE COURSE

- master the methods of solving ordinary differential equations;
- set math problems;
- be able to build mathematical models;
- be able to solve problems modeled by differential equations, both analytical and numerical methods using Matlab.

Digital circuitry
CODE - SEC163
CREDIT - 6 (2/1/0/3)
PREQUISIT - Physical Foundations of Electronics

- PURPOSE AND OBJECTIVES OF THE COURSE
- Teaching students how to construct and work principles of digital integrated circuits of logic elements, circuits of functional combined (analog and digital) nodes, structures and methods of functioning of programmable read-only memory devices, principles of construction and operation of analog-to-digital and digital-to-analog converters, as well as teaching the basics of practical designing digital circuits and simulating their work.
- SHORT DESCRIPTION OF THE COURSE
- The course "Digital circuitry" teaches the basics of building electrical schematic diagrams of nodes (blocks) of various electronic devices, including modern computers, methods of using various (semiconductor) logic elements. Knowledge of the standards governing the legislation of the Republic of Kazakhstan in the field of symbols for semiconductor components, their standard sizes and electrical characteristics. Creation of examples of schematic diagrams of the simplest electronic assemblies based on CAD "Altium Designer" and design of a printed circuit board. Simulation of the operation of electrical circuits using various programs (for example, MICROCAP). Practical fabrication of an electronic device, commissioning, performance measurement and operation. Obtaining the skill of measuring the electrical characteristics of circuit solutions using measuring instruments.
- KNOWLEDGE, ABILITY, SKILLS TO COMPLETE THE COURSE
- As a result of studying the discipline, the student must know:
- integrated circuits of basic logic elements of digital devices;
- fundamentals of functioning of semiconductor components and their practical application;
- principles of construction and operation of functional units and circuits of digital devices;
- principles of construction and operation of semiconductor components, analog-to-digital and digital-to-analog converters.
- have skills:
- designing electrical schematic diagrams of digital devices;
- simulation of the operation of digital devices;
- measurement of electrical characteristics of circuit solutions;

Information bases of information protection

CODE - SEC118

CREDIT - 6 (2/0/1/3)

PREQUISIT - Information and Communication Technologies, Discrete Mathematics, Physics

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PURPOSE AND OBJECTIVES OF THE COURSE

The purpose of the discipline "Information bases of information security" is to form the basic knowledge of future specialists who are able to apply information theory to ensure information security. The discipline deepens the natural science and mathematical knowledge of students and is based on the disciplines of the natural science cycle, serves as the basis for the formation of professional skills of students.

The objectives of the discipline are to study the theory and practice of informational bases of information security related to the forms of presentation of discrete information, transformation and transmission of information, cryptographic protection of information.

SHORT DESCRIPTION OF THE COURSE

The program of the training course "Information bases of information security" is aimed at acquainting students with the information bases of the future specialty, their application for solving information security problems. The course is devoted to the application of information theory in information security systems, basic concepts of information theory, measures and forms of representation of discrete information, number systems for the representation of numerical information, problems of information transmission, alphabetical representation of information, the basics of coding and encryption of discrete information.

KNOWLEDGE, ABILITY, SKILLS TO COMPLETE THE COURSE

As a result of mastering the discipline, the student must know:

- basic concepts of information theory;
- problems of transmission of discrete information;
- problems of coding and encryption of information.

As a result of mastering the discipline, the student should be able to:

- use measures and forms of presentation of discrete information;
- use number systems to represent numbers;
- encode information using correction codes;
- use simple cryptographic ciphers.

Have skills:

- presentation and measurement of discrete information;
- effective and noise-resistant coding of information;
- encryption and decryption of information using simple cryptographic ciphers.

Operating system security

CODE SEC106

CREDIT - 6 (2/0/1/3)

PREREQUISIT - Information and communication technologies, Algorithmization and programming basics.

PURPOSE AND OBJECTIVES OF THE COURSE

The course is devoted to acquaintance with the architecture and basic capabilities of modern operating systems, teaching the methodological foundations of the principles of building and functioning of tools for managing user programs, as well as managing memory resources, protecting them, processors, peripherals, etc., as well as gaining practical skills in operating Windows and Linux.

SHORT DESCRIPTION OF THE COURSE

Purpose and functions of the operating system. Types of operating systems. The main components of the operating system. Classification of operating systems. Organization and management of processes. I / O control. File subsystem. Files and directories. Memory management. Memory allocation models. Virtual memory and implementation mechanisms. Telecommunication access management.

KNOWLEDGE, ABILITY, SKILLS TO COMPLETE THE COURSE

Knowledge gained during the course: principles of building operating systems, architecture of operating systems, resource allocation, process and memory management, organization of input-output processes, file systems management, network management. organization of operating system protection.

Skills and skills (professional, managerial, communicative) obtained during the course: practically apply the principles of building operating systems, create and use processes in the OS, use and allocate OS resources, organize input-output processes, manage memory and be able to organize virtual memory, work in the network, the ability to work with technical literature, acquire new knowledge.

Computer networks

CODE - CSE122

CREDIT – 6 (2/1/0/3)

PREQUISIT - Information and communication technologies, Digital circuitry, Security of operating systems

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PURPOSE AND OBJECTIVES OF THE COURSE

The purpose of the discipline "Computer networks" (CS) is the formation of basic knowledge in the field of architecture, principles of construction and operation of computer networks, communication tools, protocols and network standards.

