


The Ministry of Agriculture of the Republic of Kazakhstan
Kazakh Agro Technical University. S.Seifullin

considered
at a meeting of the Academic
University Board
Protocol number 15 of "30" 05 2019

APPROVED
Chairman of the Board
JSC " S.Seifullin Kazakh Agro
Technical University"

A.K. Kurishbaev
« 30 » 05 2019



EDUCATIONAL PROGRAM
"Computer engineering"
(Program name)

Code and classification of education: 06 Information and communication technologies

Code and classification of training areas: 6V061 Information and Communication Technologies

Group educational programs B57 Information technology

Key in the International Standard Classification of Education: 65 Bachelor or equivalent, vocational training 655 first degree (3-4 years)

Qualifications: Bachelor / Bachelor specialist in the field of information and communication technologies in the educational program

"6B061 Computer Engineering"

(According to appendix 4 SES)

Duration of training: 4 years

Mode of study: full-time

Language: Kazakh, Russian, polylingual

Nur-Sultan in 2019

Authors:

1. Name - academic degree, title, position, place of work

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Educational program "Computer engineering"

reviewed at the meeting of the department "Computer Engineering and Software"
protocol № 7 of "13" on February 9, the 201,

approved by the Faculty Council
protocol № 11 "14" on February 9 of 2019

Dean of the Faculty



Sarbasova K.A.

Head of Department



Adamova A.D.

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one.Passport of the educational program "Computer Engineering"

№	field Name	note
1	Code of the educational program	06
2	Code and classification of education	6B061 Information and Communication Technologies
3	Code and classification of areas of training	6B061
4	Naimenovanieobrazovatelnoy program	Computer engineering
5	Type of educational program	new
6	The purpose of the educational program	PPreparing bachelors in computer engineering with expertise in the field of programming and development of software, websites, databases, robotics, design and maintenance of computer systems, networks, and server hardware.
7	at the level of NRC	6 Higher Education. Bachelor, sptsialitet, internship and practical experience.
8	The level of the RCA	61 Higher education. Bachelor, practical experience, 62 Vyssee education. Bachelor, practical experience.

The task of the educational program "Computer Engineering" is development of students' systematic competence based on obtaining in-depth knowledge in the field

- IT hardware and software tools, computer systems and networks,
- their system software and databases,
- technical protection of information, decision-making systems,
- diagnostic and testing system,
- distributed and clustered computer systems,
- local, global and corporate computer networks.

Upon successful completion of the educational program of the graduate has a wide range of theoretical and practical knowledge about the programming, database, information security, network technologies, big data, robotics, software and computer hardware and peripheral equipment, and can be engaged in installation and commissioning, production and technology, experimental research, development, design and technological activities, which correspond to the 6th skill level and on the National Qualifications Framework (NQF) and sectoral qualifications frameworks (ORK), respectively, received a bachelor's degree in the field of information and communication technologies in the educational program "Computer engineering".

2. General characteristics of the education program

Relevance

The educational program "Computer Engineering" in the direction of training Information and communication technology, is considering training in the use of modern network technology for data transfer performance, smart technologies for the development of intelligent control devices in the fields of agriculture, economy and trade, education, and medicine for the successful implementation of the State Program "Digital Kazakhstan".

Features and competitive advantages:

A distinctive feature of the educational program is to provide a new level of training specialists, meeting the requirements of IT in the digitalization of industries. The student has vozmozhnostsvobodno navigate the global educational space on the basis of memoranda from the Belarusian State University of Informatics and Radio Electronics, University of Milan, the University of California for the passage of the internship, academic mobility and two-diploma education (Kazakh get a university degree and a foreign university).

Students can combine theoretical training with practical training in the IT-company laboratories: JSC "Kazakhtelecom" LLP «ArtaSoftware», LLP "KazdreamTechnologies", JSC NC "Kazakhstan Gharysh Sapary" based on the agreement of the dual training.

In the development of educational programs we have been interested in and contributed to the following stakeholders:

Kazakh Association ITkompany;
JSC "Kazakhtelecom";
TOO "Kazdream Technologies";
"G1 Software Kazakhstan" LLP;
"OPEN SYSTEMS DEVELOPMENT" LLP;
"QLT" LLP;
JSC "Kazakhstan GIS Center" The Ministry of Defense;
«ArtaSoftware» LLP.

