Ф.7.02-10

MINISTRY OF SCIENCES AND HIGHER EDUCATION OF THE REPUBLIC OF KAZAKHSTAN

M.O. AUEZOVSOUTH KAZAKHSTAN UNIVERSITY

«APPROVED»
Chairman of the Board-Rector
_____ D.Zh. Akhmed-Zaki
«___»_____2025 y.

EDUCATION PROGRAMME

6B06150– Information and communications technology and security

Registration number	6B06100257
Code and classification of the field of education	6B06-Information and communication technologies
Code and classification of training areas	6B061-Information and communication technologies
Group of educational programs (EP)	B057- Information technologies
Type of EP	current
ISCE level	6
NQFlevel	6
IQFlevel	6
Language learning	Kazakh, Russian, English
The complexity ofEP	240 credits
Distinctive features of EP	-
University Partner (JEP)	-
University Partner (DDEP)	-

Shymkent, 2025

Drafters:

Name	**Position**	**Sign**
SabiraT. Akhmetova	Candidate of phys-math. sciences, associate professor, Head of chair “Computer engineering and software”	
Nurzhamal N. Dausheyeva	Candidate of technical sciences, senior lecturer	
Olzhas A. Zhantassov	Lecturer	
Student’s name	**group**	
Kazakpay Akniet	Student of group IP-22-1k	
Saparkhan Sabina	Student of group IP-21-1k2	
Employer’s name		
Kayrat P. Dzhumagaliev	Head of the Department of JSC "National Information Technologies"	
ZhandosM. Zhunisov	Director of «KazMBS» LP	
Aleksandr A. Pavlov	Director of "Digital Systems" LP	
Murod I. Akmalov	Director of "KomSity Shymkent" LP	
Aleksandr V. Gatsko	Director of "ART Technology" LP	

The EP was considered in the direction of training "Information and communication technologies and telecommunications" at a meeting of the academic committee, Minutes # ___ «_____» _____ 2025 y.

Chairman of the Committee _____ N. Zhumatayev
Sign

The EP was considered and recommended for approval at Educational-methodical meeting of M. Auezov SKU.
Minutes # ___ «_____» _____ 2025 y.

Chairman of the Committee _____ K. Sarykulov
Sign

The EP was approved by the decision of the Academic Council of the University.
Minutes # ___ «_____» _____ 2025 y.

CONTENT

1. CONCEPT OF THE PROGRAM

University Mission	We are focused on generating new competencies, training a leader who translates research thinking and culture.
University Values	• Openness–open to change, innovation and cooperation. • Creativity – generates ideas, develops them and turns them into values. • Academic freedom – free to choose, develop and act. • Partnership – creates trust and support in a relationship where everyone wins. • Social responsibility – ready to fulfill obligations, make decisions and be responsible for their results.
Graduate Model	• Deep subject knowledge, their application and continuous expansion in professional activity. • Information and digital literacy and mobility in rapidly changing conditions. • Research skills, creativity and emotional intelligence. • Entrepreneurship, independence and responsibility for their activities and well-being. • Global and national citizenship, tolerance to cultures and languages.
The uniqueness of the educational program	• Orientation to the regional labor market and social order through the formation of professional competencies of the graduate, adjusted to the requirements of stakeholders • Practical orientation and emphasis on the development of critical thinking and entrepreneurship, the formation of a wide range of skills that will allow to be functionally literate and competitive in any life situation and be in demand in the labor market
Academic Integrity and Ethics Policy	The university has taken measures to maintain academic integrity and academic freedom, protection from any type of intolerance and discrimination: • Rules of academic integrity (order No.212 of October 10, 2022); • Anti-corruption standard (order No. 221 n/a dated 12/07/2021). • Code of Ethics (Order No. 212 of October 10, 2022).
Regulatory and legal framework for the development of EP	1. Law of the Republic of Kazakhstan “On Education”; 2. Model rules for the activities of educational organizations implementing educational programs of higher and (or) postgraduate education, approved by order of the Ministry of Education and Science of the Republic of Kazakhstan dated October 30, 2018 No.595 with amendments and additions dated December 29, 2021. No.614 3. Standard rules for admission to training in educational organizations implementing educational programs of higher and postgraduate education, approved by order of the Ministry of Education and Science of the Republic of Kazakhstan dated October 31, 2018 No. 600 with amendments and additions dated 06/02/2023. No. 252 4. State mandatory standards for higher and postgraduate education, approved by order of the Ministry of Education and Science of July 20, 2022 No. 2; 5. Rules for organizing the educational process in credit technology of education, approved by order of the Ministry of Education and Science of the Republic of Kazakhstan dated April 20, 2011 No. 152; with changes and additions from 09/23/2022. No. 79

	6. Qualification reference book for positions of managers, specialists and other employees, approved by order of the Minister of Labor and Social Protection of the Population of the Republic of Kazakhstan dated December 30, 2020 No. 553. 7. Methodological recommendations for introducing ECTS principles into the educational process and expanding academic freedom. Appendix to the order of the Minister of Science and Higher Education. of the Republic of Kazakhstan dated February 12, 2024 No. 57 8. Guidelines for the development of educational programs for higher and postgraduate education, Appendix 1 to the order of the Director of the National Center for the Development of Higher Education of the Ministry of Education and Science of the Republic of Kazakhstan dated May 4, 2023 No. 601 n/k
Organization of the educational process	• Implementation of the principles of the Bologna Process • Student-centered learning • Availability • Inclusivity
Quality assurance of the Educational program	• Internal quality assurance system • Involvement of stakeholders in the development of the Educational Program and its evaluation • Systematic monitoring • Actualization of the content (updating)
Requirements for applicants	They are established in accordance with the Standard Rules for admission to training in educational organizations implementing educational programs of higher and postgraduate education by order of the Ministry of Education and Science of the Republic of Kazakhstan No. 600 dated October 31, 2018, with changes and additions dated June 2, 2023. No. 252
Conditions for the implementation of educational programs (EP) for persons with disabilities and special educational needs(SSN)	For students with SEN (special educational needs) and persons with disabilities (PSI), tactile PVC tiles, specially equipped toilets, a mnemonic diagram, and shower bars have been installed in educational buildings and student dormitories. Special parking spaces have been created. Crawler lift installed. There are desks for people with limited mobility (PLM), signs indicating the direction of movement, ramps. In the educational buildings (main building, building No.8) there are 2 rooms with six working places adapted for users with disorders of the musculoskeletal system (DMS). For visually impaired users, the SARA™ CE Machine (2 pcs.) is available for scanning and reading books. The library website is adapted for the visually impaired. There is a special NVDA audio program with a service. The JIC website http://lib.ukgu.kz/ is open 24/7. An individual differentiated approach is provided for all types of classes and in the organization of the educational process.