The objectives of the discipline are: study of modern trends in the construction and organization of computer networks, the application of basic topologies, network models and principles of interaction of network devices at various levels of the model of interaction of open systems.

SHORT DESCRIPTION OF THE COURSE

The program of the training course "Computer networks" is aimed at familiarizing students with the basics of organization, construction, architecture and principles of functioning of computer networks. The course focuses on the application of skills to organize the operation of real networks

KNOWLEDGE, ABILITY, SKILLS TO COMPLETE THE COURSE

As a result of mastering the discipline, the student must know:

- principles of construction, parameters and characteristics of networks;
- the basics of the architectural and systemic organization of computer networks;
- basic network models and principles of interaction of various network devices;
- physical and logical network topology;
- data transmission media and access methods;
- methods of encoding information for its transmission over the network.

As a result of mastering the discipline, the student should be able to:

- justify the choice of the network structure, complex of technical means;
- to competently organize the work of the network;
- configure and customize communication tools;
- to carry out the choice of firewalls.

Have skills:

- operation of computer networks;
- work with all network services;
- selection of an element base for building various architectures of computer networks;
- configuring computer networks;
- implementation of network protocols using software.

Digital Device Design

CODE - SEC173

CREDIT - 6 (2/0/1/3)

PREREQUISIT - Information and communication technologies, Information bases of information security, Digital circuitry

PURPOSE AND OBJECTIVES OF THE COURSE

The aim of the discipline "Design of digital devices" (DCD) is to form basic knowledge in the field of designing digital devices. The discipline deepens the natural science and mathematical knowledge of students, is based on the disciplines of the natural science cycle, serves as the basis for the formation of professional competencies of students.

The objectives of the discipline are: the study of the arithmetic and logical foundations of digital devices, the theory of automata, their application for the analysis and synthesis of digital devices and the possibilities of using these methods in problems of designing real devices.

SHORT DESCRIPTION OF THE COURSE

The program of the training course "Designing Digital Devices" is aimed at acquainting students with the basics of designing digital devices. The course is devoted to the application of formal logic and the theory of automata for solving practical problems of designing digital devices.

KNOWLEDGE, ABILITY, SKILLS TO COMPLETE THE COURSE

As a result of mastering the discipline, the student must know:

- formal ways of describing the work and structure of digital devices;
- Methods for the synthesis and analysis of digital devices and the possibilities of using these methods in design problems;
- principles of developing microprograms of algorithms for performing arithmetic operations;
- principles of synthesis of minimal combinational circuits and circuits with memory;
- Methods for constructing structures of digital control devices.

As a result of mastering the discipline, the student should be able to:

- to develop microprograms of algorithms for performing arithmetic operations;
- transform Boolean functions, synthesize minimal combinational circuits;
- use methods of constructing structures of control machines.

Have skills:

- presentation of numerical information to the control center;
- synthesis and analysis of minimal combinational circuits;
- synthesis of microprogram digital devices.

Designing secure Web-based applications

CODE - SEC135

CREDIT – 6 (2/1/0/3)

PREQUISIT - Information and Communication Technologies, Object-Oriented Programming

PURPOSE AND OBJECTIVES OF THE COURSE

To give a systematic review of modern approaches and technologies for developing web applications, to study and master the ways of developing web applications using ASP.Net WebForms and MVC technologies, to consider methods for designing new web applications and ensuring the security of Web applications.

SHORT DESCRIPTION OF THE COURSE

History and main trends in the development of Web-technologies. Basic Web standards. The concept of Web applications and approaches to their development. ASP.NetWebForms technology basics. Server controls. The structure and design of the Web application. Navigation through the web pages of the application. Managing the state of the Web application. Working of a Web application with databases. Web application security. Development of web services. ASP.Net MVC Web Application Development Technology. Designing web applications. Organization of security of web-applications.

KNOWLEDGE, ABILITY, SKILLS TO COMPLETE THE COURSE

As a result of mastering the discipline, the student must know:

- the main trends in the development of Web-technologies;
- the concept of Web-applications and approaches to their development;
- organization of links between a web application and a database, modern technologies, vulnerabilities and technologies for protecting web applications;
- managing the state of the Web application.

Have skills:

- building secure Web applications;
- creation of web services, sites, portals using modern web development technologies;
- Web-application design and web-application security organization.

Be competent in creating, developing and designing secure Web applications.

Organization and securing databases

CODE - SEC126

CREDIT - 6 (2/1/0/3)

PREQUISIT - Information and communication technologies, Object-oriented programming

PURPOSE AND OBJECTIVES OF THE COURSE

The purpose of the discipline "Organization and security of databases" (OBDB) is the formation of basic knowledge in the field of databases (DB). The discipline deepens the natural science and mathematical knowledge of students, is based on the disciplines of the technological and natural science cycle, serves as the basis for the formation of professional competencies of students.

The objectives of the discipline are: the study of database technology, its application for the safe storage and processing of information, the study of database application technologies.

SHORT DESCRIPTION OF THE COURSE

The program of the training course "Organization and Security of Databases" is aimed at acquainting students with the basics of organizing secure databases, their application for solving real problems. The course is devoted to the application of database technology for solving practical problems of database development and database applications.