3. Competence model (portrait) graduate

The sphere of professional activity graduates who have mastered the program "Computer Engineering" includes IT - field in all areas of human activity. Graduates engaged in the development of computer systems and network nodes, and their integration in the field of research robototizirovannyh systems that emphasizes aktualnot vosstrebovannost and educational program offered.

Bachelor of preparation "Computer Engineering" has knowledge of the following types of professional activity:

- Analytical: planning and designing software, the design of programmable logic integrated circuits;
- Constructive: software development, repair of computers and peripheral equipment, Repair of communication equipment;
- organizational and management: system and network administration;
- maintenance, activities Computer facilities management;
- design: developers and analytics software and applications;
- Production: Production of programmable logic integrated circuit, creation of intelligent devices to control the devices;

Students on completion of the educational program "Computer Engineering" must have the following competencies:

competence	discipline	learning Outcomes
KK1 - language competence	Professional English IELTS Preparation	<p>PO1 - to communicate in Russian, foreign, Kazakh languages using conventional expression. Answer questions and competently express their thoughts in a professional environment. Have the skills to write different kinds of professional documents on Russian, Kazakh and foreign language, to speak freely and express themselves in a professional theme.</p>
KK2 - physical and mathematical competence	Mathematical Foundations of ICT	<p>PO2-Define and use correctly in solving professional tasks corresponding mathematical apparatus (methods and algorithms for the solution). Compute problems of mathematical analysis, discrete mathematics, Boolean algebra, probability theory and mathematical statistics, information theory, number theory, fundamentals of mathematical modeling related to physical phenomena and processes of modern devices of computer systems and networks to present a model of physical processes; conduct experimental research, to handle the results of experiments.</p> <p>Demonstrate the application of knowledge in practice, including the ability to make mathematical models of typical professional tasks and find ways to solve them, to interpret the physical meaning of the mathematical result. Demonstrate the ability to use the fundamental laws of mathematics in professional activities, to integrate knowledge from different sections of the mathematics. Calculate the problems of probability theory and mathematical statistics, fundamentals of mathematical modeling related to physical phenomena and processes of modern devices of computer systems and networks. Show the ability to apply analytical computational methods for applications in computer science. Compute discrete mathematics problems of mathematical logic,</p>
	Probability and Statistics in Computer Science	
	Graph theory and linear programming	
	Physics	

		Boolean algebra, information theory, number theory,
CC3 - The competences of algorithms and programming	Algorithms and Data Structures programming technology	<p>PO3-Develop, describe and explain the algorithm for solving the problem, determine the structure of the problem: a linear, branched and cyclic, interpret the data structure: lists, arrays, sets, files, strings, etc. Explain to choose and use a "top down" programming and ". bottom-up "master practical skills of programming in a programming language, to show differences in the syntax of programming languages and their features, principles of programming, structure and types of programming, applying s expertise in application development; tabled in the difficult areas of application development, to show a complete picture of the problem</p> <p>PO 4 - to analyze the problem, identify solutions and to select efficient algorithms for the task. Allocate the input and output data. Understand the integrity of the developed software. Select tools and programming language for the effective implementation of the software. Develop (write program code to determine the design, verifitsirovat, test, etc.) complete the application database, Web portals, individual modules to them, to integrate the modules in the application.</p>
	1. Programming in Python, 2. Programming in Java, 3. Programmirovanie in C #	
	1. Development of applications on Python 2. Application Development on naJava 3. Development of applications in C # 1.	
KK4 -Kompetentsii for database development and project management	1. Design of database / oracle 2. Database design SQL1.	<p>PO5 - Describe the database model, list the steps of database design and explain what happens at each stage of the design, to explain and normalize database; The use of modern database management systems, to integrate them into applications, manage databases exactly create queries to search data by various criteria, delete, add data to determine the relevance of the data in the software and hardware.</p>
	1. The management of IT projects and predprinimatelstvo 2. IT Project Management Methodology	

