**MINISTRY OF EDUCATION AND SCIENCE OF THE REPUBLIC OF KAZAKHSTAN**

**NON-PROFIT JOINT STOCK COMPANY«ALMATY UNIVERSITY OF POWER ENGINEERING AND TELECOMMUNICATIONS named after Gumarbek Daukeev»**

**Institute of management systems and information technologies**

**Department of Information Security Systems**

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| **"Agreed"** | **"Agreed"** |
| Chairman ALE «КISA» | AUEC Rector |
| \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_V.Pokusov | \_\_\_\_\_\_\_\_\_\_\_\_\_\_ S. Sagintayeva |
| «\_\_\_»\_\_\_\_\_\_\_\_\_\_\_\_\_\_2020 y. | «\_\_\_»\_\_\_\_\_\_\_\_\_\_\_\_\_\_2020 y. |
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**MODULAR EDUCATIONAL PROGRAM**

**DIRECTION 6B06104 - INFORMATION SECURITY SYSTEMS**

**HIGHER EDUCATION**

**Area of education (according to the classifier dated 10/13/2018):** 6B06 - Information and communication technology

**Direction of study (according to the classifier dated 10/13/2018):** 6В061 - Information and communication technology

**Duration of study - 4 years**

**Awarded academic degree:** *Bachelor of Engineering and Technology*

**Qualification level in accordance with the National Qualifications Framework:** Level 6.

**Алматы 2020 г.**

**Training trajectories (specialty):**

Protection and security in infocommunication structures

E-commerce security

The EP is developed on the basis of: the 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 “Information and communication technologies”, Approved by the protocol of the meeting of the Sectoral Commission in the field of information, informatization, communications and telecommunications dated December 20, 2016 No. 1; State compulsory standard of higher education, Approved by the Decree of the Government of the Republic of Kazakhstan dated 08.23.2012 No. 1080 (amended by the decree of the Government of the Republic of Kazakhstan. Order of the Minister of Education and Science of the Republic of Kazakhstan dated October 31, 2018 No. 604. Registered in the Ministry of Justice of the Republic of Kazakhstan from November 1, 2018 No. 17669.); Professional standards or standard projects.

The educational program was developed at the Information Security Systems Department.

Head of the educational program Berdibayev R..

In the development of the educational program participated: Satimova Y.., Ph.D., associate professor, Almuratova К.. senior lecturer of the Department of ISC, AUPET.

The EP was reviewed and approved at a meeting of the Information Systems and Cybersecurity Department on 06/04/2020, protocol No. 8.

Head of ISS \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Berdibayev R..

The EP was reviewed and approved at a meeting of the educational and methodical commission of the Institute of Management Systems and Information Technologies (protocol No. \_ from \_13\_/\_04\_/2020).

Director of IMSIT \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Kartbayev T.S.

The EP was reviewed and approved by the Scientific and Methodological Council of AUEC (protocol No. 5 dated 20/10/2020).

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**List of symbols and abbreviations**

|  |  |
| --- | --- |
| HE | - Higher education |
| STSE | - State Compulsory Standard of Education |
| EQF | - European Qualifications Framework |
| NCO | - National classifier of occupations |
| RK | - Republic of Kazakhstan |
| NQF | - National Qualifications Framework |
| NQS | - National Qualifications System |
| GEM | - General educational module |
| EP | - Educational program |
| GED | - General educational disciplines |
| CC | - Compulsory component |
| UC | - University component |
| BD | - Basic disciplines |
| PD | - Profile disciplines |
| IEP | - Individual educational path |
| SQF | - Sectoral Qualifications Framework |
| PS | - Professional standard |
| PGE | - Postgraduate education |
| ON | - Competencies |
| LO | - Learning outcome |
| CW | - Course work |
| CGW | - Calculation and graphic work |
| RWS | - Research work of students |
| CED | - Catalog of elective disciplines |

**Educational program passport**

|  |  |  |
| --- | --- | --- |
| **№** | **Field name** | **Notes** |
| 1 | Registration number | 6В061000500 |
| 2 | Code and classification of the field of education | 6B06 Information and communication technology |
| 3 | Code and classification of training areas | 6B061 Information and communication technology |
| 4 | Group of educational programs | В058- Information security |
| 5 | Name of educational program | 6B06104 - Information Security Systems |
| 6 | Type of EP | Current EP |
| 7 | Purpose of EP | The goal of the educational program "Information Security" is to train highly qualified specialists in the field of information security who are able to solve almost any complex problems related to the protection, reliable storage, transmission and processing of information, while relying on the most advanced achievements in the field of mathematics and information technology , and using modern hardware and software. |
| 8 | ISCE level | ISCE 6 Baccalaureate or its equivalent |
| 9 | NQF level | 6 |
| 10 | SQF level | 6 |
| 11 | Distinctive features of EP | No |
| Partner university (JEP) | No |
| Partner university (AEP) | No |
| 12 | The list of competencies | ON1. Demonstrate knowledge about the historical development, traditions, cultural heritage, the constitutional system of the Republic of Kazakhstan, competitiveness and the ability for self-development and critical understanding of the accumulated experience, the formation of worldview, civic and moral positions based on the knowledge of information and communication technologies, building communication programs in the state, Russian and foreign languages, targeting a healthy lifestyle.  ON2. Demonstrate and apply basic mathematical, natural science, humanitarian, socio-economic and legal knowledge in an interdisciplinary context, master the methods and methods of organizing production and compliance with life safety rules for solving engineering problems in the professional field.  ON3. Use in professional activities various types of information and communication technologies: Internet resources, cloud and mobile services, application packages for the search, storage, processing, protection and dissemination of information.  ON4. To have knowledge of international and domestic regulations, standards and rules in the field of information technology and information security.  ON5. Demonstrate knowledge about the element base, architecture, operating systems of computer systems, networks and organization and ensuring their security, setting up security policies for operating systems, DBMS, application software, technologies and programming methods for protecting information and information processes.  ON6. Develop and put into operation a system for ensuring information security of enterprises, analyze and assess its fault tolerance and develop measures to improve it.  ON7. Checking the resilience of applications to external unauthorized access: checking the resilience of the company's web applications to attacks; implementation of security control (code audit, vulnerability scanning, etc.).  ON8. Install and configure information security tools. Installation, configuration, testing and maintenance of technical means of information protection. Monitoring the security of information.  ON9. Ensuring the operability of application and system software by means of information protection, administration, operation and support of the operability of software and hardware for information protection and information security.  ON10. Managing cryptographic keys, encryption, administering antivirus software, installing and configuring the server side of the system, configuring and configuring a firewall, and organizing other cybersecurity measures.  ON11. Administration of the information security event management system, intrusion detection / prevention systems, monitoring of events and incidents. |
| 13 | Learning outcomes |
| 14 | Form of learning | Full-time, distance |
| 15 | Language of learning | Russian, Kazakh, English |
| 16 | Credits | 240 |
| 17 | Awarded Academic Degree | Bachelor in the field of information and communication technologies on the educational program “6B06104- - Information Security Systems” |
| 18 | Availability of an appendix to the license for the training | License KZ80LAA00018161  Date of issue 05.05.2020 |
| 19 | Availability of accreditation of EP | Есть |
| Name of accreditation body | IAAR Non-profit organization "Independent agency for accreditation and rating" |
| Accreditation Duration |  |
| 20 | Information about disciplines | Information about disciplines of UC/OC GED, BD, PD (Appendix 1) |
| 21 | Professional activity | industry, science, education, culture, healthcare, agriculture, public administration. |
| 22 | Types of professional activity | design and engineering; production and technological; organizational and managerical; operational |
| 23 | Modular Curriculum | Given in appendix 2 |