KNOWLEDGE, ABILITY, SKILLS TO COMPLETE THE COURSE

As a result of mastering the discipline, the student must know:

- the basics of the organization of secure databases and database architecture;
- basic data models and basic data operations;
- language tools for describing and manipulating data in a DBMS;
- standard language for queries of relational systems SQL;
- principles of building database applications.

As a result of mastering the discipline, the student should be able to:

- create databases;
- use the SQL language to work with the database;
- use object-oriented and visual programming to create database applications.

Have skills:

- creation of database objects;
- creating queries to the database;
- creating database applications.

Computer Architecture & concurrency

CODE - CSE607

CREDIT - 6 (2/1/0/3)

PREQUISIT - Information and communication technologies, Digital circuitry, Design of digital devices

PURPOSE AND OBJECTIVES OF THE COURSE

The purpose of the discipline "Computer Architecture & concurrency" is the formation of basic knowledge in the field of architecture of computer systems. The discipline deepens the natural science and mathematical knowledge of students, is based on the disciplines of the natural science cycle, serves as the basis for the formation of professional competencies of students.

The objectives of the discipline are: the study of the components of the architecture of modern computer systems and the principles of their interaction with each other, the study of promising architectures of computer systems.

SHORT DESCRIPTION OF THE COURSE

The program of the training course "Computer Architecture & concurrency" is devoted to the study of the architecture of computer systems, interaction and control of processes, the principles of building hardware and software and their interaction in the process of input, processing and output of information in modern computer systems.

KNOWLEDGE, ABILITY, SKILLS TO COMPLETE THE COURSE

As a result of mastering the discipline, the student must know:

- logical, physical and software structure of computer systems;
- principles of organization of the interrupt system;
- principles of organization of the input-output system;
- principles of memory organization and methods of memory protection;
- principles of organizing a multi-program mode of operation of computer systems;
- organization of promising architectures of computer systems.

As a result of mastering the discipline, the student should be able to:

- to develop and own the principles of modernization of computer systems;
- to carry out synthesis of nodes of computer systems and microprogram control devices;
- to use computer systems to solve problems in the field of information security.

Have skills:

- synthesis and modeling of nodes of computer systems;
- building RAM for a given organization;
- synthesis and simulation of microprogram digital control devices;
- calculation of the parameters of the multiprogrammed operating mode of computer systems.

Cryptographic Information Security Systems

CODE SEC 121

CREDIT – 6 (2/1/0/3)

PREQUISIT - Discrete Mathematics, Mathematics of Cryptography, Information Basics of Information Security

PURPOSE AND OBJECTIVES OF THE COURSE

Modern cryptography and tasks related to information security problems. Formal definition of a cryptosystem. Classical cryptosystems. The main tasks of cryptanalysis. Stream encryption. Public key cryptosystems. Applications of mathematical modeling in cryptography. Advantages and disadvantages of various systems. Euler's and Fermat's theorems.

SHORT DESCRIPTION OF THE COURSE

Block encryption systems. Components of a modern block cipher. Modes of execution of block ciphers. Streaming encryption systems. Pseudo-random number generators. Principles of using pseudo-random number generators for stream encryption. Asymmetric encryption systems. Effective encryption. Key distribution. Cryptographic protocols. Hash functions. Electronic digital signature.

KNOWLEDGE, ABILITY, SKILLS TO COMPLETE THE COURSE

- ability to manage keys;
- solving problems of decomposition into prime factors and discrete logarithm;
- solving problems of cryptographic strength;
- knowledge and ability to provide an information security system;
- skill and knowledge in building electronic signature schemes;
- ability and knowledge of the use of authentication and identification protocols;
- ability and knowledge of the principles of using pseudo-random number generators, etc.

Technologies of protection of computer information

CODE - SEC143

CREDIT – 6 (2/0/1/3)

PREREQUISIT - Information and communication technologies, Computer networks

PURPOSE AND OBJECTIVES OF THE COURSE

The purpose of the discipline "Technologies for the protection of computer information" (TZKI) is the formation of professional knowledge in the field of protecting computer information, organizing secure transmission

The objectives of the discipline are: studying the legal framework of protection technologies; the main types of threats and vulnerabilities of information in computer systems, methods of their identification and localization, study of the concepts of technology for protecting computer information, study of the main components of protection; technologies and means of countering threats and attacks.

SHORT DESCRIPTION OF THE COURSE

The program of the training course "Technologies for protecting computer information" is aimed at acquainting students with the basic concepts, methods and technologies for protecting computer information, technologies for countering bookmarks;

The course is devoted to the study and application of modern technologies for solving practical problems of protecting computer information.

KNOWLEDGE, ABILITY, SKILLS TO COMPLETE THE COURSE

As a result of mastering the discipline, the student must know:

- basic concepts of information security and information protection;
- sources, risks, forms of attacks on information;
- security policy and standards;
- technologies for detecting computer attacks and their capabilities;
- major vulnerabilities and typical attacks on modern computer systems;
- the possibilities and features of the use of specialized software and hardware when conducting information security audits;
- technologies of protection against interception of information due to electromagnetic radiation, through telecommunication networks;
- technologies for identification and authentication of users and processes;
- technologies for organizing control of access to information;
- technologies for cryptographic protection of programs and data.
- methods of information protection in computer networks;
- classification and general characteristics of network software and hardware information security;
- features of the implementation of information protection methods with modern software and hardware;
- methods of ensuring the reliability of programs;
- legal and organizational support of software development and application processes.