1. PASSPORT of the Educational program

Purpose of the EP	Training of practice-oriented IT specialists with research, entrepreneurial thinking and culture, capable of designing, coding, implementing and maintaining software for information and communication systems, ensuring the protection of resources for the development of the digital ecosystem.
Tasks of the EP	• formation of socially responsible behavior in society, an understanding of the significance of professional ethical norms and adherence to these norms; • providing basic undergraduate training that allows you to continue learning throughout life, to successfully adapt to changing conditions throughout their professional career; • providing conditions for acquiring a high general intellectual level of development, mastering literate and developed speech, a culture of thinking and the skills of scientific organization of work in the field of information and communication technologies; • creation of conditions for intellectual, physical, spiritual, aesthetic development to ensure the possibility of their employment in the specialty or continuing education at subsequent levels of education. • Establishing conditions for the development of in-demand knowledge and skills, as well as a conscious attitude towards enhancing the welfare of society and conserving the planet within the framework of the SDGs.
Harmonization of EP	• 6th level of the National Qualifications Framework of the Republic of Kazakhstan; • Dublin descriptors of the 6th level of qualification; • 1 cycle of a Framework for Qualification of the European Higher Education Area); • 6thLevel of European Qualification Framework for Life long Learning).
Connection of the EP with the professional sphere	1. Professional standards. Appendix № 7 to the Order of the Deputy Chairman of the Board of the National Chamber of Entrepreneurs of the Republic of Kazakhstan "Atameken" №171 on July 17, 2017 Professional Standard "Information security "; 2. National classifier of the Republic of Kazakhstan, approved by the order of the Committee for technical regulation and Metrology of the Ministry of investment and development of the Republic of Kazakhstan dated may 11, 2017 No. 130-od (hereinafter-NCRC); 3. Professional standard: "Software development". Appendix No. 7 to the order of the Acting Chairman of the Board of NCE RK "Atameken" No. 222 dated 05.12.2022.; 4. Professional standard: "Software testing". Appendix No. 22 to the order of the Acting Chairman of the Board of NCE RK "Atameken" No. 222 dated 05.12.2022.; 5. Professional standard: "Information security". Appendix No. 3 to the order of the Acting Chairman of the Board of NCE RK "Atameken" No. 222 dated 05.12.2022.; 6. Professional standard: "Ensuring the security of information infrastructure and IT". Appendix No. 4 to the order of the Acting Chairman of the Board of NCE RK "Atameken" No. 222 dated 05.12.2022. 7. Professional standard "Forensic examination of computer technology tools". Appendix 3 to the Order of the Minister of Justice of the Republic

	of Kazakhstan dated 23.01.24 No. 60
Name of the degree awarded	"Bachelor in the field of information and communication technologies in the EP "6B06150 - Information and communications technology and security".
List of qualifications and positions	Information security engineer, information security specialist in key information infrastructure systems, information security specialist without presenting requirements for work experience. The qualification directory of positions of managers, specialists and other employees, approved by the order of the Minister of labor and social protection of the Republic of Kazakhstan dated may 21, 2012 No. 201-o-m. Registered with the Ministry of justice of the Republic of Kazakhstan on June 25, 2012 No. 7755.
Field of professional activity	- public and private enterprises and organizations that develop, implement, and use computer technology and software for information and communication systems in various fields of economic activity. - the study of systems for threats and vulnerabilities, development, implementation, monitoring, security and maintenance of information and communication systems.
Objects of professional activity	Specialty ICT and B are information processes, computer systems for secure information processing and management, technologies, systems and networks, their instrumental (software, technical, organizational) support, methods and methods of design, production and operation of information and communication systems in the context of information security.
Subjects of professional activity	• computers, complexes, systems and networks; • computer systems for information processing and management; • computer-aided design systems; • software of computer equipment and information systems (programs, software systems and information systems).
Types of professional activity	• analysis of software requirements for information and communication systems; • design software and hardware for information and communication systems; • operation of operating systems and operation of information and communication systems; • software implementation of development systems tasks; • administration of systems and computer networks; • testing software systems; • maintenance, technical support of software systems; • integration of software modules and software components; • provision of software and hardware protection; • commercialization of ICT services.
Learning outcomes	**LO1** Demonstrates the ability to use the laws and tools of natural sciences, mathematics, economics, practices solving professional problems in information systems, web space, expert and scientific research skills in an interdisciplinary context; **LO2** Analyzes requirements in accordance with standards and determines the characteristics of software components, networks (functionality, external interfaces, data requirements, user documentation, operation and maintenance) for information and cyber systems in compliance with the principles of security of user and system interaction;

	LO3 Transforms the requirements of functioning into an architecture that defines the composition of its components, describes them, interfaces between them for subsequent coding, implementation, testing, maintenance based on programming technologies; **LO4** Applies appropriate algorithms, data structures, tools and programming languages to solve problems in professional activities; **LO5** Integrates software components based on the procedures for assembling software modules and converting (converting) data, generates relevant information from extracted data, creates SQL queries to the database, evaluates software for compliance with the required quality criteria; **LO6** He knows the software lifecycle, uses the tools of modern object programming languages with standard sets of libraries in different environments and the specifics of implementation in multitasking software, the functionality of intelligent systems, as well as the rules for updating software versions and migrating databases to new platforms, technologies to improve usability; **LO7** Defines and maintains up-to-date security policy, arguing for the choice of standards, modern OS and hardware systems, implements software for ICS, mobile devices, and the web environment to meet the basic needs of secure Internet access; **LO8** Applies the basic principles of security procedures (authentication, EDS, cryptography), data mining, network security, database protection schemes and specifics of data storage, mobile devices based on research, vulnerability examination and statistical information; **LO9** Ensures the functioning of systems by analyzing the results of monitoring the processes of existing systems and software and hardware, develops proposals for improving security measures based on the principles of preventing unauthorized actions, updates to antivirus databases; **LO10** Determines the prospects for the development of methods and software and hardware for software development and protection from destructive information influences, using the achievements of science and technology at home and abroad to increase competitiveness; **LO11** He is able to build written and oral communications in the state, Russian, and English languages in a professional environment and society in compliance with the principles of academic integrity, financial knowledge, and draw up special documentation of software support systems; **LO12** Demonstrates analytical thinking and responsible consumption and production at all phases of the design and implementation of digital solutions, partnership skills for sustainable development, lifelong learning commitment.

3. Competencies of an EP graduate

SOFTSKILLS.Behavioral skills and personality qualities	
SS1. Competence in managing one's own literacy	SS1.1. The ability to self-study, self-develop and constantly update their knowledge within the chosen trajectory and in an interdisciplinary environment. SS1.2. Ability to express thoughts, feelings, facts and opinions in the professional sphere. SS1.3. The ability to mobility in the modern world and critical thinking.
SS 2. Language competence	SS2.1. Ability to build communication programs in the state, Russian and foreign languages. SS2.2. The ability to interpersonal social and professional communication in the context of intercultural communication.
SS 3. Mathematical Competence and Competence in the field of Science	SS3.1. The ability and willingness to apply the educational potential, experience and personal qualities acquired during the study of mathematical, natural science, technical disciplines at the university to solve professional problems.
SS 4. Digital competence, technological literacy	SS4.1. The ability to demonstrate and develop information literacy through the mastery and use of modern information and communication technologies in all areas of their lives and professional activities. SS4.2. The ability to use various types of information and communication technologies: Internet resources, cloud and mobile services for searching, storing, protecting and disseminating information.
SS 5. Personal, social and academic competencies	SS5.1.The ability for physical self-improvement and focus on a healthy lifestyle to ensure full-fledged social and professional activities through the methods and means of physical culture. SS5.2. The ability to social and cultural development based on the manifestation of citizenship and morality. SS5.3 The ability to build a personal educational trajectory throughout life for self-development, career growth and professional success. SS5.4. The ability to successfully interact in a variety of socio-cultural contexts during study, work, home and leisure.
GC 6. Entrepreneurial competence	SS6.1. The ability to be creative and entrepreneurial in avariety of environments. SS6.2. Ability to work in the mode of uncertainty and rapid change of task conditions, make decisions, allocate resources and manage your time. SS6.3. Ability to work with consumer requests.
SS 7. Cultural awareness and ability to express yourself	SS7.1. The ability to show ideological, civic and moral positions. SS7.2. The ability to be tolerant to the traditions and culture of other peoples of the world, to possess high spiritual qualities.
HARDSKILLS	
Theoretical knowledge and practical skills specific to this field	HS1. Identifies requirements and applies software design methodologies, ICS and CFU protective mechanisms, programming tools, evaluates software functionality using mathematical modeling methods, mathematical logic, information theory and probability theory of their formalization based on standards, principles, templates.
	HS2. It is able to determine and choose measures to counteract the malicious influence of software and technical impact on the architecture of subsystems in the OS ICS, OS of mobile devices, databases, elements and transmission channels of a computer network, configure antivirus protection.