**1. The structure of the educational program of higher education**

Bachelor's degree - the level of higher education aimed at training personnel with the award of a "bachelor" degree on the relevant educational program with the obligatory mastering of at least 240 academic credits. The content of the educational program of higher education consists of three cycles of disciplines - general education disciplines (hereinafter - GED), basic disciplines (hereinafter - BD) and profile disciplines (hereinafter - PD).

The GED cycle includes disciplines of the compulsory component (hereinafter - CC), the university component (hereinafter - UC) and (or) the optional component (hereinafter - OC). BD and PD cycles include UC and OC disciplines.

The list of GED cycle does not allow a reduction in the volume of disciplines of the compulsory component, the content of which is determined by standard educational programs. The exception is shortened educational programs of higher education with accelerated terms of study on the basis of technical and vocational, post-secondary or higher education.

UC and OC are determined independently by the university and take into account the needs of the labor market, the expectations of employers and the individual interests of the student.

The volume of the GED cycle is not more than 23% of the total educational program of higher education or 56 academic credits. Among them, 51 academic credits are allocated to the disciplines of the compulsory component.

The BD cycle includes the study of academic disciplines and the passage of professional practice and is at least 47% of the total educational program of higher education or at least 112 academic credits.

The PD cycle includes academic disciplines and types of professional practices, the volume of which is at least 25% of the total educational program of higher education or at least 60 academic credits.

The modular curriculum meets the requirements of the state compulsory standard of higher education and the structure of the educational program of higher education, contains all the components of the compulsory part, and has university and optional components. In the modular program, the minimum requirements for the number of credits for theoretical training are -228 and 12 credits for final certification. Terms and types of practices in the educational program are defined as: educational - 1 semester (3 credits), production - 4 semesters (5 credits) and 6 semesters (5 credits), pre-diploma - 8 semesters (8 credits). The optional component is defined in the catalog of elective disciplines.

Appendix 1

to the State Compulsory

Standard of Education

|  |  |  |  |
| --- | --- | --- | --- |
| No. | The name of the cycles of disciplines and activities | Total labor input | |
| in academic hours | in academic credits |
| 1 | 2 | 3 | 4 |
| 1. | General education disciplines cycle (GED) | 1680 | 56 |
| 1) | Compulsory component | 1530 | 51 |
| The modern history of Kazakhstan | 150 | 5 |
| Philosophy | 150 | 5 |
| Foreign language | 300 | 10 |
| Kazakh (Russian) language | 300 | 10 |
| Information and communication technologies (in English) | 150 | 5 |
| The module of socio-political knowledge (sociology, political science, cultural studies, psychology) | 240 | 8 |
| Physical Culture | 240 | 8 |
| 2) | University component and(or) Optional component | 150 | 5 |
| 2. | Basic disciplines cycle (BD) | 3360 | 112 |
| 1) | University component | 180-1680 | 6-56 |
| 2) | Optional component | Not least than 1680 | Not least than 56 |
| 3. | Profile disciplines cycle (PD) | 1800 | 60 |
| 1) | University component and(or) Optional component | 1800 | 60 |
| 4. | Additional types of education (ATE) |  |  |
| 1) | Optional component |  |  |
| 5. | Final examination (FE) | 360 | 12 |
|  | Preparation and defense of a diploma work and preparation and passing a comprehensive exam | 360 | 12 |
|  | TOTAL | 7200 | 240 |

**2. Catalog of Elective Disciplines**

The catalog of elective disciplines is formed for the entire period of study, but it is not static, and can be changed in accordance with the needs of production, the desire of a group of students (at least one subgroup), academic exchange of teaching staff and the opportunity to listen to a modern professional course, leading specialists, leading universities of the world.

CED is developed and issued as a separate document.

**3. Modular curriculum**

The modular curriculum is presented in Appendix 2. The effectiveness of learning outcomes is achieved by observing a comprehensive approach, when the educational programs and the curriculum and educational disciplines are formed on a modular basis.

The content and volume of each module varies depending on the didactic purposes, profile and level differentiation of students and the entire educational program is structured into autonomous organizational and methodological modules.

The formation and content of the modules provides the necessary degree of flexibility and freedom for students in selecting a training path and obtaining special professional competencies that increase competitiveness in the labor market.