As a result of mastering the discipline, the student should be able to:

- install, test, test and use the software and hardware for software protection;
- to implement measures to counter violations of network security using various software protection tools;
- install and configure software to protect against malicious software;
- configure the protective mechanisms of network software and hardware;
- configure the security policy by means of software and hardware systems for network information protection;
- apply protection mechanisms implemented in software and hardware complexes;
- to organize the protection of information in a computer network using firewalls;
- apply modern technologies for protecting computer information.

Have skills:

- information security analysis;
- to identify threats and channels of information leakage;
- assess threats to information security;
- competently use and apply effective methods and means of protecting information;
- to use cryptographic algorithms in widespread software products, to check their quality;
- choose protocols and algorithms to protect information;
- work with software and hardware to protect information from virus programs;
- work with software and hardware to protect information from unauthorized access to information;

- organization of information protection using technologies of cryptography, identification and authentication, organization of access control to information.
- have the skills to analyze information security conditions;
- choose technical and organizational measures to ensure information security at the design stage, manufacture and operation of critical information processing facilities.

Social engineering and ethical hacking

CODE - SEC171

CREDIT – 6 (2/1/0/3)

PREQUISIT - Operating System Security, Computer Networks

PURPOSE AND OBJECTIVES OF THE COURSE

The aim of the course is to give students the knowledge and skills to form a systematic approach to ensuring computer security, to teach methods of checking the security of various nodes of a computer network and to acquaint students with the tools of attackers, with their advantages and limitations. Introduce you to the issues of economic security and the basics of entrepreneurship.

SHORT DESCRIPTION OF THE COURSE

The knowledge and skills required to successfully identify and resolve security issues in mixed computer networks. The course focuses on unique hacking techniques and hacking techniques in the context of the defensive practices and recommendations set out by real hackers.

KNOWLEDGE, ABILITY, SKILLS TO COMPLETE THE COURSE

- As a result of mastering the discipline, the student must know:
- the interconnection of network security components, the scope of responsibility and influence of each of the nodes;
- know and manage network vulnerabilities;
- independently discover vulnerabilities;
- work with tools for hacking networks and systems;
- know hacker tricks to penetrate systems and networks;
- test any network components for hacking;
- classify workstations according to the degree of risk of an attack;
- understand the train of thought of the attacker;
- assess the scale of potential attacks;
- counteract unauthorized collection of information about the organization's network;
- understand the attacker's strategy;
- assess the security of virtualization and cloud computing platforms;
- define an attack based on social engineering;
- learn methods of hacking a wireless network;
- identify the most vulnerable spots of mobile platforms;
- counteract cryptographic attacks;
- understand the process of intrusion into the system;
- know the issues of economic security and the basics of entrepreneurship.
- resist invasion.

Development and protection of server databases

CODE - SEC136

CREDIT - 6 (2/1/0/3)

PREQUISIT - Organization and security of databases

PURPOSE AND OBJECTIVES OF THE COURSE

The purpose of the discipline "Design and protection of server databases" (P&SDB) is the formation of special competencies in the design and protection of server databases for solving professional problems. The discipline deepens the natural-scientific and mathematical knowledge of students and is based on the disciplines of the technological and natural-science cycle, forms the professional skills of students.

The objectives of studying the discipline are issues related to the theory and practice of design, operation and protection of server databases (WBS).

SHORT DESCRIPTION OF THE COURSE

The program of the training course "Design and Security of Server Databases" is aimed at acquainting students with the basics of designing secure databases and ensuring their protection. The course is devoted to the application of database technology for solving practical problems of developing and protecting secure server databases.

KNOWLEDGE, ABILITY, SKILLS TO COMPLETE THE COURSE

As a result of mastering the discipline, the student must know:

- criteria for evaluating reliable databases;
- methods for designing secure databases;
- built-in mechanisms of the DBMS to ensure the safety of the DBMS;
- access control strategies in the DBMS;
- principles of managing transactions and locks;
- principles of using the built-in cryptographic capabilities of the DBMS to encrypt the database.

As a result of mastering the discipline, the student should be able to:

- apply the ER-method of designing relational databases and perform database engineering;
- to ensure the integrity and reliability of data in the database using integrity constraints, views, triggers and stored procedures;
- to perform backup, restoration, monitoring and audit of SDS;
- to use the capabilities of the SQL language to protect the database;
- manage access rights and encrypt database objects.

Have skills:

- DB design in CASE-DB design tools;
- creating integrity constraints, views, triggers and stored procedures;
- database backup and recovery;
- creating monitoring and audit files.

Securing cloud technologies

CODE - SEC111

CREDIT - 6 (2/1/0/3)

PREQUISIT - Information and communication technologies, Security of operating systems, Organization and security of databases

PURPOSE AND OBJECTIVES OF THE COURSE

The goal of the discipline "Security of cloud technologies" (BOT) is the formation of special competencies in the field of cloud technologies for solving professional problems. The discipline deepens the natural science and mathematical knowledge of students and is based on the disciplines of the technological and natural science cycle, forms the professional competencies of students.

The objectives of studying the discipline are:

- studying the concepts of virtualization, as the basis of cloud technologies, and ensuring the security of virtualization;
- study of concepts and services of cloud technologies, ensuring their security.