	HS3. It can evaluate and identify sources of security threats to the ICS software, computer networks, mobile devices, and CFCs, and select the operating modes of the PTS, malware protection technologies in these systems based on the security policy.
	HS4. Develops programs for protecting applications and scripts, application programs for IP, web-environment, mobile applications, systematizes data, complies with the rules for safe operation of software, uses cryptographic transformations and cryptographic protocols for integrity control, determines the procedure for safe operation of software.
	HS5. Applies the principles of integrated control of protected components, taking into account risk-forming factors, targeted forecasting of conflict situations, planning measures to minimize risks and ensure sustainable operation of systems with continuous management with an emphasis on economic efficiency.
	HS6.Use of incoming flow clustering methods and models for behavioral analysis, tools and tools, and machine learning methods at all stages of user device processes for proactive protection before starting the workstation.
	HS7. Synthesizes electronic circuits under specified conditions, systems of General-purpose processors and microcontrollers, describes USB, WiFi, and PCI Express interfaces. Applies methods and tools for designing a VHDL-based control CENTER, solves problems of interference suppression, reliable transmission of information over communication channels.
	HS8. Ensuring the protection of integrity properties, availability of data and resources of digital devices, network interaction using cryptographic methods, defining restrictions on access methods, applying security SYSTEMS, network monitoring, and intrusion prevention and detection systems IPS/IDS.
	HS9. Has the skills of database design, access control to the database server, removal of authentication tools outside the DBMS in the OS, conducts audit (logs of user actions) by DBMS tools, uses data encryption, software agents for capturing actions, creates backups.
	HS10. Demonstrates the ability to identify features and properties when identifying signals, situations in ICS and mobile devices, explores biometric systems for controlling access to information in systems, practical skills in controlling access to information SACcat.
	HS11. It is able to take responsibility for the results when implementing information security systems, for its own security and the security of others, configure it for a specific user, and carry out strategic management and development of security policies.

3.1 Matrix for correlating learning outcomes in the EP as a whole with the competencies being developed

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
ОК1	✓	✓									✓	
ОК2											✓	✓
ОК3		✓				✓			✓			
ОК4	✓											✓
ОК5					✓	✓			✓	✓		
ОК6			✓		✓				✓			✓
ОК7			✓				✓		✓			✓
ПК1	✓	✓	✓									
ПК2			✓	✓	✓							
ПК3					✓	✓	✓	✓				
ПК4		✓			✓			✓				
ПК5			✓			✓	✓	✓				
ПК6			✓			✓	✓					
ПК7	✓		✓		✓					✓		
ПК8					✓		✓	✓				
ПК9			✓	✓	✓		✓					
ПК10		✓				✓	✓					✓
ПК11	✓								✓	✓	✓	✓

4. Matrix of the influence of modules and disciplines on the formation of learning outcomes and information on labor intensity

№	Module name	Cycle	UC/ CC	Component Name	Brief course description	Number of credits	Formed LO(codes)											
							LO1	LO2	LO3	LO4	LO5	LO6	LO7	LO8	LO9	LO10	LO 11	LO 12
1	Fundumentals of the Public Sciences	GED	OC	History of Kazakhstan	**Purpose:** formation of an objective idea of the history of Kazakhstan based on a deep understanding and scientific analysis of the main stages, patterns and originality of the historical development of Kazakhstan. **Content:** Ancient people and the formation of nomadic civilization. Turkic civilization and the great steppe. Kazakh Khanate. Kazakhstan in the era of modern times. Kazakhstan as part of the Soviet administrative-command system. Declaration of Independence of Kazakhstan. State system, socio-political development, foreign policy and international relations of the Republic of Kazakhstan. Methods and techniques of historical description for the analysis of the causes and consequences of events in the history of Kazakhstan.	5	✓	✓									✓	
		GED	OC	Philosophy	**Purpose:** The formation of a holistic idea among students about philosophy as a special form of knowledge of the world, about its main sections, problems and methods of studying them in the context of future professional activity. And also the formation of philosophical reflection, introspection and moral self-regulation among students. **Contents:** Emergence of a culture of thinking. Subject and method of philosophy. Fundamentals of philosophical understanding of the world: questions of consciousness, spirit and language. Being. Ontology and metaphysics. Cognition and creativity. Education, science, technology and technology. Human philosophy and the world of values. Ethics. Philosophy of values. The subject of aesthetics as a field of philosophical knowledge. Philosophy of freedom. Philosophy of art. Society and culture. Philosophy of history. Philosophy of religion. "Mangilik El" and "Modernization of Public	5	✓	✓									✓	

					Consciousness" are a new Kazakhstan philosophy.													
2	Socio-Political knowledges	GED	OC	Social and Political Studies	**Purpose:** forming knowledge about social and political activities, explaining social and political processes and phenomena. **Content:** Consideration of the system of socio-ethical values of the society. Ways to use social, political, cultural, psychological institutions, features of youth policy in the modernization of Kazakhstani society and solve conflict situations in society and professional environment based on them. To study the methods of analysis and interpretation of political institutions and processes, ideas about politics, power, state and civil society, to understand and use the methods and methods of sociological, comparative analysis, to understand the meaning and content of the political situation in the modern world. Analysis and classification of the main political institutions.	4		✓									✓	
		GED	OC	Cultural Studies and Psychology	**Purpose:** The basics of the morphology of culture are studied, the characteristic of the anatomy of culture is given and its semiotic character is revealed. **Content:** the ideas about the archaic culture on the territory of ancient Kazakhstan are given, the main stages of the formation of Kazakh culture are considered, the essence of Kazakh culture in the context of modern world processes is revealed and an idea of the basics of Kazakhstan's cultural policy is given.	4	✓	✓									✓	
3	Socio-ethnic Development	GED	EC	Ecosystem and Law	**Purpose:** Formation of integrated knowledge in the field of economics, law, anti-corruption culture, ecology and life safety, entrepreneurship, scientific research methods. **Content:** Fundamentals of safe human-nature interaction, ecosystem and biosphere productivity. The entrepreneurial activity of society in conditions of limited resources, increasing the competitiveness of business and the national economy. Regulation of relations in the field of ecology and human life safety. Knowledge and compliance of Kazakhstan's law, obligations and guarantees of subjects, state regulation	5		✓	✓									✓

					of public relations to ensure social progress. Application of scientific research methods.													
				Basics of Financial Literacy	**Purpose:** to study personal and family financial resources, which are critical to achieving financial well-being. **Content:** Financial planning and consumer safety. Basic methods and techniques for effective spending and saving money. Protecting and investing your own financial resources. The role and significance of personal finance, its capabilities for achieving financial stability. Filtering out a lot of dubious financial information. Incentives for independent management of responsibilities and optimal financial capabilities of the consumer. Making smart financial decisions when building a professional career.			✓								✓	
		BD	EC	Abay Studies	**Purpose:** based on the creativity of A.Kunanbayev, the preservation of the «national code» and in the project «Kazakhtanu» **Content:** historical overview of the history of Kazakhstan and Kazakh literature of the XIX-XX centuries. Studies of Abai's legacy of the XX-XXI century. Chronology of Abai's creativity. Abai is a great poet, ethnographer, founder of Kazakh written literature. Abai is the compiler of the code of laws «The Position of Karamola», social significance. Abai is a thinker, religious scholar, philosopher. The role of Abai in education and science, the concept of a «Holistic person». «Words of Edification»by Abai, an epic novel by M.Auyezova «The Way of Abai» . K. Tokayev «Abai and Kazakhstan in the XXI century», role, significance.	3		✓								✓	
				Mukhtar Studies	**Purpose:** Formation of a historical, literary idea of M. Auezov's work in the context of literary history, patriotism and cultural and spiritual position. Development of artistic thinking, skills of independent research activity. **Content:** The life and creative path of M. Auezov Semipalatinsk, Tashkent, St. Petersburg periods. M. Auezov's activity in the magazines «Sholpan», «Abai».			✓								✓	