Modules of the educational program 6В06104 “Information security systems” in the 1st and 2nd semesters are mandatory or basic disciplines of the university component, and starting from the 3rd semester, they are variable. For example, in the module "MSIB03 - Cybersecurity software" the teacher can choose 3 disciplines out of six –“Technologies and methods of programming”, “Fundamentals of object-oriented programming”, “WEB programming”, “Scripting languages”, “System programming”,” Fundamentals of system programming”. A similar principle for choosing disciplines is preserved in the modules “MSIB06 - Introduction to the specialty. Methods of information protection and security "," MSIB07 - Security of operating systems and DBMS "," MSIB08 - Security of computer systems and networks "," MSIB09 - Legal and organizational and technical support of information security "," MSIB10 Professional disciplines ".

Consolidation of special competencies, the ability to work in a team, in production, to independently solve the assigned tasks is facilitated by the development of the module "MSIB12 - Industrial practice".

**4. Path selection method**

Until the fourth year, the modules have a "horizontal-vertical" scheme. Modules consist of a compulsory and variative component. Learning outcomes after studying the module may vary depending on the selected variative component of the module. The variative part leaves the possibility of changing the learning path up to the 7th semester. From the 7th semester, the student studies modules in a specific direction and the variative component of the modules studied in earlier semesters.

Such a scheme for the formation of an educational program gives a student freedom in choosing the disciplines listed in the catalog of elective disciplines and in a modular curriculum, each student's personal participation in the formation of their individual curriculum, and the involvement of academic consultants to the educational process that assist students in choosing an educational path.

As a result of the implementation of the chosen educational path, the necessary competencies must be obtained. An individual educational path consists of a compulsory one, including a university component, variative, corrective, and organizational parts. The compulsory part includes the basic modules for the study, which correspond to the state compulsory standard of higher education. The university component of the modules is studied obligatory, regardless of the chosen path and forms the basic "General Professional" and "Professional" competencies of the future specialist. The variative part includes a set of modules and their components, which the student selects for study, depending on the areas of study that interests him. The compulsory and variative parts are aimed at determining the content of learning. The corrective part provides assisting students in the selection of disciplines of the variative part of modules and variative modules taking into account their individual characteristics, as well as determining the organizational part. The organizational part includes the following system components: forms, methods, technologies, tools, monitoring the study of selected content. Table 4.1 presents the organizational components of IEP training.

Table 4.1 - Organizational components of IEP training

|  |  |  |
| --- | --- | --- |
| Elements of asynchrony | Providing asynchronous learning | Tools providing asynchrony |
| 1. Individual work of a student 2. The choice of disciplines of the variative component 3. Work on projects 4. The choice of an additional training profile | Institute of Control Systems and Information Technologies | Working curriculum; Timetable of classes; Schedule of consultations of teachers of IWM; curriculum monitoring |
| Эдвайзеры, Тьюторы | Individual curriculum of a student |
| Advisors, Tutors | EMDC, schedule of completion of tasks, bibliography, handout, electronic resource |
| Techers | Library, media library, electronic publications, Internet, syllabuses |

В таблице 4.2 представлен содержательный компонент ИОТ обучения. Содержательный компонент конкретизирует варианты формирования индивидуальной образовательной технологии. В рамках образовательной программы возможна реализация академической мобильности, получения дополнительного образования.

Table 4.2 Substantive component of IEP training

|  |  |  |
| --- | --- | --- |
| IEP variants | Providing asynchronous learning | Tools providing asynchrony |
| Individual competency set | Advisors, students | Individual curriculum of a student |
| Departments | A set of variative disciplines |
| ICSIT | Working curriculum |
| Concretization of the training profile (CGW, TW, research work, project work) | Advisors, students | Individual curriculum of a student |
| Departments | Exemplary topics for TW, CGW topics, RWS topics |
| Individual level of mastering disciplines (high, medium, low) | Advisers, students, teachers | Regulations on the ball-rating assessment system, schedule of tasks completion, experimental research work |
| Professional adaptation to professional activities during the practice | Advisors, students, departments, dean's office | Practice programs, agreements with enterprises on the bases of practices, the formation of individual tasks for practice, elements of dual learning |
| An expanded set of professional competencies (selection of an additional training profile) | Advisors, students | Individual plan of a student |
| ICSIT | Non-linear schedule, the main educational program of an additional learning profile, professional advanced training courses |

The educational program assumes two learning paths: “Protection and security in infocommunication structures” and “Security of e-commerce”.

The first course is characterized by a significant number of compulsory disciplines and disciplines of the university component included in the modular plan. In the first year, there are no disciplines of the variative component. After studying the disciplines of the first and second semester, students will master 30 credits in the first semester and 30 credits in the second semester. In the first semester, educational practice is provided.

In the second year, the study of the general and basic disciplines cycles continues. The share of the variative part in the second year is significant. In the second year, the formation of a future profession begins; a significant proportion of disciplines is devoted to the theoretical foundations of systems analysis, the basics of information systems, the study of programming languages, etc. The choice of disciplines of the variative component does not affect the choice of the direction of preparation of the educational program, but forms the basic knowledge associated with information systems.

In the second year, the formation of the future profession begins in the modules “MSIB03 - Cybersecurity software”, “MSIB06 - Introduction to the specialty. Methods of information protection and security”, “МSIB07 - Security of operating systems and DBMS”, “МSIB09 - Legal and organizational technical support of information security” disciplines of an optional component appear inherent in a specific direction of training a future specialist, from these disciplines it is necessary to choose a discipline that forms the basis of specialization. Thus, after choosing the disciplines of the third and fourth semesters, students will master 30 credits in the third semester and 30 credits in the fourth semester. In the fourth semester, five internship credits must be completed.

In the third year, the study of the disciplines of the cycle of basic disciplines continues, however, a sufficiently large block of major disciplines appears, both compulsory and variable components. The share of the variable part in the third year is significant. After choosing the disciplines of the fifth and sixth semester, students will master 30 credits in the fifth semester and 30 credits in the sixth semester. In the sixth semester, five Apprenticeship credits must be completed.