SHORT DESCRIPTION OF THE COURSE

The program of the training course "Security of Cloud Technologies" is aimed at acquainting students with the basics of cloud technologies and virtualization, ensuring their security. The course focuses on the application of virtualization technologies and cloud services for cloud computing.

KNOWLEDGE, ABILITY, SKILLS TO COMPLETE THE COURSE

As a result of mastering the discipline, the student must know:

- principles of organization of cloud technologies;
- principles of virtualization of resources and platforms;
- organization of virtual machines;
- types of clouds and cloud services;
- attacks on clouds and methods of securing virtualization and cloud technologies.

As a result of mastering the discipline, the student should be able to:

- create and use virtual machines;
- apply cloud technologies to solve practical problems;
- find vulnerabilities when using virtual machines;
- use means of protection of virtual environments;
- Apply standard cloud security best practices.

Have skills:

- installation of virtualization systems and work on virtual machines (VMWare, Virtual Box, Hyper-V, etc.);
- safe use of cloud services (Google, Azure, Amazon, etc.);
- creating a virtual encrypted disk (TrueCrypt, BoxCryptor);
- simulation of an attack on virtual machines.

Organizational and legal aspects of information security and computer forensics

CODE - SEC172

CREDIT - 6 (2/1/0/3)

PREREQUISIT - Informational bases of information security, Computer networks.

PURPOSE AND OBJECTIVES OF THE COURSE

Familiarization of students with the legal and organizational aspects of information security and the basics of computer forensics and cybercrime investigation. Application of normative legal and other documents regulating information security. Application of regulatory legal and other documents regulating information security. Legal basis for combating corruption.

SHORT DESCRIPTION OF THE COURSE

Legislation of the Republic of Kazakhstan in the field of information security. Information security certification. Licensing of information protection activities. Certification of protected objects. Model of threats for objects of information activity. Organizational and security measures for information protection. Forensics (computer forensics, cybercrime investigation) is an applied science about solving crimes related to computer information, about the study of digital evidence, methods of searching, obtaining and securing such evidence. The concept of corruption, the current legislation of the Republic of Kazakhstan on combating corruption, issues of anti-corruption culture, as well as the need to form an anti-corruption consciousness among citizens.

KNOWLEDGE, ABILITY, SKILLS TO COMPLETE THE COURSE

Students gaining knowledge and skills in applying legal and organizational measures to protect information; knowledge in the field of computer forensics, cybercrime investigation. Knowledge and skills in solving crimes related to computer information, on the study of digital evidence, methods of searching, obtaining and securing such evidence. Knowledge of the legal framework for combating corruption.

Biometrics and neural networks

CODE - SEC113

CREDIT – 6 (2/1/0/3)

PREREQUISIT - Mathematics, Algorithmization and programming fundamentals, Information bases of information security

PURPOSE AND OBJECTIVES OF THE COURSE

The goal of the discipline is to form special competencies in the field of data analysis; application of modern methods of data analysis, various methods of data mining, biometrics technology, biometric methods of information protection.

Objectives of the course: be able to determine when and why to use a certain data analysis technique; use machine learning algorithms to solve simple problems; use machine learning tools like Octave, Python.

SHORT DESCRIPTION OF THE COURSE

The course is devoted to biometric technologies, biometric methods of information security, artificial intelligence.

In addition, the course is devoted to the basics of accuracy and classification, regression issues in detail. Machine learning algorithms (MLA), KNN classifier, support vector machines, decision trees, neural networks.

KNOWLEDGE, ABILITY, SKILLS TO COMPLETE THE COURSE

As a result of mastering the discipline, the student should be able to:

apply biometric methods of information protection;

create intelligent systems that support this application;

use a number of implementations of machine learning algorithms to solve practical problems;

understand the basic concepts of decision theory, vision and language in understanding human intelligence from a computational point of view;

- to use algorithms of regression, classification and clustering in order to develop intelligent systems.

Security of networking technologies

CODE - SEC160

CREDIT – 6 (2/1/0/3)

PREQUISIT - Operating System Security, Computer Networks

PURPOSE AND OBJECTIVES OF THE COURSE

The purpose of the discipline "Security of network technologies" (BLT) is the formation of professional knowledge in the field of organizing and ensuring network security; application of principles, methods, protocols and technologies for organizing network protection; basic approaches to the development, implementation, operation, analysis, security, maintenance and improvement of information transfer technologies.

The objectives of the discipline are: the study of modern technologies, hardware, software and hardware-software for network security.

SHORT DESCRIPTION OF THE COURSE

The program of the training course "Security of Network Technologies" is aimed at acquainting students with the basics of organizing security in a network, the use of modern technologies and the main trends, their application to ensure security in real networks. The course is devoted to the use of modern network technologies for solving practical problems of organizing network security.

KNOWLEDGE, ABILITY, SKILLS TO COMPLETE THE COURSE

As a result of mastering the discipline, the student must know:

- modern technologies to ensure the protection of data transmission;
- wireless data transmission technologies;
- the relationship between modern hardware and software data protection technologies;
- ways of implementing safe technologies;
- methods of hardware and software protection of wireless information transmission;
- purpose and functions of elements of hardware and software protection technologies;
- organization and structure of software protection technology;
- information transfer protocols;
- possible threats during wireless transmission of information;

- organization of the system backbone, ways of connecting additional devices;

As a result of mastering the discipline, the student should be able to:

- formalize the task at hand;
- to implement in practice safe technologies (virtual private, wireless networks);
- configure wireless means of information transmission;
- understand the devices of workstations and servers;
- understand telecommunication data transmission devices;
- make an informed choice of standard peripheral equipment;
- manage network security;
- apply the knowledge gained to various subject areas.