	1. Introduction to the Technology BIG DATA 2. Analysis of Big Data	Consult and unread interface to work with databases. RO6 - designing IT projects that demonstrate the software projects (software), use of software design techniques to use IT project management methodology in the process of software design, writing the terms of reference for the software to know the circuit design front-end and back-end; apply the basics of big data technologies, methods of analysis and work with big data. Database design and comply with the integrity of the database normalization. Develop client-server applications to work with big data in a professional activity. Discuss the developed product, to identify errors in the verification, testing software. Program applications for the analysis of large data.
KK5 -Kompetentsii of Architecture of computer systems	1.Sovremennaya computer architecture	RO7 - Describe the architecture of computer systems, computer work parallel systems, classified computer systems on the processor type, on the principle of shared memory; to explain the idea of parallelization on multi-core processors. Install and maintain operating systems. Stake (amount) judgment of modernization architecture COP, install and replace the internal and external computer device. RO8 - Select the programming language for computer hardware. Make programs for microprocessors, microcontrollers. To be able to program individual instruction blocks in microcontrollers and microprocessors, determine a relationship of the microcontroller / microprocessor with external devices in equipments APC. Check the protection of information in computer systems. Choose methods of information protection from outside intruders. Use programming encryption algorithms, to develop programs for encoding and decoding data. To be able to create anti-virus programs.
	1.Operatsionnye system and system programming	
	1.Mashinno-oriented programming Assembler2. Machine-oriented programming in C / C ++	
	1. Kiberbezopasnost2.Mezhsetevoe ekranirovaniel.	
KK6-Competence Networking	1. IoT technologies2. Industrial IoT1. IoT technologies	RO9 - Describe the concept of a computer network. Enumerate the layers of the OSI reference model and their purpose. Explain and to

	<p>1. Network technologies and system administration 2. Fundamentals of organization of Cisco networks</p>	<p>give specific examples of the principle construction of LAN, wireless data transmission operation of virtual network address in the stack TCP / IP protocol. Describe the computer system of physical objects ("things"), equipped with built-in technologies to interact with each other and the environment. Construct WLAN, a virtual network, a client server network. Configure the switch and router for networking. Perform network administration. To justify action on the network using IoT network technologies in the workplace, in industry, in agriculture. To choose and configure the device for constructing a specific network</p>
<p>KK7 - Competence Programming digital devices</p>	<p>1. Driver Programming for parallel programming OS 2. Printsipy</p>	<p>RO10 - Describe the system application software and operating system drivers to explain the source code of the existing device drivers to use the basics of programming language, competently use a set of tools for developing drivers. When programming, use the principles of parallel programming. Select and use appropriate language for programming of microprocessors and microcontrollers. Comparing devices microprocessors and microcontrollers.</p> <p>RO11 - called types of sensors and smart sensors, to describe the basic elements of intelligent sensors that use neural networks, fundamentals of robotic systems. Demonstrate knowledge of intelligent systems in an automated system in agriculture, in industry, in the production. To make decisions in case of breakage devices and judiciously solve the problem; to plan actions for the use of new devices and the programming of these devices. Define the principles slaves in the neural network, in robotics.</p>
	<p>1. Programmirovani microcontrollers and microprocessors 2. Programming of microcontrollers and microprocessors in C / C ++</p>	
	<p>1. Recognition obrazov 2. smart sensors</p>	
	<p>1. Osnovy robotic systems 2. Introduction to Neural Networks</p>	

KK8-design of integrated circuits	1.Elektronika and digital circuitry	RO12 - Understanding the circuitry of electronic devices in the computer, choose the machine programming languages for programming electronic devices, describe the design and operation logic integrated devices in the computer chip to store the results of logical connections in chips, roughly calculate the result obtained, display circuitry devices (encoders, decoders, encoders, decoders , transistors) computer system. Define requirements for the designed integrated circuits, to argue their work.
	1.Metody design on FPGA / 2. Design of Digital Devices	

Reachability matrix formed by the learning outcomes of an educational program with the help of academic disciplines

№	Name of the discipline	Brief description of the discipline	Number TVO loans	PO1	PO2	PO3	PO4	PO5	RO6	RO7	RO8
The cycle of general studies											
Vuzovskiy component / elective component											
1	Professional foreign language	Reasoning Thinking: IT revolution, Recent developments in IT. Future IT trends. Software Development: Operating systems, Types of application software, Graphical User Interface (GUI), The Concept of programming: Programming languages, Program design, Object-oriented programming. Active vocabulary (200 words).		+							

cycle bazovyhdistsiplin
The university component

2	Mathematical Foundations of ICT	Methods and typical problems of linear algebra, vector algebra analytic geometry, the differentiation of functions of one variable, integration of functions of one variable, the differentiation function of several variables, multiple integrals solutions of ordinary differential equations of first order, solutions of ordinary differential equations of higher order, the theory of numerical series theory functional series.	8	+								
3	Probability and Statistics in Computer Science	Methods and typical problems of probability theory: random events, the probability of a random event, discrete random variables and their characteristics, continuous random variables and their characteristics, distribution laws, the elements of the correlation theory, the law of large numbers. Methods and typical problems of mathematical statistics: the basis of the sampling method and the elements of the statistical estimation theory, statistical research based, methods of statistical hypothesis testing.	5	+								