In the fourth year, the study of cycles of basic and profiling disciplines of the variable component continues. In the seventh semester, the study of disciplines of a specific direction of training of a future specialist begins (modules “MSIB11-1 - Protection and security in infocommunication structures”, ”MSIB11-2 - Security of E-commerce”). The study of these modules is mandatory when choosing a training trajectory (specialization). In the eighth semester, the general education and basic disciplines of the university component are studied: “Economics, entrepreneurship and industry management”, “Ecology and life safety”, “Professionally-oriented foreign language”, one of the two major disciplines "Information security trends", "Special issues of cybersecurity", and training is also underway to the final certification, which completes the learning process in the educational program.

Therefore, after selecting the disciplines of the seventh semester, students will master 30 credits. In the eighth semester, in addition to studying a number of disciplines, there must be mastered pre-diploma practice and final certification, a total - 30 credits.

The volume of mastered credits by modules and training courses is presented in summary table 4.3.

By forming additional modules in the third and fourth courses in the university part of the program, you can train specialists in a wide variety of specializations, keeping up with the times.

The educational program ensures the application of an individual approach to students, ensures the transformation of professional competencies from professional standards and qualification standards into learning outcomes. Student-centered learning is provided - the principle of education, which implies a shift in emphasis in the educational process from teaching (as the main role of teaching staff in the knowledge "translation") to learning (as the active educational activity of the student). The educational program is designed to implement the principles of the democratic nature of educational management, expanding the boundaries of academic freedom and the authority of educational institutions, which will ensure the training of highly motivated personnel in the field of information technology, in particular in the field of information technology systems design.

Table 4.3 - A summary table reflecting the amount of mastered credits by modules of the educational program

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Course of study | Semester | Number of modules to be mastered | Number of subjects studied | | Number of credits KZ | | | | | Total in hours | ECTS | Quantity | |
| UC | OC | Theoretical training | Educational practice | Production practice | Final certification | Total | exam | def credit |
| 1 | 1 | 5 | 6 | 1 | 27 | 3 | 0 | 0 | 30 | 900 | 30 | 5+1 CE | 2 |
| 2 | 6 | 3 | 7 | 30 | 0 | 0 | 0 | 30 | 900 | 30 | 6 | 1 |
| 2 | 3 | 6 | 1 | 6 | 30 | 0 | 0 | 0 | 30 | 900 | 30 | 6 | 1 |
| 4 | 4 | 1 | 6 | 25 | 0 | 5 | 0 | 30 | 900 | 30 | 5 | 2 |
| 3 | 5 | 6 | 0 | 6 | 30 | 0 | 0 | 0 | 30 | 900 | 30 | 6 | 0 |
| 6 | 6 | 0 | 6 | 25 | 0 | 5 | 0 | 30 | 900 | 30 | 5 | 1 |
| 4 | 7 | 3 | 0 | 6 | 30 | 0 | 0 | 0 | 30 | 900 | 30 | 6 | 0 |
| 8 | 3 | 0 | 4 | 10 | 0 | 8 | 12 | 30 | 900 | 30 | 4+1 CE+ +ДП | 1 |
| Итого | |  | 9 | 35 | 207 | 3 | 18 | 12 | 240 | 7200 | 240 | 42+8d/c 2CE DP | 8 |