Have skills:

- application of coding methods and verification of the correctness of data transmission;
- using standards of local and global networks;
- calculation of error checking during data transmission by various methods;
- use of network tools (software and hardware);
- simulate various network structures;
- network configuration of operating systems;
- configuring local networks, implementing network protocols using software;
- choice of architecture and hardware and software that implement network technologies

Designing cryptographic information security systems

CODE SEC170

CREDIT – 6 (2/1/0/3)

PREQUISIT - Fundamentals of cryptographic information protection, Mathematics of the fundamentals of cryptography

PURPOSE AND OBJECTIVES OF THE COURSE

Acquaintance with the basic principles of designing cryptographic information security systems. The task is to teach students practical skills in applying methods of cryptographic protection of information in the design and operation of information and communication technologies.

KNOWLEDGE, ABILITY, SKILLS TO COMPLETE THE COURSE

As a result of mastering the discipline, the student should be able to:

- formalize the task at hand;
- apply cryptographic methods of information protection in information and communication technologies;
- apply standards, models and methods of encryption;
- to apply cryptographic methods of information protection in the design of information and communication technologies in various subject areas.

Have skills:

- the use of cryptographic methods;
- design of cryptographic information security systems;
- building a model and security policy;
- management of cryptographic keys. Generation, storage and distribution of keys.

Organization of microprocessor systems

CODE - SEC151

CREDIT - 6 (2/1/0/3)

PREREQUISIT - Digital circuitry. Object-oriented programming.

PURPOSE AND OBJECTIVES OF THE COURSE

Theoretical and practical training of students in the basics of building modern microprocessors and microcontrollers used in automation devices and computer technology. Course objectives:

- to form a general idea of microprocessors and microcontrollers;
- to acquaint with the principles of operation of microprocessors and microcontrollers, as separate electronic components, and as part of automation systems and computer technology;
- to get practical skills in working with microprocessors and microcontrollers.

SHORT DESCRIPTION OF THE COURSE

The course "Organization of microprocessor systems" teaches different ways of organizing microprocessor systems. Studies the architecture of microprocessor systems (RISC, CISC, etc.) and their types (microcontrollers, controllers, microcomputers, computers); structure and general principles of functioning of microprocessors (various operands and registers); processor instruction system and work with it; internal structure and principle of operation of the microprocessor; processing of digital and analog signals; representation of numbers and commands in microprocessors; methods of addressing; classification of microcontrollers and their structure. Introduction to life safety issues. Safety instructions.

KNOWLEDGE, ABILITY, SKILLS TO COMPLETE THE COURSE

- As a result of studying the discipline, the student must know:
- architecture, types of microprocessor systems, principles of operation and programming of microprocessor and microcontroller systems;
- terminology, classification and main types of microprocessors;
- organization, structure and characteristics of microprocessor modules and kits;
- hardware and software to support the design of microprocessor systems;
- diagrams of power supply units VX. ~220V VX. +5V (see [2], Fig. 1.70-74) of their safe application;
- the procedure for using measuring instruments (MS5308, UT81B) and the soldering station;
- features of building digital control systems for technical systems.
- Have skills:
- creation and programming of microcontroller and microprocessor systems;
- organization of a microprocessor system, intermodular connections in the system;
- use of standard design solutions for microprocessor systems;
- hardware and software tools for modeling and debugging microprocessor systems.

Intrusion Prevention Systems

CODE - SEC176

CREDIT - 6 (2/1/0/3)

PREQUISIT - Technologies for protecting computer information, Security of cloud technologies.

PURPOSE AND OBJECTIVES OF THE COURSE

Acquiring knowledge of practical analysis and use of data loss prevention systems; monitoring and control of data; generating reports on user activity and incidents, knowledge of managing security policies within the DLP system.

SHORT DESCRIPTION OF THE COURSE

Risks and channels of information leakage, classification of violators. APT (Advanced Persistent Threat) attacks. Data leakage protection technologies. Data loss prevention systems (DLP systems). DLP systems tasks, data leakage prevention system components. DLP systems classification, methods of confidential information recognition. Stages of DLP systems. Development of DLP systems. Analytical tools for incident investigation and analysis. IPC (Information Protection and Control) technologies, IPC tasks, components. Integration of DLP systems with intrusion detection and prevention systems (IDS / IPS), SIEM (Security Information and Event Management) systems.

KNOWLEDGE, ABILITY, SKILLS TO COMPLETE THE COURSE

- As a result of studying the discipline, the student must know:
- purpose and principles of DLP systems functioning;
- technical capabilities to obtain information about user activity;
- analysis of incidents;
- analysis of information data flows.
- As a result of studying the discipline, the student should be able to:
- perform practical analysis and use data loss prevention systems;
- manage security policies within the DLP system.
- Have skills:
- monitoring and control of data;
- generating reports on user activity and incidents.