4	Graph theory and linear programming	<p>Methods and types of discrete mathematics of the problem: the foundations of set theory, basics Torii graphs, basics of mathematical logic, formal systems and predicate logic, elements of coding theory.</p> <p>Methods and standard linear programming problem: the elements of the theory of errors, solving linear and nonlinear equations, interpolation and approximation, the simplex method, transportation problem, the elements of the matrix game theory.</p>	7		+						
5	Physics	<p>Mechanical vibration wave, foundations dynamics, Thermodynamics, electric field, a constant electric current, magnetic field, electromagnetic waves and waves, geometrical optics, wave optics, foundations of special relativity, quantum physics, atom and nucleus.</p>	5		+						
6	Algorithms and Data Structures	<p>The concept algorithms, algorithms, structures: linear, branching, cyclic. Introduction to Algorithms. sorting algorithms, the algorithm Schell, search algorithms, recursive algorithm. Formal languages and grammars, automata Turing machine data and their types. Data structure: Array The set records, stacks, queues, linked list, trees, graphs, trie, a hash table file. The compression algorithm - an algorithm Huffman Euclidean algorithm.</p>	13			+					

7	programming technology	Software life cycle. software architecture (software). Model development, technology. Design structure software. Programming Paradigms: visual, functional, procedural, object-oriented, etc. software code generation technology, Distributed computing, collective software development. Software tools for planning and managing the development process. Methods of testing and debugging programs. Documentation and assessment of the quality of software.	6			+					
8	Modern computer architecture	General requirements for modern computers. Classification of computers by application. Methods for assessing performance. Basic architectural concepts. Pipelining. Pipelining and superscalar processing. memory hierarchy. Modern microprocessors. I / O organization. Multiprocessor systems. System high availability and fault-tolerant system. Technical characteristics of modern servers.	5				+				

9	Operating Systems and System Programming	Classification, designation, modes of operation, operating system architecture. Installation, configuration and operation of the OS. Process Management. System software, classification, ACT structure, the organization of interaction between computer hardware, open source software, and application software. operating system interface. Network operating system. Modern operating systems, environments and shell.	5					+			
10	Electronics and digital circuitry	The classification of electronic circuits. Frequency jet circuits analysis. Diodes and diode circuits. Transistors. Amplifier MA. Model Ebers - Moll. Operational amplifiers and feedback. Comparators and Schmitt trigger. Multivibrators. Scheme pulse-width modulation, and analog-to-digital converter. FETs. Arithmetic and logical foundations of the computer. Logic elements. .Integralnaya injection logic .. Digital device combination type. Triggers.	5								+
Cycle basic disciplines optionally component											

11	Programming in Python,	Programming language alphabet, input-output, data types, and control the programming syntax structures: linear, branching, loop recursion. Data structures: lists, an array, trees, tuples, dictionaries, sets, files. Classes. Modules and packages. Library.	6			+					
	Programming in java	Programming language alphabet, input-output, data types, and control the programming syntax structures: linear, branching, loop recursion. Data structures: lists, an array, trees, sets, files. Classes. Modules and packages. Library.	6			+					
	Programming in C #	Programming language alphabet, input-output, data types, and control the programming syntax structures: linear, branching, loop recursion. Data structures: lists, an array, trees, signs, set of files. Classes. Modules and packages. Library.	6			+					
12	Application development in Python	Classes. Inheritance. Encapsulation. Creating modules and independent exe-applications. Software tools for application development. Creating a GUI applications (applets and window applications) .Sozdanie applications for working with databases. Using Tehnoloiya programming languages. Overview graphics libraries. Developing Web applications.	13			+					