					M. Auezov's journalism. An artistic review of the short stories "Korgansyzdyn kuni", "Kyr suretteri", "Okagan azamat", "Kokserek", the play Enlik-Kebek and the stories "Kili Zaman", "Karash-Karash" okigasy", the monograph "Abai Kunanbayev", the epic novel "Abai Zholy".													
				Foundations of Anticorruption Culture	**Purpose:** formation of an anti-corruption worldview, strong moral foundations of a personality, civic position, stable skills of anti-corruption behavior. **Content:** Overcoming legal nihilism, formation of the basics of students' legal culture in the field of anti-corruption legislation. Formation of a conscious perception/attitude towards corruption. Moral rejection of corrupt behaviour, corrupt morality and ethics. Development of skills necessary to fight corruption. Development of anti-corruption standards of conduct. Anticorruption propaganda, dissemination of lawfulness and respect for the law. Activities aimed at understanding the nature of corruption, awareness of social damage caused by its manifestation, ability to defend one's position with arguments, seeking ways to overcome manifestation of corruption.			✓									✓	
4	Communication and Physical Training module	GED	OC	Kazakh (Russian) language	**Purpose:** formation of communicative competence using the Kazakh (Russian) language in the socio-cultural, professional and public life, improvement of the ability to write academic texts. C**ontent**. Levels A1, A2, B1, B2-1, B2-2 (B2, C1 Russian language) are presented in the form of cognitive-linguocultural complexes, consisting of spheres, themes, sub-themes and typical situations of communication of the international standard: social, social - cultural, educational and professional, modeled by forms: oral and written communication, written speech works, listening. Demonstration of understanding of the language material in the texts on the educational program, knowledge of terminology and development of critical thinking.	10	✓	✓									✓	
		GED	OC	Foreign Language	**Purpose:** formation of students' intercultural and communicative competence in the process of foreign	10	✓	✓									✓	

					language education at a sufficient level A2 and a level of basic sufficiency B1. Student reaches B2level of common European competence if the language level at the start is higher than B1level of common European competence **Content:** Levels A1, A2, B1, B2 are presented in the form of cognitive-linguocultural complexes, consisting of spheres, themes, sub-themes and typical situations of international standard'scommunication: social, social - cultural, educational and professional, modeled by forms: oral and written communication, written speech works, listening.Demonstration of language material'sunderstanding in texts on educational program, knowledge of terminology and critical thinking development.												
		GED	OC	Physical training	**Purpose:** the formation of social and personal competencies and the ability to purposefully use the means and methods of physical culture that ensure the preservation and strengthening of health in preparation for professional activity; to the persistent transfer of physical exertion, neuropsychic stresses and adverse factors in future work. **Content:** Implementation of physical culture and health and training programs. A complex of general development and special exercises. Sports (gymnastics, sports and outdoor games, athletics, etc.). Control and self-control during classes, insurance and self-insurance. Refereeing competitions, Means of professionally applied physical training. Modern health-improving systems: the breathing system according to A. Strelnikova, K. Buteyko, K. Dinaiki, joint gymnastics according to Bubnovsky.	8	✓	✓									✓	
		BD	HsC	Professional Kazakh (Russian) Language	**Purpose:** to provide professionally oriented language training of a specialist who is able to competently construct communication in professionally significant situations and speak the language norms for special purposes. **Content:** Professional language and its components. Professional terminology as the main feature of	3		✓										

					scientific style. Scientific vocabulary and scientific constructions in educational-professional and scientific-professional spheres. Algorithm of work on the analysis and production of scientific texts on specialty. Producing scientific and professional texts. Basics of business communication and documentation within the framework of future professional activity.													
		BD	HsC	Professionally Oriented Foreign Language	**Purpose:** the formation of intercultural and communicative competence of students in the process of foreign language education at a sufficient level A2 and the level of basic sufficiency B1. The student reaches the level B2 of the pan-European competence if there is a language level at the start above the level B1 of the pan-European competence. **Content:** the technologies of a professionally-oriented foreign language are considered for the use of knowledge of a foreign language in the process of studying other university subjects, foreign-language competencies are applied in further professional activity.	3		✓									✓	
		GED	OC	Information and Communication Technologies	**Purpose:** knowledge of computer systems, software. **Content:** development of skills in using information resources for searching and storing information, working with spreadsheets, working with databases. Application of methods and means of information protection; design and creation of websites, multimedia presentations. Skills in using e-government and electronic textbooks, various cloud mobile technologies, SMART technology management.	5		✓									✓	
5	Fundamentals of Mathematical and Natural Sciences	BD	HsC	Physics	**Purpose:** to form a scientific method of cognition among students, for which it is necessary to provide a presentation of the course based on the qualification characteristics of a future specialist, to ensure that the student learns the relationship between classical and modern physics and the limits of applicability of certain theories and laws. **Content:** the laws of classical and modern physics are considered; modern scientific equipment and methods of physical research; techniques of modern physical experiment. The degree of reliability of the results of	5	✓	✓			✓							

					theoretical and experimental studies is evaluated; an experiment is planned and its results are processed. The acquired knowledge is used to solve specific problems from various fields of physics: mechanics, thermodynamics and molecular physics, electrodynamics, optics, etc.													
		BD	HsC	Algebra and geometry	**Purpose:** to give future engineers a certain amount of knowledge in mathematics, necessary both for studying related engineering disciplines and special courses; to develop mathematical intuition and the ability to apply the studied mathematical methods in solving applied problems related to the student's future specialty. **Content:** the basic fundamental concepts of linear algebra and analytic geometry are explained. He is proficient in the mathematical apparatus of the theory of matrices, determinants and systems of linear equations, vector algebra, analytical geometry, the theory of lines and surfaces of the second order. Skills of solving applied problems in the field of ICT in the implementation of methods of protection against threats.	4	✓	✓											
		BD	HsC	Mathematical Analysis	**Purpose:** to give future engineers a certain amount of knowledge in mathematics, necessary both for studying related engineering disciplines and special courses; - to develop mathematical intuition and the ability to apply the studied mathematical methods in solving applied problems related to the student's future specialty; - to foster mathematical culture and the ability to work with literature. **Content:** the main fundamental concepts of mathematical analysis are considered: differential calculus of functions of one real variable, indefinite integrals and the use of integration methods, definite integrals and their implementation in geometry, mechanics and physics.	4		✓			✓							
		BD	EC	Probability Theory and Mathematical Statistics	**Purpose:** to develop probabilistic thinking, assimilation of terminology and concepts of the theory of statistical solutions, mastering the mathematical foundations of the theory of random events and values of estimating unknown parameters of distributions, testing statistical	4		✓	✓									