Standardization and certification of cryptographic tools

CODE SEC169

CREDIT – 6 (2/0/1/3)

PREKVISIT - Computer information protection technologies, Cryptographic information protection systems

PURPOSE AND OBJECTIVES OF THE COURSE:

The purpose and objectives of studying the discipline are the student's assimilation of the theory and practice of standardization and certification in the field of information security, as well as issues of standardization and certification of cryptographic means.

SHORT DESCRIPTION OF THE COURSE

Development of standardization and certification in the field of information security. Standardization and certification - prerequisites, goals and objectives. Conceptual model of information security. Foreign and Kazakhstan specificity. Development of a

functional model for standardization and certification. General criteria for assessing the security of information technology. Problems and prospects for the development of standardization and certification. Information security standardization and certification - information security practice and management. Technical specifications and regulatory standards for standardizations and certifications. Modern principles of standardization and certification.

KNOWLEDGE, ABILITY, SKILLS TO COMPLETE THE COURSE

As a result of studying the discipline, the student must know:

- general issues of theory and practice of standardization and certification;
- development of modern information technologies and their use in standardization and quality management;
- general principles of standardization and certification systems;
- problems and trends in the development of standardization and certification in the field of information security and certification of cryptographic means;
- organizational and technical foundations for the creation and improvement of control systems and quality assurance systems management;

be able to:

- apply modern information technologies in the systems of standardization and certification;
- to apply hardware and software for control, management and quality assurance;
- manage information security.

Technical means and methods of information protection

CODE - SEC142

CREDIT – 6 (2/1/0/3)

PREQUISIT - Physical foundations of electronics, Digital circuitry, Design of digital devices

PURPOSE AND OBJECTIVES OF THE COURSE

Familiarization with the basics of technical aspects of information security, the types of methods and means used to counter technical intelligence, technical methods of information security.

BRIEF COURSE DESCRIPTION: Technical channels of information leakage. Technical means of unauthorized information retrieval. Identification of possible channels of information leakage. Technical protection measures. Passive and active methods and means of protecting information. Engineering and technical protection measures.

KNOWLEDGE, ABILITY, SKILLS TO COMPLETE THE COURSE

Students gain knowledge of methods and technical means of protecting information, as well as instilling skills in their practical application for organizing events to protect objects and information from technical means of intelligence.

System and Network Administration

CODE - CSE411

CREDIT – 6(2/1/0/3)

PREQUISIT - Operating System Security, Computer Networks

PURPOSE AND OBJECTIVES OF THE COURSE

- The aim of the course is to study the basics of administering Linux and Windows operating systems, studying issues related to the operation and organization of a computer network, data transmission, studying modern methods and means of protecting its protection.

SHORT DESCRIPTION OF THE COURSE

- The material is mostly practical and contains a minimal amount of theory. The course is suitable both for novice system administrators who want to configure company servers, and for network engineers, because most of the networking equipment runs Linux and Windows.

KNOWLEDGE, ABILITY, SKILLS TO COMPLETE THE COURSE

- As a result of mastering the discipline, the student must know:
- principles of construction of cable systems;
- ensuring the safety and resiliency of the network and servers;
- organizing user access to the Internet, publishing web servers on the Internet, setting up an e-mail system on the network;
- have skills:
- install, configure and administer peer-to-peer and domain-based networks;
- create and administer file servers, print servers, Internet servers, terminal servers, application servers;
- organize routing between networks, remote user access to the network, VPN access.

Technologies for building cryptographic information security

CODE - SEC168

CREDIT – 6 (2/1/0/3)

PREQUISIT - Fundamentals of cryptographic information security, Mathematics of cryptography, Cryptographic information security systems

PURPOSE AND OBJECTIVES OF THE COURSE

Training in the basic methods and means of cryptographic information protection, as well as technologies for their construction.

SHORT DESCRIPTION OF THE COURSE

Application of means of cryptographic information protection. Principles of using encryption keys. Types of encryption using cryptographic information protection tools. Public Key Infrastructure. Certificates. Certification authorities. Virtual private networks. Classification of virtual private networks. Virtual private network technology. New directions in cryptography. Multi-base cryptography. Quantum key distribution.

KNOWLEDGE, ABILITY, SKILLS TO COMPLETE THE COURSE

As a result of mastering the discipline, the student must know:

- basic methods and means of cryptographic information protection;

- technology for building cryptographic information protection tools;
- principles of using encryption keys;
- new directions in cryptography.

be able to:

- use means of cryptographic information protection
- build virtual private networks;
- to apply the mathematical apparatus to solve the assigned tasks.

Internet of things security

CODE SEC175

CREDIT - 6 (2/1/0/3)

PREQUISIT - Operating System Security, Computer Networks

PURPOSE AND OBJECTIVES OF THE COURSE

- The explosive growth of the Internet of Things is changing our world, and the rapid fall in prices for typical IoT components allows people to implement new designs and products at home. The course aims to introduce students to the concepts behind the Internet of Things (IoT) through classes on a variety of topics that are important to understanding the state of the art as well as trends for IoT.

SHORT DESCRIPTION OF THE COURSE

- The discipline examines the current components of typical IoT devices; future trends; restrictions and interactions between the physical world and the IoT device; key network components for connecting an IoT device to the Internet; IoT security issues.