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Приложение 1

Таблица П1.1 - Сведения об изучаемых дисциплинах и формируемых компетенциях

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| № | **Name of the discipline** | **Discipline Summary (30-50 words)** | **Amount of credits** | **Formed competencies (codes)** |
| **The cycle of general education** | | | | |
| **University component / Optional component** | | | | |
| 1 | Modern history of Kazakhstan (in Kazakh language) | As a result of studying the discipline "Modern History of Kazakhstan", students should understand the most important periods and events in the history of Kazakhstan, master the ability to analyze the key problems of Natural History and the ability to navigate in the historical space. | 5 | ON1 |
| 2 | Philosophy | The discipline reflects the essence of the basic philosophical and scientific problems with which the modern engineer should be familiar. Formation of the main stages and branches of modern humanitarian and socio-economic knowledge, the emergence of the main philosophical and scientific schools, directions and concepts that are the sources of humanitarian knowledge and humanitarian culture. Knowledge of the problem of modern domestic and world philosophy | 5 | ON1 |
| 3 | Module social-floor characters (sociology, political science) | As a result of studying the discipline, students will acquire the necessary knowledge about the cultural development of society, about the cultural heritage of their country, as well as they will form an understanding of the laws governing the development of political processes, the place and role of politics in public life, and the features of political relations in the modern world. | 5 | ON1 |
| 4 | Module social-floor characters (cultural studies, psychology) | As a result of studying the discipline, students will receive the skills and abilities to reasonably and reasonably provide information on various stages of development of Kazakhstan's society, social and interpersonal relations, to develop programs for solving conflict situations in society, including in professional society. | 3 | ON1 |
| 5 | Physical Culture | Formation of knowledge on the scientific-biological, methodological and practical basis of physical culture and a healthy lifestyle; methodology of using means of physical culture and sports for the prevention of diseases, mental well-being, development and improvement of qualities and personality traits. Mastering practical skills that ensure the preservation and promotion of health, development and improvement of psychophysical abilities and qualities | 8 | ON1 |
| 6 | Foreign language 1 | As a result of studying the discipline "Foreign Language", students must master a foreign language at a high professional level, sufficient for professional interaction with foreign colleagues, as well as for searching, studying and analyzing foreign sources of information. | 5 | ON1 |
| 7 | Foreign language 2 | As a result of studying the discipline "Foreign Language", students must master a foreign language at a high professional level, sufficient for professional interaction with foreign colleagues, as well as for searching, studying and analyzing foreign sources of information | 5 | ON1 |
| 8 | Kazakh (Russian) language | As a result of studying the “Kazakh (Russian) language” discipline, students will master the skills of working with authentic texts, master the language system and how to use it, and demonstrate in Russian as a language of interethnic communication written and oral communication skills in various areas of life (social, everyday, | 5 | ON1 |
| 9 | Kazakh (Russian) language | As a result of studying the “Kazakh (Russian) language” discipline, students will master the skills of working with authentic texts, master the language system and how to use it, and demonstrate in Russian as a language of interethnic communication written and oral communication skills in various areas of life (social, everyday, socio-political, educational and vocational). | 5 | ON1 |
| 10 | Information and communication technologies (in English) | In the result of the study of the discipline "Information and communication technologies" students will master information and communication competencies that will facilitate everyday life and provide an opportunity to use modern information technologies in various fields of professional activity, scientific and practical work, for self-educational and other purposes. | 5 | ON1 |
|  |  | **GED (General Education disciplines) cycle** (**compulsory component CC)** | **51** |  |
| **Optionally component** | | | | |
| 11 | Module of the university component of the GED (Fundamentals of Ethics and Anti-corruption Culture,Ecology and Life Safety, Economics, Entrepreneurship, Leadership and Innovation ) | Study of the economics and management of the communications industry in modern market conditions. Study of the principles of management, planning and organization of business activities, the basics of pricing, understanding of economic mechanisms and economic problems. Training in the basics of entrepreneurship. Mastering the ethics of business relations, establishing a new firm, finding the most cost-effective ways to achieve results in a highly competitive environment. Assessing the impact of technological processes on the environment, the types and sources of contamination and methods of cleaning, categorization environmental hazards sanitary and protection zones, as well as the parameters and characteristics of emergency situations of various nature, predicting their consequences, the method of determining the amount and structure losses. Allows you to help the student to get the necessary knowledge about the basics of legal knowledge, legal culture in the Republic of Kazakhstan, ensuring law and order, special knowledge about state anti-corruption measures. The special course helps to acquire the skills of independent analysis of complex and diverse processes and phenomena associated with corruption. | 2 | ON1 |
|  |  | **Total university component GED** | **5** |  |
| **Basic Disciplines cycle** | | | | |
| **university component** | | | | |
| 1 | Professional Kazakh (Russian) language | The discipline is aimed at the formation of linguistic professional competence of students, integrating the general cultural, intellectual, social and professional qualities of a specialist; formation of skills in the use of special vocabulary in the professional field, reproduction and analysis of text on special topics, as well as its translation into Kazakh / Russian, production of a text in the specialty in written / oral communication of professional communication and public speaking | 3 | ON1, ON2 |
| 2 | Professionally oriented foreign language | The discipline is aimed at developing the speech skills of oral and written communication in a foreign language, reading and translating texts in the specialty, producing monologic statements in compliance with the rules of speech etiquette. Students will be able to demonstrate knowledge of word-formation models, terms, lexical structures, grammar and syntax of a technical language; skills of search, processing, selection of information from foreign language scientific and technical literature. | 3 | ON2 |
| 3 | Operating system security | Formation of students' knowledge about the principles of management of computer systems and networks; technologies, methods and means of software product production; methods and means of ensuring the security of operating systems; principles of building and protecting modern operating systems and system software |  | ON5 |
| 4 | Mathematics 1 | Acquaintance with the fundamental sections of higher mathematics: elements of linear algebra and analytical geometry: determinants, matrices, systems of linear equations, vectors, equations of a straight line and a plane, curves of the second order; differential and integral calculus of functions of one variable: limit of a function, continuity, derivative of a function, antiderivative, definite integral and complex numbers. | 5 | ON2 |
| 5 | Mathematics 2 | Acquaintance with the fundamental sections of higher mathematics: differential and integral calculus of functions of several variables: partial derivatives, total differential and its connection with partial derivatives, extrema of functions of several variables, multiple integrals; differential equations: differential equations of the first and higher orders; series theory: numerical series, functional series, Fourier series. | 5 | ON2 |
| 6 | Physics | As a result of studying the discipline "Physics", students will master the theoretical foundations of classical mechanics, elements of the special (particular) theory of relativity, the basics of molecular physics and thermodynamics, electrostatics, direct electric current and electromagnetism, mechanical vibrations and waves | 5 | ON2 |