					hypotheses, elements of correlation and regression analysis. **Content:** the main types of asymptotic results of probability theory, interrelations and conditions of applicability of various asymptotic results are considered. Practical skills of calculations of basic numerical characteristics are used in solving applied problems												
				Applied Mathematical Statistics	**Purpose:** introduction to the basic concepts and methods of applied statistics. **Content:** the basic concepts of mathematical statistics, methods of nonlinear dynamics are considered. He has the skills to build and analyze multidimensional statistical models of information security tasks, machine learning, and data mining. It uses modern computing tools and mathematical application software packages to evaluate the results of visual data display, forecasting the resilience of systems and networks to threats.			✓					✓		✓			
6	Programming Basies	BD	EC	Mathematical Logic and Discrete Mathematics	**Purpose:** teaching students the basic concepts of mathematical logic, the method of development, analysis and justification of algorithms for solving mathematical problems on a computer. **Content:** concepts, definitions of discrete mathematics, mathematical logic are described; formulation of statements, methods of proof, applications in digital electronics, computer networks. Application of graph theory, Boolean functions in modeling situations, objects. Determines the prospects for solving cryptography problems, encoding information on modern circuit elements (quantum).	4		✓		✓				✓					
				Applied Theory of Algorithms	**Purpose:** mastering the basics of theoretical knowledge in discrete mathematics; familiarization with the main applied problems and methods of discrete mathematics; acquisition by students of the skills of describing discrete objects using mathematical models. **Content:** studies basic knowledge of the theory of algorithms, teaches rational and effective use of the acquired knowledge in solving practical problems; Allows you to master the mathematical apparatus of the			✓			✓					✓			

					theory of algorithms, methods of proving statements in this field, skills of algorithmization of tasks. Contributes to: solving problems of a theoretical, applied nature from various sections of the theory of algorithms, to prove statements, to build models of objects, concepts.													
		BD	EC	Information and Coding Theory	**Purpose:** The concepts of information, its sources and properties, methods of presentation, accumulation, processing, measurement of quantity and transmission of information are studied. **Content:** The limiting ratio is established, compliance with the requirements of information flows in the design of the IP. Coding skills in systems with interference, without interference, solving cryptography problems, calculating transmission bandwidth over communication networks, with analog-to-digital conversion of signals with specified parameters.	5		✓						✓				
				Discretization and Quantization of Information	**Purpose:** The basics of digital information processing are described: the concepts of analog, discrete, digital signal, their spectra, their transmission and processing systems. **Content:** Calculate Discrete Fourier transform based on algorithm models. Calculate digital filters of various types, structures with specified parameters, evaluate their characteristics when determining the stability and operability of systems. When designing, be able to determine the distortion of quantization coefficients of communication channels.			✓	✓		✓							
		BD	HsC	Basies of Algorithmization and Programming (Python)	**Purpose:** Studies the logical, physical structure of a computer, mastering the basics of algorithmization, methods of modern programming technologies using the algorithmic Python language. **Content:** Solving problems of various classes of processing, transmission of information. Allows you to identify, analyze, structure data, class definition skills to support inheritance in subsequent program development, debugging, testing. Using Python to improve productivity, readability of code when programmatically solving problems in subsequent learning activities.	5						✓	✓	✓				

		BD	EC	Introduction to the Specialty	**Purpose:** The features of the credit technology of training are considered. Concepts of ICT and information security. **Content:** Selection and application of the basic principles of software design. The use of modern methods of constructing algorithms, their analysis. Basic principles of security procedures (authorization, authentication)when processing and transmitting information via communication channels. Threats to systems, hardware and software protection, preventive security measures are investigated. Develops proposals for improving security measures based on the principles of preventing unauthorized actions. Practical organization of the enterprise information security system.	4				✓	✓			✓	✓			
				Fundamentals of Academic Writing	**Purpose:** formation of professional competence and expansion of communicative competence related to analytical textual activity, formation of skills to analyze expressive units of language. **Content:** expands communicative competencies in the field of the use of the state, Russian and foreign languages in relation to the academic sphere; forms pragmatic thinking skills based on the materials of the state, Russian and foreign languages, the ability to analyze variant units of the language and competently choose the right unit depending on the goals and conditions of communication.		✓	✓			✓							
		BD	HsC	Educational Practice	**Purpose:** formation of professional competence and expansion of communicative competence related to analytical textual activity. **Content:** consolidates the acquired theoretical knowledge about the basic schemes of algorithms and practical skills in the development of algorithms and their programming. Types of information processes, sources and receivers of information; Acquisition of skills in creating information objects, for registration of work results, formation of accounting documentation; Use of automated office management systems; Develops skills in teamwork, compliance with ethical and social	1		✓		✓	✓							✓

					norms.													
		BD	EC	Operating System Basics	**Purpose:** To study the key system of the information structure, the basics of functioning, the use of secure operating systems, the architecture of system software and components, software tools for interaction. **Content:** Skills of working in modern OS and shells: Windows, Unix, macOS, real-time OS, mobile OS, embedded OS. Installs and configures operating systems. Solves administrative tasks.	5		✓	✓			✓						
				Linux Operating System Basics	**Purpose:** to study the general principles of building operating systems (OS), as a means of effective management of the computing process through the rational allocation of computing system resources, and software tools for creating a user-friendly interface. **Content:** The basic concepts of the Linux operating system are studied, as the basics of supercomputer cluster solutions, skills of working in it. Transforms the requirements for the functioning of the ICS into the Linux architecture. To set and solve tasks in the programming languages of system software, administration and configuration of the structure and composition of components of Linux systems. Develops proposals for improving the security measures of software and hardware.		✓			✓	✓			✓				
7	Information Security and Data Management	BD	EC	Information Security Planning and Management	**Purpose:** To master the basic methods and means of information security management in the organization. **Content:** study of the main approaches to the development, implementation, operation, analysis, maintenance and improvement of information security management systems of a certain object. Management decision-making skills in the field of information security, analyzing the requirements of security conditions in information and cybersystems.	4	✓							✓		✓		
				Research Work of Students	**Purpose:** to increase the level of training of students through the development of methods, techniques and skills in the process of teaching, the development of their creative abilities, independence, initiative in studies and future activities. **Content:** Intellectual activity. Scientific research.		✓							✓		✓		