	Developing applications on naJava	Classes. Inheritance. Encapsulation. Creating modules and independent exe-applications. Software tools for application development. Creating a GUI applications (applets and window applications) .Sozdanie applications for working with databases. Using Tehnoloiya programming languages. Overview graphics libraries. Developing Web applications.	13			+					
	Development of applications in C #	Classes. Inheritance. Encapsulation. Creating modules and independent exe-applications. Software tools for application development. Creating a GUI applications (applets and window applications) .Sozdanie applications for working with databases. Using Tehnoloiya programming languages. Overview graphics libraries. Developing Web applications.	13			+					
13	1. Database Design - oracle	database model. Database design. The normalization of relations. The decomposition method, entities and relationships. Construction of information and the logical data model. ORACLE database development environment. Creating database queries to retrieve data. The calculations and conclusions in queries. Request modification data integrity. Transactions and locking. Design of molds. Data processing. Development reports. user application development.	8				+				

	2. SQL database design.	database model. Database design. The normalization of relations. The decomposition method, entities and relationships. Construction of information and logical model dannyh.Sreda development MYSQL.Sozdanie base DB data queries to retrieve data. The calculations and conclusions in queries. Request modification data integrity. Transactions and locking. Design of molds. Data processing. Development reports. user application development.	8					+				
14	Machine-oriented programming in Assembler	The concept of machine-oriented programming (MOP). MOS means of interaction with the operating system (OS). The basic architecture of processors. RAM. Registers. Presentation of data. Presentation of the teams. addressing modes. Programming of linear processes. Arithmetic command. Interruption. input-output system. BIOS functions to work with the console. MS DOS functions to work with the console.	5					+				

	Machine-oriented programming in C / C ++	The concept of machine-oriented programming (MOP). MOS means of interaction with the operating system (OS). The basic architecture of processors. RAM. Registers. Presentation of data. Presentation of the teams. addressing modes. Programming of linear processes. Arithmetic command. Interruption. input-output system. BIOS functions to work with the console. MS DOS functions to work with the console.	5						+				
Cycle majors The university component													
15	Introduction to the BIG DATA Technology	Doing Big Data Analytics. Basic concepts and definitions. Background. Sources of more data. Applications in economics, business, healthcare and industrial applications Features. BigData and DataMining. Technology more data. Hadoop. Infrastructure Big Data. Practical application technologies more data examples, using tools MicrosoftAzure	7						+				
16	IoT technologies	Introduction to the "Internet of Things". The hardware of the "Internet of Things" .Setevye technologies and the "Internet of Things". Processing in the "Internet of Things". The use of cloud computing and service-oriented; architectures in the "Internet of Things" .Servisy, applications and business models "Internet of Things".	5								+		

**Cycle majors
optionally component**

17	Methods of designing FPGA	Functional modeling of the designed device based on PLIS.Struktura and methods of preparation of the test module of the project. Creating a test project module in text format and in the form of time diagrams. Stages of simulation of digital devices on FPGA. The use of VHDL language to describe the designed device. The study of functional modeling technology	5								+
	Design of Digital Devices	Basic concepts of digital technology. Basics of algebra of logic. Digital devices such as Raman. Digital devices of sequential type. Design of digital devices. Classification of CAD/CAM systems. Analysis and synthesis of digital devices and combination type of sequential type. Calculation and design of digital devices.	5								+
18	cybersecurity	Cybersecurity: basic concepts and definitions. Network technologies and protocols: basic concepts and definitions. Functional safety: basic concepts and definitions. Cybersecurity in the "Internet of things". Cyber security systems, "smart city." Cybersecurity in the "Internet of things" in the industry. Designing security systems.	6				+				

	firewall	Classification and identification of firewalls firewall'a policy 4. Different types of environments firewall'a 36Primer packet filters in the operating system FreeBSD 6.0 65. IntrusionDetectionSystems (IDS) 120. The deployment of IDS 148. The principles of the safe deployment of DNS services 180. Transactions DNS 202. DNS Security Query / Response 242. Securing web-server 282. secure web-content 318. The authentication and encryption technologies 339. The implementation of secure network infrastructure for web-server 385	6														+			
19	Driver Software for Windows	Basic concepts of driver development. Windows architecture. WDM architecture. Programming in kernel mode. Driver Structure. Writing, compiling, installation, debugging drivers. The driver for the printer, display, video, multiprocessor programming paradigm. Writing 64-bit drivers and drivers for multi-processor systems.	5																+	
	The principles of parallel programming	Architecture of parallel computers. Methods for parallel processing. Parallelism and its use. Graphs information dependencies. OpenMP programming technology. MPI programming technology. Introduction to CUDA technology. GPU architecture. CUDA programming model. Hierarchy CUDA.Gibridnaya memory parallel programming model	5																	+