| 7 | Digital circuitry | study of methods of construction and principles of operation of digital integrated circuits of logical elements, circuits of functional units of combinational and sequential types, structure and methods of organization and functioning of semiconductor memory devices of statistical and dynamic types, mask, programmable and reprogrammable read-only memory devices, principles of construction and operation of analog-digital and digital-to-analog converters | 5 | ON5 |
| 8 | Educational practice Fundamentals of computer graphics | As a result of studying the discipline, students will master the methods of computer geometry, raster and vector graphics, acquire skills in working with graphics libraries and in modern graphics packages and systems such as Photoshop, CorelDraw, etc. | 3 | ON2, ON3 |
| 9 | Industrial practice 1 | Formation of knowledge on applicable standards, regulations and instructions for radio installation, placement of elements on the circuit board. Skills acquisition: designing a circuit board, soldering, testing a manufactured device using measuring equipment: an oscilloscope, a tester, etc. | 5 |  |
| 10 | Industrial practice 2 | The purpose of the internship is to console  date professional competence, acquire practical skills and professional experience. During the practice, students must acquire practical skills in the maintenance and technical operation of equipment, study the issues of economics and organization of production, safety measures and rationalization activities. | 5 | ON7 |
|  |  | **Total university component** | **44** |  |
|  | | | | | |
| **Optionally component** | | | | | |
|  | **Discipline of choice 1 (choose 1 of 2)** |  | 3 |  |
| 11 | Discrete mathematics | Acquaintance with the fundamental sections of set theory, mathematical logic, graph theory and coding: boolean of sets, universe, cardinality, Euler-Venn diagram, one-to-one correspondences, logic formulas, binary relations, logic and predicate calculus, predicates, quantifiers, trees, forest, encoding, decoding, Hamming codes |  | ON2 |
| 12 | Mathematical analysis | Introduction to the fundamental sections of mathematical analysis: metric space, differential calculus of a function of one variable, Riemann integral, series, functional series, differential calculus of functions of many variables. |  | ON2 |
|  | **Discipline of choice 2 (choose 1 of 2)** |  | 4 |  |
| 13 | Theory of Probability | Acquaintance with the fundamental sections of the theory of probability and mathematical statistics: the space of elementary events, probability, basic theorems of the theory of probability and mathematical statistics, about the laws of probability distribution of random variables, statistical estimates of distribution parameters, methods of information processing, their systematization and methods of analyzing statistical data |  | ON2 |
| 14 | Mathematical Statistics | The study of the discipline is aimed at mastering the theoretical foundations of the branch of mathematics that develops methods for registering, describing and analyzing observational and experimental data in order to build probabilistic models of mass random phenomena. Depending on the mathematical nature of the specific results of observations, mathematical statistics are divided into statistics of numbers, multidimensional statistical analysis, analysis of functions (processes) and time series, statistics of objects of non-numeric nature. |  | ON2 |
|  | **Discipline of choice 3 (choose 1 of 2)** |  | 5 |  |
| 15 | Technologies and methods of programming | Studying the basics of algorithmization and teaching students programming skills for solving problems on modern computers. The study of the discipline is aimed at mastering the theoretical foundations of problem algorithms, practical programming techniques in high-level algorithmic languages, program design and training intensification, expressed in the requirement to write complete programs. |  | ON9, ON10 |
| 16 | Object-oriented programming fundamentals | The study of the discipline is aimed at mastering the theoretical foundations of object-oriented programming, practical methods of using OOP in high-level algorithmic languages. The acquired knowledge will allow students to successfully master modern technological approaches to the development of complex software systems in the future. |  | ON9, ON10 |
|  | **Discipline of choice 4 (choose 1 of 2)** |  | 5 |  |
| 17 | Web programming | Study of modern methods and tools for developing interactive Web-applications. Formation of knowledge and skills in applying the basic elements of HTML and CSS stylesheets, creating dynamic web pages using JavaScript and object-oriented technologies using Python. Laboratory exercises are conducted in a computer lab (Windows 10, Apache web server, Python software, Django, etc.) |  | ON5, ON6, ON7 |
| 18 | Scripting languages | As part of the discipline, he is trained in scripting programming languages, such as: VBScript, JScript, JavaScript, Python, Tcl, Ruby, PHP, Perl. The main focus is on the Python language. Laboratory exercises are conducted in a specially equipped computer class with modern software (Windows 10, Apache web server, Python software package, Django, etc.) |  | ON5, ON6, ON7 |
|  | **Дисциплина по выбору 5 (выбрать 1 из 2)** |  | 5 |  |
| 19 | Основы алгоритмизации и программирования | В результате изучения дисциплины «Основы алгоритмизации и программирование» студенты получат компетенции по основам алгоритмизации задач, методах разработки программ, динамических структур данных, методов проектирования программного обеспечения, стиля программирования, методов отладки и испытания программ. |  | ON1, ON2 |
| 20 | Алгоритмы и структура данных | В результате изучения дисциплины «Основы алгоритмизации и программирование» студенты получат компетенции по основам алгоритмизации задач, методах разработки программ, динамических структур данных, методов проектирования программного обеспечения, стиля программирования, методов отладки и испытания программ. |  | ON1, ON2 |
|  | **Discipline of choice 6 (choose 1 of 2)** |  | 3 |  |
| 21 | Basics of IP telephony and streaming technologies | As a result of studying the discipline "Fundamentals of IP-telephony, video communication" students will acquire basic knowledge of the principles of implementing IP-telephony networks, technologies for transmission and processing of streaming data; ways to organize high-quality video communication. |  | ON1 |
| 22 | Streaming technologies | As a result of studying the discipline "Streaming Technologies" students receive basic information about the organization of quality video communication; effective use and knowledge of modern streaming technologies for the creation and distribution of audio and video content, as well as in real time. As a result of studying the disciplines, students receive knowledge and effective use of the possibilities of modern streaming technologies for the creation and distribution of audio and video content, including in real time. |  | ON1 |
|  | **Discipline of choice 7 (choose 1 of 2)** |  | 5 |  |
| 23 | Cybersecurity Information basics | The discipline studies the main components of information security, considers objects of protection, categories and media, information security means and methods of transferring confidential information |  | ON10, ON11 |
| 24 | Information security basics | The classification of protected objects, classification of information protection methods, risk analysis |  | ON10 |
|  | **Discipline of choice 8 (choose 1 of 2)** |  | 5 |  |
| 25 | Computer Information Protection Technologies | Study of systematized information about the technologies of organizing and ensuring the protection of computer information in computer systems and networks, about the regulatory framework for protecting information; on technologies of counteracting software and hardware bookmarks, protection against information interception due to electromagnetic radiation |  | ON10 |
| 26 | Information security technologies | The discipline considers technologies that ensure information protection: authentication technologies, security policies, problems of information security of networks, legal aspects and standards; software technologies and information security tools, computer viruses and anti-virus protection problems; methods of protecting information from unauthorized access using biometric scanners |  | ON10, ON11 |
|  | **Discipline of choice 9 (choose 1 of 2)** |  | 5 |  |