					Methodology of scientific research. The main methods of searching for scientific information. Methodology of preparation of the report and presentations.													
		PD	EC	Forecasting Information Threats	**Purpose:** To study the issues of threat prevention, identification of possible software vulnerabilities, assessment of possible damage based on the analysis of statistical data of the IP operation. **Content:** Overview of tools that identify vulnerabilities of systems. Application of methods of forecasting and prevention of information security threats, probable attacks. Monitoring the performance of the IP to improve security measures.	5			✓					✓				
				Basies of Designing Cyber-physical Systems	**Purpose:** Describes the technologies of Internet of things, cyber-physical systems, distributed systems, transdisciplinary approaches, combining the theory of cybernetics, mechatronics. **Content:** design and process science, CPS computing elements, robotics concepts, sensor networks with intelligent mechanisms. Integrates components of cyber-physical systems and designs them by analyzing the requirements for security conditions. Evaluates the results of monitoring the work of the information security PTS.								✓	✓	✓			
		PD	HsC	Project Management of Information Safety	**Purpose:** The issues of security system planning are considered. Demonstrates analytical thinking and the ability to conduct a pre-project survey of enterprises for vulnerabilities. **Content:** Models of security policy, principles of choice of software and hardware protection of information systems, mobile devices. Skills of neutralization and minimization of threats to the integrity of information flows in the system, in computer networks. Solving problems of forecasting and sustainability of projects with continuous management of information security.	5	✓	✓	✓	✓				✓				
8	Hardware and software system protection	BD	EC	Digital Electronics	**Purpose:** Formation of knowledge about the synthesis of electronic circuits under specified conditions, development of combinational, sequential circuits. **Content:** Basic types of chip housings. Comparison of the principles of digital electronics. Systems of general-	5			✓					✓	✓			

					purpose processors and microcontrollers. Description of USB, Wi-Fi, PCI Express interfaces. Binary coding skills. Application of digital device development tools based on the design language of modern digital circuits VHDL.														
				Electronics and Circuit Design	**Purpose:** Studies the practice of application and calculation methods of functional blocks based on modern integrated circuits. **Content:** Describes the physical processes of electronic devices. Based on the analysis of the features of microelectronic devices, the rules of combinational logic correctly selects the element base for the design, construction of circuits, determines the prospects for the development of technical means.			✓	✓	✓								
		BD	EC	Network Technology	**Purpose:** To study the physical, logical, and software structure of computer networks. Analysis of requirements, compliance with standards in the design of CS. **Content:** Classification by attributes, principles of network construction. Rules of network interaction. Application of addressing methods. Research of basic CS technologies. Selection, justification of software and hardware components, their compliance with the quality of a certain network technology. Identifies threats and applies network protection measures.	4		✓		✓						✓			
				Basies of Information Systems	**Purpose:** Information processes are considered as the basis of information systems (IS). **Content:** Source information, the main unit of movement, transmission, changes in IP. Definition of IP requirements, functional characteristics, architecture, implementation methods. Solving the tasks of developing a database for storing information of a certain IP, the user interface of client applications. Skills of working with typical software components based on data processing logic, their standard protection.			✓			✓	✓							
		BD	EC	Cryptography	**Purpose:** To master the methods of ensuring confidentiality, data integrity, authentication of objects.. **Content:** Study of the mathematical foundations of modern cryptography; indicators and problems of	4		✓			✓	✓							

					cryptosystem durability. Application of tools for software implementation of cryptographic algorithms-symmetric, assimitric, hash functions. Substantiates the methods of solving basic cryptographic problems, analyzes the durability of cryptosystems.													
				System and Network Architecture	**Purpose:** A complex of distributed computer equipment connected by a data transmission system, communication equipment and communication channels in accordance with standards is considered. **Content:** Principles of computer network architecture as a multi-level system. The standard model of an open system. Investigation of the coordinated operation of systems based on protocols. Tasks of parallelization of processes in systems. Calculations of performance, scalability of systems in the specified functional characteristics.			✓			✓	✓						
		BD	EC	Computer Information Protection Technology	**Purpose:** The problems of vulnerability of information in data processing systems are considered. **Content:** Information security threats are analyzed, and based on them, software and hardware protection tools for IP and physical devices are developed and selected. Methods, techniques and technologies of information protection, threat prevention are used and proposals for improving security measures are developed on their basis.	4	✓			✓		✓						
				Preventive Protection of Information Systems	**Purpose:** To analyze an integrated approach to information security. The concept and components of information security. **Content:** Threats to information security in information systems. Development of a procedural level of information security. Software and technical level of information security. Protection of information from leakage through technical channels. Protection of information from unauthorized access. Antivirus protection tools. Effective application of the basic principles of security procedures (authorization, authentication, EDS) and threat prevention technologies, data mining, network security, database protection schemes, mobile devices, workplace security based on								✓		✓			

					vulnerability research and statistical information.													
		PD	HsC	Industrial practice 1	**Purpose:** consolidation and deepening of theoretical and practical knowledge gained in the study of general professional and special disciplines. **Content:** strengthens knowledge of theoretical training, acquisition of practical skills in analyzing computer system programming technologies, adaptation to the labor market, future work related to software design and development. Definition of technical requirements taking into account the functions performed by information and communication systems, justification of rational software architecture. Acquisition of practical skills in the analysis of information flows of the subject area, the development of standard information objects.	4		✓		✓	✓							✓
9	System Software and Protection	BD	HsC	Object-Oriented Programming (Java)	**Purpose:** Describes the basic principles of object-oriented construction of software systems. **Content:** explains the concepts of classes, objects and the relationship between them. Develops the ability to use OOP tools in Java; apply the basics of multithreaded and distributed programming in practice; develop algorithms and programs based on OOP to protect ICS and networks.	5					✓		✓		✓				
		PD	EC	Web-Programming	**Purpose:** The principles of programming for working with web technologies are studied. Determining the requirements for the client and server group program. **Content:** Application of programming tools for the client (JavaScript, CSS), server parts (PHP language) of database-based applications (MySQL). Organization of interaction with the DBMS. Has the skills of development, secure hosting, support and maintenance of a web site on the server.	6			✓		✓			✓				
				Cryptographic Methods of Information Security	**Purpose:** Common types of ciphers and methods of their cryptanalysis, concepts of information integrity, cryptographic protocols, electronic signatures are described. **Content:** Mathematical methods (group theory, pseudorandom sequences) are used in the implementation of cryptographic methods of threat protection in ICS. Implementation of encryption and			✓			✓		✓						

					cryptanalysis algorithms, modern cryptographic approaches based on the use of unique properties of physical communication channels.													
		PD	EC	Database Management System	**Purpose:** to acquire theoretical knowledge about database design; to study the theoretical foundations of database management systems; to acquire practical skills in using and implementing modern database management systems on a computer. **Content:** Formation of knowledge about databases, data models; functions of the database management system; modern technologies of data storage and retrieval. Application of SQL query development methods, MySQL for design and management; Definition of criteria for data search and extraction. Skills in developing client and server parts using modern DBMS. Monitoring the use of the database. Analysis of events when using the database. Means and methods of database access control.	5		✓			✓			✓					
				Basics of database development	**Purpose:** The principles of storage and processing in the concept of databases are given. Issues of safe functioning of ICS, research of new approaches and solutions in this area. **Content:** Analyzing the requirements for security conditions, ICS designs mechanisms to ensure the integrity, confidentiality and availability of data, access control. Applies, evaluates mechanisms, database protection schemes. Forecasting and assessing the risks of database failures. Organization of a database management system. Aspects of theoretical and practical problems of DBMS organization are studied. The use of relational algebra, ER diagrams to bring the database structure to normal forms, performing data processing operations in SQL. Installation, configuration of system and application software to ensure the smooth operation of the DBMS. Analysis of DB security conditions, solution of current and future DBMS tasks. Identification and elimination of malfunctions that occur during the operation of the database.				✓				✓					