20	Programming microcontrollers and microprocessors in java	General information on microcontrollers and microprocessors. Familiarity with the platform Arduino. Development environment and programming language javamikrokontrolerovArduino. Digital contact input - output pulse - width modulation. Poll analog sensors. Using transistors and controlled motors. We are working with sound. Light-emitting diode, and radio frequency identification (RFID)	7							+	
	Programming of microcontrollers and microprocessors in C / C ++	General information on microcontrollers and microprocessors. Familiarity with the platform Arduino. The development environment and programming language C / C ++ Arduino microcontrollers. Digital contact input - output pulse - width modulation. Poll analog sensors. Using transistors and controlled motors. We are working with sound. Light-emitting diode, and radio frequency identification (RFID)	7							+	
21	Pattern recognition	Digital image processing. Methods of Imaging: point and spatial. Image analysis based on the expansion of basis functions, based on wavelets. Methods of analysis Texture, image compression. Binary mathematical morphology. Vectorization of discrete shapes. Identification and classification of shape. Efficient algorithms for Voronoi.	6							+	

	smart sensors	From simple sensors - to the intellectual. From simple sensors - to the intellectual. Mechanical displacement sensors. Principles of operation of the global system of orientation and GPS sensors. Vibrating and chromatography sensors. Physical basics of acoustic sensors. Some smart acoustic sensors. Intelligent acoustic sensors for ultrasound. Element base of intelligent sensors.	6									+	
22	Fundamentals of Robotic Systems	Basic concepts of robotics. The principles of the use of robots in industry. Methods representation in the space coordinate system used in robotics, and transitions between the coordinate systems. Dynamics of manipulators. Basic principles roboetiki and interaction between man and robot.	7									+	
	Introduction to Neural Networks	Basic Concepts. Artificial neural networks. Single-layer and multilayer perceptrons. Network based on radial basis functions. Support vector machines. Principal component analysis of the Kohonen self-organizing maps. Neurodynamic model. Livshits condition. The divergence theorem.	7									+	

23	IT Project Management and Entrepreneurship	The project as a control object. Types of projects. Project Life Cycle. Development and analysis of the project requirements. Scheduling IT projects. management of IT projects. Risk management of IT projects. version control and document IT projects. Financial and economic planning and analysis of IT projects. Stages of registration of individual entrepreneurs, working in egov.kz. structure of enterprises in Kazakhstan and documentary support.	7					+			
	IT Project Management Methodology	Definition of the project objectives, the preparation study for the project, its structuring, the definition of financial needs and financing sources; selection of suppliers, contractors and other artists, preparation and conclusion of contracts; calculation of estimates and the draft budget, the timing of the project and develop the implementation schedule, risk management in the project; monitoring the progress of the project.	7					+			

24	Networking and system administration	The concept of information network (IVS). network classification. The methods and techniques of switching. The multi-level approach to the development of means of networking. Open systems. The concept of specification. decomposition principle. Protocols and protocol stacks. Interfaces. Interaction model OSI Open Systems. IVS structure. Analog and digital data channels. The Internet. The network topology. Network administration.	5						+		
	Fundamentals of organization of Cisco networks	Networking Basics. General principles of networks. Network solutions from CISCO. Operating System (IOS). The OSI model. The standard communication protocol stacks. Network model of Cisco. Communication networks means. Network adapters. Methods of structuring networks. IPv6. packet format. Address types. Cisco routers: Configuration RIPng, problem diagnosis. corporate network security. Security management.	5						+		

4 Base passage of professional practices

Teaching practice

The aim of practical training is the acquisition of primary professional competences, including the consolidation and deepening of theoretical knowledge acquired during the training, the preparation of the first skills of research activity, the acquisition of practical skills working in the laboratories of the University:

- Laboratory of Information Technologies;
- systems research laboratory;
- Artificial Intelligence Laboratory;
- Laboratory Nerazruchayuschy control;
- Laboratory of Robotics and Mechatronics.