KNOWLEDGE, ABILITY, SKILLS TO COMPLETE THE COURSE

- As a result of mastering the discipline, the student must know and be able to:
- - analyze the main components of the IoT;
- build sensor / actuator systems using the Arduino microcontroller;
- Create Python programs that provide IoT functionality
- use Cloud and Fog technologies in the IoT system;
- understand IoT systems capable of solving global problems - manufacturing;
- design and build an IoT prototype on real devices or in Packet Tracer 7.0.

Organization and management of information security service

CODE SEC166

CREDIT – 6 (2/0/1/3)

PREQUISIT - Fundamentals of cryptographic information protection, Computer information protection technologies, Organizational and legal aspects of information security and computer forensics.

PURPOSE AND OBJECTIVES OF THE COURSE

The purpose of the discipline is to study the structure, logical organization and management system of the information security service as the main link in information security systems.

Discipline objectives: determination of the place of the information protection service in the enterprise security system; an explanation of the functions of the information security service; substantiation of the optimal structure and staffing of the information

protection service, depending on the tasks to be solved and the functions performed; establishment of the organizational foundations and principles of the information security service; resolution of general and specific issues of selection, placement and training of personnel, organization of labor of employees of the information security service; disclosure of principles, methods and technologies for managing information security services

SHORT DESCRIPTION OF THE COURSE

Place, tasks and functions of the information security service in the information security system. The purpose of the information protection service. Information security service as an information security management body and an integral part of the security system. Types and types of organizational structures of the information security service. Factors affecting the number of employees in the information security service. Organizational foundations and principles of the information security service. The procedure for creating an information protection service. Principles of organization and activity of information protection service. Conditions and factors affecting the organization of the information security service. Organization of interaction between the information security service and departments and external information security services. Features of the selection of personnel for the information security service. Requirements for employees of the information security service. Technology, principles and methods of information security service management

KNOWLEDGE, ABILITY, SKILLS TO COMPLETE THE COURSE

As a result of mastering the discipline, the student must know:

- the purpose and role of the information security service;
- the main tasks and functions of the information security service;
- types of organizational structures of information security services;
- the procedure and technology for creating and reorganizing the information security service;
- basic methods and technology of information security service management.

Be able to:

- determine the optimal structure of the information security service;
- organize and ensure the creation of an information protection service;
- carry out the selection, placement of personnel and training of employees of the information security service;
- organize and carry out all types of work of the information security service;
- to manage and control the activities of employees of the information security service;
- to develop normative and methodological documents on the organization and functioning of the information security service.

Content

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РЕЦЕНЗИЯ

НА ОБРАЗОВАТЕЛЬНУЮ ПРОГРАММУ «ИНФОРМАЦИОННАЯ БЕЗОПАСНОСТЬ». ВЫСШЕЕ ОБРАЗОВАНИЕ. БАКАЛАВРИАТ.

Представленная Образовательная программа (ОП) отвечает нормам Закона Республики Казахстан «Об образовании» от 27.07.2007 г. №319III с изменениями и дополнениями от 24.10.2011 г. № 487-VI ЗРК и Государственного общеобязательного стандарта высшего образования, утвержденного постановлением Правительства Республики Казахстан (Приказ № 604 от 31 октября 2018 года).

В рассматриваемой образовательной программе (ОП) предусматривается подготовка специалистов в области информационной безопасности по трем наиболее актуальным направлениям информационной безопасности: Безопасность систем и сетей, Криптографическая защита информации, Техническая защита информации.

Определенные в ОП требования по знаниям, умениям, навыкам и компетенциям, приобретаемыми обучающимися в результате обучения, соответствуют трудовым функциям профессионального стандарта РК «Информационная безопасность», утвержденного протоколом № 171 заседания Правления Национальной палаты предпринимателей РК «Атамекен» от 17.07.2017 г. Эти требования охватывают все основные направления подготовки специалистов в области информационной безопасности.

Содержание ОП согласовано с Национальной Рамкой Квалификаций РК, утвержденной протоколом от 16.03.2016 г. Республиканской трехсторонней комиссией по социальному партнерству и регулированию социальных и трудовых отношений и Отраслевой Рамкой Квалификаций в области ИКТ, утвержденной протоколом № 1 заседания Отраслевой комиссии в сфере информации, информатизации, связи и телекоммуникации от 20.12.2016 г.

Рабочий учебный план (РУП) ОП составлен в соответствии с Правилами организации учебного процесса по кредитной технологии обучения, утвержденными Приказом Министра МОН РК № 152 от 20.04.2011 г. (последние изменения внесены Приказом Министра МОН РК №90 от 28.01.2016 года);

Определены и описаны дескрипторы уровня и объема знаний, умений, навыков и компетенций. Требования к профессиональным компетенциям удовлетворяют требования работодателей к специалистам по защите и безопасности информации.

Дисциплины базового цикла обеспечивают формирование базовых знаний для освоения дисциплин профессионального цикла. Профессиональные дисциплины РУП отражают основные тренды в области информационной безопасности, и их содержание отвечает современному развитию информационной безопасности.

Рецензируемая ОП «Информационная безопасность» (высшее образование, бакалавриат), разработанная Казахским национальным исследовательским техническим университетом имени К.И. Сатпаева рекомендуется к утверждению и введению в действие.

Председатель
Казахстанской Ассоциации
Информационной Безопасности **В. Покусов**