10	Biometric protection	BD	EC	Graphical User Interface	**Purpose:** To study the software shell for the user to work with the OS. **Content:** Skills of placing graphic modules in the workspace of the corresponding parent program. Synchronization of access to a resource (mutexes, semaphores). Skills of creating basic GI elements: input and output of information (buttons, switches, combobox, label, edit field, listbox, menu, etc.	4			✓			✓	✓						
				Content and Language Integrated Learning	**Purpose:** to promote the mastery of professional vocabulary, to form the skills and abilities of reading and translating specialized literature, as well as to develop the skills of professional speech communication in English within the subject matter covered. **Content:** Provides knowledge in the field of programming of the fundamentals of the disciplines of the specialty necessary for further education and creativity in English during the study of the discipline. Communication skills with the use of information technology. The ability to use information resources and hardware and software in English.			✓				✓	✓						
		BD	EC	Biometric Information Security Technologies	**Purpose:** Biometric information security technologies, static and dynamic methods of biometric authentication, biometric security systems are explained. **Content:** Their application in access control and control systems in accordance with the criteria of the security policy of the ICS. Designs and builds biometric algorithms for processing, analysis, classification of biometric data.	4						✓		✓					
				Biometric Identity Management	**Purpose:** The main characteristics of biometric systems are studied and applied. **Content:** biometric identification methods (fingerprint identification, facial identification, iris scanning, retina scanning, voice analysis, geometric analysis methods), protection of biometric templates. Skills in managing biometric identification methods in accordance with the criteria of the security policy.				✓			✓	✓						
		PD	HsC	Industrial practice 2	**Purpose:** consolidation and deepening of theoretical and practical knowledge gained in the study of general professional and special disciplines.	6						✓	✓						

					Content: allows you to demonstrate: ability to systematize knowledge of architecture, organization of computer systems; skills in analysis, synthesis of electronic circuits, calculation of elements of digital devices, taking into account current trends in the development of electronics, architecture of computer systems. To demonstrate the ability to search, evaluate information necessary for the formulation, solution of professional tasks for the formulation of technical requirements of computing systems in production conditions.													
11	Cyber protection	PD	EC	Basies of Intelligent Systems	**Purpose:** To study the blocks of intelligent systems: knowledge base, decision output mechanism, intelligent interface. **Content:** Presentation of tasks in natural and formalized languages. Modeling of fuzzy sets, fuzzy logic. Knowledge representation in intelligent systems by means of production systems, semantic networks, frames; logical inference algorithms based on knowledge. Practical use of intelligent systems for recognizing text in an image. Application of rules, algorithms and technology for creating test datasets.	5							✓	✓	✓			
				Fundamentals of Robotics	**Purpose:** to teach the student to reproduce the acquired knowledge, practical skills and abilities in the study of the basics of robotics, as well as to apply and use the acquired knowledge in the development of software products. **Content:** examines the application and main capabilities of robotic systems; design methods and principles of RTS functioning. Analysis of objects of RTS logical control; preparation of technical specifications for the development of robotic devices; calculate characteristics and select RTS elements; Programming algorithms for robots of various types; synthesis of control automata by regular methods.				✓		✓		✓					
		PD	EC	Cyberphysical Information Security	**Purpose:** Embedded and cyberphysical systems, their interaction with the physical world are studied. **Content:** Applies the methodology of designing the	5			✓		✓		✓			✓		

				Design	protective mechanisms of the CFS, programming tools, analysis of the structure of cyber-physical systems. Simulation of calculations using logic and discrete models as finite automata. Identification of threat sources and protection measures, embedded and real-time cyber-physical systems.													
				Cyberphysical Systems Management	**Purpose:** The architecture of cyber-physical systems is considered as the integration of computing resources into physical entities. **Content:** The study of a complex of sensors, equipment and information systems in interaction via Internet protocols for forecasting, adaptation to changes. Selection, application of secure communication, account management systems, access control (Identity and Access Management) for the protection of industrial systems, applications and standardization of CFCs.				✓					✓			
		PD	EC	Basies of Developing Mobile Applications	**Purpose:** features of the use of service programs, shells in the development of mobile applications. **Content:** describes the features of the use of service programs, shells in the development of mobile applications. Possess the skills of development, use of service programs, service shells in the development of mobile applications. Skills in choosing optimal software products, OT models from several possible solutions to applied problems. Programming of the multimedia object. Apply modeling principles to create a model of an implemented multimedia object. Monitor and select software tools for modeling multimedia information. Import a multimedia project into the format of mobile gadgets.	5							✓		✓			
				Arduino and 3D Printing Technology	**Purpose:** students acquire practical skills in developing software for microcontrollers according to a given methodology, taking into account current trends in the development of electronics and computer technology. **Content:** considers Arduino as an infrastructure, an environment where electronic and mechanical components are assembled into a single device, and programming the behaviors of these components. Studies the hardware part (electronic boards with a								✓		✓			

					microcontroller, accompanying elements-a power stabilizer, a quartz resonator, blocking capacitors). Develops the ability of practical programming of microcontrollers (Arduino), compile programs in an integrated software environment, load them into hardware; use 3D-Printing.													
		PD	EC	Mobile Security	**Purpose:** Mastering methods and means of information protection in mobile systems. **Content:** identification of typical threats, identification of vulnerabilities for creating a protection system; investigation of interaction with the server, application audit. Argues for the choice of means of protection, evaluates these measures for the development of secure programs for mobile OS.	5					✓				✓	✓			
				Web Control Technology	**Purpose:** The components of a secure web technology system are being studied. **Content:** Issues of interaction between the user's computer and browser, communication channel between all components, firewall, IPS, WAF. The use of tools for integrity control, the choice of PAS, built-in cryptographic protection mechanisms.						✓		✓					
12	Information Security Testing Tools	PD	EC	Basies of Automatical Recognition	**Purpose:** to teach the student to reproduce the acquired knowledge and practical skills in pattern recognition, to teach him to use the basics of a modern approach in the development of software products for pattern recognition, to creatively apply and use the acquired knowledge. **Content:** explains the basic techniques and methods of pattern recognition by signs; Attribution of the source data to a certain class. Determination of the types of tasks of the functioning phase. Using classification rules. Examples of systems that solve the recognition problem. Application of speech recognition methods, images, texts. Possess mathematical and algorithmic apparatus used in solving recognition problems.	4				✓	✓		✓					
				Graphics Application Software	**Purpose:** Describes methods and means of computer graphics. Knowledge of composition theory, color science, animation, mathematical, algorithmic, technical foundations of image formation.					✓			✓	✓				

					Content: Algorithms and mathematical foundations of constructing realistic scenes; Implementation of basic graphics algorithms using graphics standards and libraries, methods and technologies of multimedia application. Application of methods of computer animation, design design. Creating vector illustrations for the web and printing using computer programs.													
		PD	EC	Technology of software development	**Purpose:** Considers the concept of technological operation, life cycle, stages of software product development, requirements for a software product. **Content:** Develops the ability to develop a technical task for a software product; develop a structural and functional scheme of software; use the method of step-by-step detailing for designing the structure of software. Develops skills in developing software structures; debugging and testing developed software; compiling software documentation.	6						✓			✓			
				Application Software	**Purpose:** formation of students" basic competencies in the field of application software use, which are further developed in the formation of professional competencies of a specialist in technical and software engineering. **Content:** examines the concept of technological operation, life cycle, stages of software product development, requirements for a software product. Develops the ability to develop a technical specification for a software product; develop a structural and functional scheme of software; use the method of step-by-step detailing for designing the structure of software. Develops skills in developing software structures; debugging and testing developed software; compiling software documentation.								✓		✓	✓		
		PD	EC	Information Security Culture	**Purpose:** The provisions of the IB are given – respect for the interests of information participants, based on the UN Convention. **Content:** Differentiation of access levels. Synthesis of a behavior model: attitudes, a set of skills for handling information resources. Implementation of organizational measures, constant management, establishment of regulations, prevention of leakage risks, safe handling of	4					✓			✓		✓			