| 27 | Architecture of computer systems and networks | The basic principles of constructing architectures of computer systems and networks, the internal structure of computer systems, information processing processes at all levels of computer architectures, types of computer systems and networks, their features, basic components and functions are studied; input-output modules, system highways, their functions; internal and external memory structure, TCP / IP protocol stack and functions of OSI model layers |  | ON5, ON10 |
| 28 | Organization of computer systems | Students are given the basic principles of computer systems and networks. The process of data transmission in networks is studied according to the OSI reference model (ISO). The principles of data transmission in the information transmission medium, the principles of switching are studied. Routing is studied in detail: static and dynamic. Students gain practical skills in setting up network equipment |  | ON10 |
|  | **Discipline of choice 10 (choose 1 of 2)** |  | 3 |  |
| 29 | Internet basics | Principles of network interconnection based on protocols. IP addressing. IP protocol. Routing protocols in IP networks. Classification of computer networks. Informational and interactive Internet resources. |  | ON3,ON5 |
| 30 | Computer data networks | The discipline aims to familiarize the student with the principles of organization and functioning of computer systems and networks, the peculiarities of the work of a personal computer in networks, modern computer network technologies and methods of transferring, storing, searching, processing and presenting information, Internet technology, familiarizing students with the basic methods of scanning, setting and modernization of computer networks, as well as the basics of designing and modeling networks using the PacketTracerGNS3 program. |  | ON3,ON5, ON7 |
|  | **Discipline of choice 11 (choose 1 of 2)** |  | 5 |  |
| 31 | Information security software and hardware | Familiarization of students with the main classes of information security software and hardware, their capabilities and functional applicability; basic technologies for ensuring security in information systems, as well as in the process of information transfer; monitoring procedures in the areas of security and information protection; primary skills in working with basic information security tools |  | ON5, ON9, ON10 |
| 32 | Software and hardware means of information protection | Formation of knowledge and skills among students about the main methods and technologies for ensuring information security in applied systems, about ensuring protection against unauthorized access and network hacker attacks; on the use of tools for choosing the best way to ensure information security using modern software (Packet Tracer, MAAK, Ideco, Secret Net, App Cheker, etc.) |  | ON5, ON9, ON10 |
|  | **Discipline of choice 12 (choose 1 of 2)** |  |  |  |
| 33 | Database systems | Formation of students' understanding of database systems and its architecture; ability to create a real database using structured query language; the ability to work in a network or local database, studying the principles of building basic data models and their use in modern database management systems, studying the administration and protection of databases |  | ON5 |
| 34 | Database design | Formation of conceptual ideas about the principles of building a database and DBMS, representing the fundamental concepts and mathematical models that underlie the database and DBMS, the principles of database design, as well as the technologies for implementing the database and illustrating the above concepts using the example of MS SQL-Server |  | ON5 |
|  | **Discipline of choice 13 (choose 1 of 2)** |  | 4 |  |
| 35 | Organizational and legal support of information security | Formation of professional skills related to the structure of legal support for information security Creation of an understanding of the application of organizational and legal methods of ensuring information security in the work of small teams of executors and ways to improve the information security system; development of abilities for logical and algorithmic thinking, for monitoring the effectiveness of the implementation of information security policy |  | ON10 |
| 36 | Political and legal aspects of information security | Formation of professional skills related to the structure of political and legal support for information security and relevant legislation in the field of information, information technology and information protection, personal data, state secrets, EDS, technical regulation; concepts related to the issues of responsibility for offenses in the field of information security, as well as mechanisms to protect the rights and legitimate interests of subjects of the information sphere |  | ON7, ON8 |
|  | **Discipline of choice 14 (choose 1 of 2))** |  | **5** |  |
| 37 | Social engineering | Study of aspects of interpersonal communication related to ensuring the information security of an organization. The features of interaction and cooperation of the security administrator regarding information security of the organization of the information security administrator with the management of the organization are considered. Analyzes typical conflict situations that may arise when ensuring the information security of an organization |  | ON4, ON5 |
| 38 | Theory and methods of social engineering in information security | Basic concepts of social engineering in the context of information security. Methods for managing human actions without the use of technical means. Psychological manipulation of people in performing actions or disclosing confidential information. |  | ON4, ON5 |
|  | **Discipline of choice 15 (choose 1 of 2)** |  | **5** |  |
| 39 | Computer analytics | Study of methods for conducting an initial analysis of the structure of information processes and identifying vulnerable components; - Using specialized sources and reference systems to search for scientific and technical literature, regulatory and methodological materials; analysis of methods, methods, means and algorithms for solving the problems of investigating incidents in the field of information security of the protected object |  | ON7, ON8, ON10 |
| 40 | Analysis of digital evidence | Disclosure of crimes related to computer information. Researching digital evidence. Methods for finding, obtaining and securing evidence. Recover and analyze content found on digital devices |  | ON7, ON8, ON10 |
|  |  | **Total optionally component OC** | **68** |  |
| **A cycle of majors** | | | | |  |
| **University component** | | | | |
| 1 | Undergraduate practice | Formation, consolidation and expansion of knowledge gained in the learning process, using them to solve engineering and technical problems related to the topic of the diploma project. Mastering the skills of research work; new mathematical and statistical methods of calculations and design solutions. Improve the ability to set tasks on an urgent scientific problem, collect the necessary factual material on the topic of the diploma project. | 7 |  |
|  |  | **Total University component of PD** | **7** |  |
|  | **Optional component** | | | |
|  | **Discipline of choice 1 (choose 1 of 2)** |  | 5 |  |
| 2 | Cryptographic methods and information security tools | Formation of systematized knowledge about the principles, methods and means of protecting information during its transfer, predicting situations and taking competent measures for decisions in different conditions and situations to protect information in local and global computer networks; the use of cryptographic means and methods of information protection in various technologies during its transmission over networks |  | ON9, ON10 |
| 3 | Cryptographic information security techniques | The purpose and the summary of the discipline: the formation of students' knowledge on the theoretical foundations of the construction and practical application of cryptographic information security systems in information and communication systems; forecasting and making competent decisions in emergency situations to protect information in local and global infocommunication networks |  | ON9, ON10 |
|  | **Discipline of choice 2 (choose 1 of 2)** |  | 3 |  |
| 4 | System Programming | The discipline aims to acquaint students with the concept of system programming: process management; flows and their planning; memory management, memory architecture, memory usage; Windows Object Security; studying the basic principles and techniques of programming system applications for interacting with a computer |  | ON5 |
| 5 | Fundamentals of System Programming | Familiarization of students with the principles of designing applied programs; the basics of the concept of system programming; principles of functioning of various elements of the operating system; studying the basic principles and techniques of programming system applications for interaction with computers; development of programs covering system programming |  | ON5, ON8 |