Internship

The student direction "Computer Engineering" performs the following tasks on a field:

- the study of professional activities, functions and tasks in the field of IT;
- the acquisition and improvement of professional skills and abilities that reinforce the theoretical knowledge;
- the study used in the enterprise / organization methods, technologies and hardware and software, computer networking and systems;
- analysis of the state and development of possible options to improve the concepts and methods of controlling the development, implementation, maintenance and development of software and hardware used in the business / organization;
- Formation of an adequate self-interest, a sense of responsibility and respect for their chosen profession, the ability to be responsible for the results of their work;
- development of interest to the research activities under the production team, to find effective methods for solving problems in the creation, development and maintenance of hardware and software;
- processing of the materials and design of the report of the traineeship.

Manufacturing practice contributes to writing term papers, final qualifying works, implementation of projects (technological, productive, team project).

Undergraduate practice

Pre-diploma practice is designed for the preparation and writing of the thesis, and completes a series of field trips, during the passage of which the students solve the following problems:

- the study of information technology used in a particular company, the composition and functionality of hardware and software;

- the use of specialized development tools and data and software;
- illustrate the skills of independent development of the system, network and application software;
- identification and study of the subject area from the position information and functional analysis, the collection of source documents;
- formalization of the problems for its subsequent decisions in the framework of graduate design.

Base practice:

Kazdream Technologies	http://kazdream.kz/
International Science and Technology Center	http://www.istc.int/
JSC "KazContent" technical support department	http://kazcontent.kz/
LLP "Center for Sustainable Development of the capital"	http://curs.kz/
JSC "NAT Kazakhstan"	http://www.nat.kz/
LLP «ArtaSoftware»	https://arta.pro/
Computer Academy "STEP"	https://astana.itstep.kz/
LLP "InformSystem"	http://www.inform-system.kz/
LLC "1C-Batyr"	http://www.1c-batyr.kz/
LLP «Integrity Systems»	http://www.isystems.kz/
LLP «QLT»	https://qtl.kz/
"BaylykFinans"	http://www.bailyk.kz/
REPUBLICAN PUBLIC ASSOCIATION "UNION OF FARMERS OF KAZAKHSTAN"	http://sfk.kz
JSC "Information and Cost Center"	http://www.iuc.kz
JSC "Eurasian Bank"	https://eubank.kz/
1SfranchayzingVaniev	https://vaniev.kz/
Branch ALSI INNOVATION	https://alsi.kz/

5 Structure educational program

4-year training

№	Name of cycles and disciplines	Total labor	
		in academic hours	academic credits
1	2	3	4
1	Cycle general subjects (DTE)	1710	57
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
	Module socio-political knowledge (sociology, political science, cultural studies, psychology)	240	8
	Physical education	240	8
2)	The university component	150	5
	Foreign Language + IELTS	180	6
	optionally component		
	Professional English	180	6
2	basic disciplines cycle (DB)	3360	112
1)	The university component	180-1680	6-56
	Mathematical Foundations of Information Technology	240	8
	Probability and Statistics in Computer Science	150	5
	Graph theory and linear programming	210	7
	Algorithms and Data Structures	390	13
	Physics	150	5
	Electronics and digital circuitry	150	5

	Modern computer architecture	150	5
	programming technology	150	5
	Operating Systems and System Programming	150	5
	Teaching practice	13	1
	Internship	600	20
2)	optionally component	at least 1680	at least 56
	Designing an Oracle database	240	8
	Designing SQL database	240	8
	Programming in Python	180	6
	Programming in Java	180	6
	Programming in C #	180	6
	Developing applications on naPython	390	13
	Developing applications on naJava	390	13
	Development of applications in C #	390	13
	Machine-oriented programming in Assembler / C and C ++	150	5
3	Cycle majors (PD)	1800	60
1)	The university component	1800	60
	IoT technologies	150	5
	Introduction to the BIG DATA Technology	150	5
2)	optionally component		
	Driver Software for Windows	210	7
	The principles of parallel programming		
	Networking and system administration	150	5
	Fundamentals of organization of Cisco networks	150	5
	Programming microcontrollers and microprocessors in java	150	5
	Programming of microcontrollers and microprocessors in C / C ++	150	5