					information. Instilling an information security culture – trusting relationships of strategic perspective, development, sustainability of the company.													
				Protection Against Internal IT Threats	**Purpose:** Intentional, accidental threats, failures of information processing and storage facilities are studied. **Content:** Regulatory compatibility, confidentiality issues, and information integrity are analyzed. The tasks of implementing protective mechanisms. Skills of choosing a defense system, internal security paradigms. Application of methods for evaluating the effectiveness of protective measures, a comprehensive DLP system for preventing leaks, unauthorized access, distortion, control of workplaces, print queues, access to network resources.				✓		✓		✓					
		PD	HsC	Architecture and Organization of Computer Systems	**Purpose:** The principles of architecture of computing systems, methodology of construction, prospects of development as an object of informational influence are studied. **Content:** Directions of development of computers with traditional, parallel and non-traditional architecture; principles of building data transmission networks. Determine the criteria for the quality of aircraft. Distinguish between processor types. Issues of reducing memory access time. Determination of system performance. Develops skills in architecture selection and integration of modern computers, systems and networks.	5		✓							✓			
13	Module new professional competencies acquiring	BD	EC	Subjects on the Additional Educational Program	**Purpose:** students acquire practical skills in developing software for microcontrollers according to a given methodology, taking into account current trends in the development of electronics and computer technology. **Content:** allows you to determine the degree of assimilation by bachelors of the volume of training modules, professional competence and readiness of the graduate for professional activity. Allows you to show and evaluate the acquired knowledge, skills and competencies, including those with in-depth specialization within the framework of the main program.	12			✓	✓				✓				

14	Module of Final Certification	PD	HsC	Predegree and industrial practice	**Purpose:** to collect primary scientific and technical data necessary and sufficient to complete a graduation project or graduate research papers in accordance with the assignment approved by the graduating department. **Content:** develops the ability to: correctly represent the structure of the practice base, describe the production processes of the enterprise; discuss the use of software, computer equipment of the enterprise; analyze the technical condition, production process, life safety measures; offer their own software packages, create software products on the instructions of the enterprise for implementation into production; develop solutions to real engineering problems, perform their evaluation.	10									✓		✓
				Writing and Defending a Thesis, a Graduate work, or Preparing and Passing a Comprehensive Exam	**Purpose:** has the purpose of systematization, generalization and verification of special theoretical knowledge and practical skills of graduates. **Content:** Bachelor's work is a central part of completing the course of study. With this work, students show that they have the ability to independently present complex computer scientific and technical problems and their connection with other industries, combine and apply the acquired knowledge of software tools, programming systems, computing and information technologies in their further work and professional activities.	8							✓	✓			✓
				Total:		**240**												

5. Summary table reflecting the volume of disbursed loans by EP modules

Course of Study	Semester	The number of mastered modules	The number of studied disciplines			Number of KZ credits					Total hours	Total KZ credits exam	The number of	
			OK	UC	CC	Theoretical training	Educational practice	Industrial practice	Industrial practice, pre-graduate	Final examination			exam	Diff.test
1	1	4	7	1		28	2				900	30	7	1
	2	4	3	5		26	2	2			900	30	5	3
2	3	3	1	2	5	28	2				900	30	6	2
	4	5	4	2	1	24	2		4		900	30	5	2
3	5	4			7	30					900	30	6	1
	6	4		1	4	24			6		900	30	4	1
4	7	3		1	3	20					600	20	4	
	8	3		1	3	20					600	20	4	
	9	1		1					8	12	600	20		1
Total		14	15	14	23	200	8	2	18	12	7200	240	41	11

6. Strategies, teaching methods and artificial intelligence, monitoring and assessment

Learning strategies	**Student–centered learning:** The student is the center of teaching/learning and an active participant in the learning and decision-making process. **Practice-oriented training:** orientation to the development of practical skills.
Teaching methods	Conducting lectures, seminars, various types of practices with: • the use of innovative technologies: • problem-based learning; • case study; • work in a group and creative groups; • discussions and dialogues, intellectual games, olympiads, quizzes; • reflection methods, projects, benchmarking; • Bloom's taxonomies; • presentations; • * rational and creative use of information sources: • * multimedia training programs; • * electronic textbooks; • * digital resources. • * machine learning methods Organization of independent work of students, individual consultations.
Monitoring and evaluation of the achievability of learning outcomes	**Current control** on each topic of the discipline, control of knowledge in classroom and extracurricular classes (according to syllabus). Assessment forms: • survey in the classroom; • testing on the topics of the discipline; • * control works; • protection of independent creative works; • discussions; • trainings; • colloquiums; • essays, etc. **Boundary control** at least twice during one academic period within the framework of one academic discipline. Intermediate certification is carried out in accordance with the working curriculum, academic calendar. Forms of holding: • exam in the form of testing; • oral examination; • written exam; • combined exam; • project protection; • protection of practice reports. **Final state certification.**

7. Educational and resource support for EP

<table>
<tr><td>Information Resource Center</td><td>The structure of the JRC has 6 subscriptions, 16 reading rooms, 2 electronic resource centers (ERC). The basis of the network infrastructure of the OIC consists of 180 computers with Internet access, 110 automated workstations, 6 interactive whiteboards, 2 video doubles, 1 videoconferencing system, 3 scanners of A-4 format, 3. The software of the OIC – AIBS "IRBIS-64" for MSWindows (a basic set of 6 modules), an autonomous server for uninterrupted operation in the IRBIS system.
The library fund is reflected in the electronic catalog available to users on the website http://lib.ukgu .kz is on-line 24 hours 7 days a week.
Thematic databases of their own generation have been created: "Almamater", "Works of scientists of SKSU", "Electronic Archive".Online access from any device 24/7 via an external linkhttp://articles.ukgu.kz/ru/pps.
Working with catalogs in electronic form. The EC consists of 9 databases: "Books", "Articles", "Periodicals", "Works of the teaching staff of SKSU", "Rare books", "Electronic Fund", "SKSU in print", "Readers" of "SKU".
The JRC provides its users with 3 options for accessing its own electronic information resources: from the Electronic Catalog terminals in the catalog hall and divisions of the JRC; through the university's information network for faculties and departments; remotely on the library's website http://lib.ukgu.kz /.
Access to international and republican resources is open: "SpringerLink", "Envoy", "Web of Science", "EVSSO", "Epigraph", to electronic versions of scientific journals in open access, "Zan", "RMEB", "Adebiet", Digital library "Akpigress", "Smart-kitar", "Kitar.kz", etc.
For people with special needs and disabilities, the library's website has been adapted to the work of visually impaired users in the JRC.</td></tr>
<tr><td>Material and technical base</td><td>The material and technical base of the department, its equipment with computer equipment ensure high efficiency of the educational process. The Computer Engineering and Software Department has 403, 404, 405 computer classes of the academic building No.4. During the educational process, students use the computer classes of the main building to perform laboratory work and SRS.Also in the main building there is an educational and laboratory complex from Huawei (Huawei ICT Academy), in which the direction of "Computer Networks" is studied. Minimum characteristics of computers:
<table>
<tr><td>Name</td><td>Parameters</td></tr>
<tr><td>1. CPU</td><td>Core i3-9100 3.6GHz</td></tr>
<tr><td>2. MB</td><td>Gigabyte H310 LGA 1151</td></tr>
<tr><td>3. RAM</td><td>DDR4 8Gb</td></tr>
<tr><td>4. HDD</td><td>1 Tb</td></tr>
<tr><td>5. VC</td><td>Intel UHD Graphics 630</td></tr>
</table></td></tr>
</table>

APPROVAL SHEET

on the Educational program
6B06150– «Information and communications technology and security»

Director of DAA _____Naukenova A.S.
sign

Director of DASc _____Nazarbek U. B.
sign