|  | **Discipline of choice 3 (choose 1 of 2)** |  | 5 |  |
| 6 | Database security technologies | Formation among students of the concepts of the basics of information security of database systems both in terms of security, administration and server support of distributed information systems, and for acquiring skills in solving issues, ensuring the security of information in databases, principles of organizing data storage and retrieval, for subsequent practical use |  | ON5 |
| 7 | Database protection | Studying the theoretical and practical foundations of database and DBMS security; methods of protection and security of databases; database protection at the level of views, procedures, triggers; application of DBMS and database auditing |  | ON5 |
|  | **Discipline of choice 4 (choose 1 of 2)** |  | 5 |  |
| 8 | Domain systems administration | Formation of students' foundations of theoretical knowledge and practical skills in creating (setting up) a domain environment for the implementation of business processes in corporate networks (intranets) of enterprises from the point of view of a system administrator. Obtaining practical skills in network administration of an organization's information system |  | ON5, ON9 |
| 9 | Administration of server systems | Acquaintance of bachelors with the principles of practical design of a corporate network based on the management of the Windows Server operating system, which is the basis of many corporate information systems, as well as gaining practical skills in managing a network server operating system based on Windows Server, directory service (Active Directory), network infrastructure service (DNS , DHCP, WINS) |  | ON5, ON9 |
|  | **Discipline of choice 5 (choose 1 of 2)** |  | 7 |  |
| 10 | Security and administration of systems and networks | Within the discipline, the principles and methods of ensuring security and analysis of modern network technologies with the construction of virtual channels and tunnels of their scientific foundations are studied. Modern technologies for building secure networks using firewalls, data transmission over the Internet using encryption, ensuring the confidentiality of transmitted data through an open channel |  | ON5, ON11 |
| 11 | Organization of secure computer networks | Within the discipline, the principles and methods of ensuring security and analysis of modern network technologies with the construction of virtual channels and tunnels of their scientific foundations are studied. Modern technologies for building secure networks using firewalls, data transmission over the Internet using encryption, ensuring the confidentiality of transmitted data through an open channel |  | ON5, ON11 |
|  | **Discipline of choice 6 (choose 1 of 2)** |  | 5 |  |
| 12 | Information security technical means | Familiarization of students with the principles of work and characteristics of modern technical means of information protection; technical channels of information leakage; search and detection of TKUI; formation of requirements for information protection; methods of calculation and control of indicators of technical protection of information; optical (visual) channel of information leakage; telephone interception technique |  | ON8, ON11 |
| 13 | Design of systems for physical protection of information | Familiarization of students with the principles of work and characteristics of modern technical means of information protection; technical channels of information leakage; search and detection of TKUI; formation of requirements for information protection; methods of calculation and control of indicators of technical protection of information; optical (visual) channel of information leakage; telephone interception technique |  | ON8, ON11 |
|  | **Discipline of choice 7 (choose 1 of 2)** |  | 3 |  |
| 14 | Information security standardization and certification | Formation of students' knowledge in the following areas: main directions in assessing the quality of information security tools and software; theoretical foundations of regulatory documents in the process of certification and standardization of information security tools; main directions in the field of standardization and licensing of information security tools |  | ON7, ON8 |
| 15 | Information security systems standardization | Studying: basic international and domestic standards and certificates used in information security systems; the state of expert systems in the use of information infrastructure and information resources, infocommunication systems and communication networks; purpose and place of standardization and certification of information security means of networks and communication systems |  | ON6, ON7 |
|  |  |  | **33** |  |
| **Траектория (специализация) Защита и безопасность в инфокоммуникационных структурах** | | | | |
| 16 | Risk assessment and audit of information security systems | Acquisition of knowledge and practical skills in assessing and analyzing information security risks, methods and technologies for auditing information security systems; development of skills in using research methods, principles of organization and management of information security systems in an organization | 5 | ON4, ON5 |
| 17 | Internet Technology Security | Study of methods and means of ensuring the security of Internet technologies. The result of the training: the student has knowledge and practical skills in working with application-level protocols, applying methods and means of protecting e-mail, FTP servers and HTTP servers of a corporate network, as well as ways to protect websites from various attacks (XSS attacks, and CSRF attacks, hijacking session id, etc.) | 5 | ON3, ON5, ON6 |
| 18 | Wireless Security | Study of means of ensuring the security of wireless networks, types of threats and attacks carried out on wireless networks; built-in authentication and encryption methods for data transmission over wireless networks; standards of wireless networks and the use of a wide range of equipment for securing wireless networks | 5 | ON4, ON5 |
| 19 | Penetration testing | A systematic approach to computer security. Information collection technologies and methodology. Typical vulnerabilities of computer systems. Vulnerability analysis. Actions to strengthen the security of computer systems and networks. | 5 | ON3, ON4, ON6, ON7 |
|  |  | **Total variable component of the PD** | **20** |  |
| **Trajectory (specialization) E-commerce Security** | | | | |
| 20 | Design of complex information security systems | Designing complex information security systems, taking into account legal justification, administrative, managerial and technical feasibility and feasibility; design of complex information security systems by integrating hardware and software, means of network protection of information and ensuring the security of physical access, as well as taking into account legal regulations | 5 | ON4, ON6, ON11 |
| 21 | Internet Application Security | The discipline is devoted to the study of issues of safe work on a computer and the protection of personal information when working on the Internet. Having mastered the proposed material, students will learn about the main Internet threats, about how to protect against them, about the rules of safe work. In the course of mastering the course, methods of safe work will be considered, security software will be described. | 5 | ON3, ON5, ON6 |
| 22 | Information security technologies in wireless networks | The general principles of organization and functioning of modern wireless networks, modern tools for analyzing and detecting information attacks and methods of protecting information in wireless networks are given. It also discusses the main technologies used to ensure the security of wireless networks. | 5 | ON9 |
| 23 | Protection of electronic payments | Study of information security issues in electronic payment systems: basic principles and technologies that underlie modern e-commerce systems, including methods of ensuring the security of transactions. Analysis of the structures of existing electronic payment systems, types of electronic means of payment, including their technical implementation | 5 | ON10 |
|  |  | **Total variable component of PD (trajectories)** | **20** |  |
|  |  | **Total variable component of PD** | **53** |  |

Кафедра отырысында қарастырылды

Рассмотрено на заседании кафедры

Considered at the meeting of the department

Күні/ дата/ date «06» 04.2020 (ж. г. y.)

Кафедра меңгерушісі: / Заведующий кафедрой: / Head of department:

Бердибаев Р.Ш. \_\_\_\_\_\_\_\_\_\_\_\_\_

(ф.и.о) (қолы/подпись/signature)

БББ басшысы / Руководитель ОП / The head of the EP:

Сатимова Е.Г. \_\_\_\_\_\_\_\_\_\_\_\_\_

(ф.и.о) (қолы/подпись/signature)

Приложение 2