	Pattern recognition	180	6
	smart sensors	180	6
	IT Project Management and Entrepreneurship	210	7
	IT Project Management Methodology	210	7
	Fundamentals of Robotic Systems	210	7
	Introduction to Neural Networks	210	7
	Methods of designing FPGA	150	5
	Design of Digital Devices	150	5
	cybersecurity	180	6
	.Mezhsetevoe screening	180	6
4	Additional kinds of training (FEB)	0	0
5	final examination	360	12
1)	Writing and defense of a thesis (project) or the preparation and delivery of complex examination	360	12
	in total	7200	241

Director of the Department of Academic Affairs

Head of Planning
and the organization of educational process
Dean of the Faculty
Chairman of methodical commission
The team of authors

_____ Serekpaev NA
 _____ Coltan GJ
 _____ Sarbasova KA
 _____ Adamov AD
 _____ Georgians VV
 _____ Akanov AS

14	Unit of Physics and Mathematics	DB	VC		Physics	5	150	30		20	20	80									5																					no prerequisites
15	IC design module	DB	VC		Electronics and digital circuitry	5	150	20		30	20	80																														Physics
16	COP architecture module	DB	VC		Modern computer architecture	5	150	20		30	20	80																														Physics
17	The module "Database Design and Applications"	DB	HF		1. Design of database / oracle2. Designing SQL database	8	240	40		40	32	128																														Algorithms and Data Structures
18	algorithms and programming unit	DB	VC		programming technology	6	180	30		30	24	96																														Algorithms and Data Structures
19	algorithms and programming unit	DB	HF		1. Programming in Python, 2. Programming in Java, 3. Programirovanie in C #,	6	180	30		30	24	96																														Algorithms and Data Structures
20	algorithms and programming unit	DB	HF		1. Developing applications naPython2. Application Development on naJava 3. Development of applications in C #	13	390	60		70	52	208																														Programming in Python / Java / C #
21	IC design module	AP	HF		1. Methods of designing on PLIS2. Design of Digital Devices	5	150	20		30	20	80																														1. Mashinno-oriented programming Assembler2. Machine-oriented programming in C / C ++
22	COP architecture module	DB	VC		Operating Systems and System Programming	5	150	20		30	20	80																														ICT
23	COP architecture module	DB	HF		1. Mashinno-oriented programming Assembler2. Machine-oriented programming in C / C ++	5	150	20		30	20	80																														Algorithms and Data Structures

24	IT project management module	AP	HF		1.MANAGING IT projects and predprimatelst vo2.IT Project Management Methodology	7		30		40	28	112								7		Programming in Python / Java / C #
25	COP architecture module	AP	HF		1. Kiberbezopasnost2.Mezhsetevoe screening	6		30		30	24	96								6		ICT Mathematical Foundations of IT
26	The module "Database Design and Applications"	AP	VC		1. Introduction to the BIG DATA Technology	7		30		40	28	112								7		Mathematical Foundations of IT Programming in Python / Java / C #
27	Module networking	AP	VC		1. IoT technologies	5	150	20		30	20	80								5		1. Network technologies and system administrirovanie 2. Fundamentals of organization Cisco1 networks. 1. Design of database / oracle2. Designing SQL database
28	digital device programming module	AP	HF		1. Driver Programming for parallel programming OS2.Printsipy	5	150	20		30	20	80								5		Programming in Python / Java / C # Operating Systems and System Programming
29	Module networking	AP	HF		1. Network technologies and system administrirovani e2. Fundamentals of organization of Cisco networks	5	150	20		30	20	80							5			Modern computer architecture
30	digital device programming module	AP	HF		1.Programmirov anie microcontrollers and microprocessors java2. Programming of microcontrollers and microprocessors in C / C ++	7		35		35	28	112							7			1. Modern computer architecture Programming in Python / Java / C #

31	digital device programming module	AP	HF		1. Recognition obrazov2. smart sensors	6			30		30	24	96									6	Programming in Python / Java / C #		
32	digital device programming module	AP	HF		1. Fundamentals of robotic systems2. Introduction to Neural Networks	7			30		40	28	112									7	Programming in Python / Java / C # Discrete mathematics and graph theory		
33	Module Prof. practice	DB	VC		Internship	20											5			8		7			
34	The module final certification				final examination	12																12			
						241		4770	940	110	945	796	3184	21	20	18	20	20	20	21	20	19	21	22	19