"Alikhan Bokeikhan University"

Faculty of Information Technology and Economics

Department of "Information – technologies science»

6B06102 Information systems

CATALOGUE OF ELECTIVE COURSES

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Considered and approved at the meeting of educational-methodic Council of the faculty
Minutes № _____ from «__» _____ 202___ y.

Awarded degree: Bachelor in the field of Information and Communication Technologies in the educational program 6B06124 «Computer technology and software»

Course of education:
B057 – Information technologies

№	Discipline	Amount of credits		Prerequisites	Postrequisites	Prerequisites Postrekvizity Brief description indicating the purpose of the study, executive summary, and expected results of the study (knowledge, skills, competences)
		РК	ECTS			
General Studies						
Be sure to select (BSS)						
Module of economic and legal knowledge						
1	Fundamentals of market economy and entrepreneurship	3		There is a need for legal, historical and economic knowledge that students receive in secondary schools	-	**Aim:** The teaching of this discipline is the formation of systematic economic thinking to understand the logic of the economic laws of society, processes and phenomena occurring at all levels, with the possibility of applying knowledge in practice in any conjuncture and in any economic system. Mastering the skills of scientific and practical foundations of the organization of entrepreneurial activity, methods of its planning and implementation in modern market conditions. **Content:** Fundamentals of economics - a system of knowledge about economic processes, laws, categories, relations in society at the level of production, distribution, exchange, consumption of material goods. The course examines the principles, methods, conditions and forms of organization of entrepreneurial activity, as well as issues related to the basic elements of entrepreneurial activity, the organization of commercial transactions, the study of patterns of formation and development of business in society. **Learning Outcome:** **Know:** the functions of money, the reasons for differences in the level of wages; the main types of taxes; organizational and legal forms of entrepreneurship; types of securities; factors of economic growth; the current state of the theory and practice of entrepreneurship; the specifics of entrepreneurial activity; **To be able to:** to give examples of factors of production and factor incomes, public goods, Kazakhstani enterprises of various organizational forms, global economic problems; to describe the operation of the market mechanism, the main forms of wages and labor incentives, inflation, the main articles of the state budget of Kazakhstan, economic growth, to use the basic terminology of modern entrepreneurship; use methods of doing business; **Skills:** skills of obtaining and evaluating economic information; drawing up a family budget; evaluating one's own economic actions as a consumer, family member and citizen.
2	Fundamentals of law and anti-corruption culture	2		Legal and historical, economic knowledge, which students receive in secondary,	-	**Aim:** Studying the course and familiarizing students with the formation of a system of knowledge on combating corruption and developing a civil position on this basis in relation to this phenomenon. **Content:** The basic concepts and meaning of legal relations, as well as legal mechanisms for regulating

			general education schools, is necessary		legal relations, the procedure for applying responsibility in legal relations. The essence of corruption and its causes; measures of moral and legal responsibility for corruption offenses; current anti-corruption legislation. **Learning Outcome:** **Know:** the basic concepts and essence of legal relations, as well as legal mechanisms for regulating legal relations, the procedure for applying responsibility in legal relations, the importance of the principles and culture of academic honesty, the measure of moral and legal responsibility for corruption offenses. **To be able to:** has an intolerant attitude to corrupt behavior, respects the law and the law. **Skills:** skills of conducting discussions on legal issues, on the application of norms in the modern period.
Module of economic and natural knowledge					
3	Fundamentals of life safety and ecology	2	School course of initial military and technological training	-	**Aim:** To form ideas about the safety of life in human life and the possibility of regulating the processes of mutual influence of the environment and man. **Content:** The discipline "Fundamentals of life safety and ecology" is aimed at forming students' ideas about ecology as a science, about the relationship and interdependence of man and the environment, about the main issues of ensuring environmental safety of life, as well as about the main environmental problems of our time that arise as a result of economic and other entrepreneurial human activities in the conditions of intensification of environmental management, emergencies, civil defense and ways to solve them within the framework of the formation of professional competence. The discipline is interdisciplinary in nature and is studied in the module of disciplines "Economic and Natural Knowledge". **Learning Outcome:** **Know:** the legislative framework of life safety and environmental control, as well as methods for identifying, eliminating the influence of harmful factors on humans and the environment, and ensuring comfortable conditions for human life and activity; **To be able to:** systematize safety standards for use in professional activities; choose methods of protection against hazards in relation to the field of their professional activities and choose ways to ensure comfortable living conditions; **Skills:** skills of ensuring the safety of life in industrial, domestic conditions and in emergency situations, skills of first aid.
4	Alashtanu	3	Legal and historical knowledge is needed, which students receive in secondary and secondary schools	-	**Aim:** formation of students' scientific knowledge on the historiography of the movement and autonomy of Alash. **Content:** The discipline "Alashtanu" is aimed at forming students' ideas about the role and significance of the Alash movement in the socio-political and legal life of Kazakh society; at developing students' analytical skills in relation to national ideas and ideas of statehood on the example of prominent figures of the Alash movement and the Alash-Orda government; at obtaining students knowledge of conceptual aspects of socio-political and socio-economic development of Kazakh society in the early twentieth century. The discipline is interdisciplinary in nature and is studied in the module of

					disciplines "Historical and legal knowledge". **Learning Outcome:** **Know:** the history of the formation and development of the Alash movement as a special stage in the national liberation struggle of the Kazakh people; the nature of the study of Alash issues in domestic and foreign historiography; the main stages of the development of the Alash movement, the main directions of activity, about the political program of the Alash intelligentsia; the relationship of the Alash intelligentsia with the tsarist administration, the provisional government, the "white" movement and the Soviet by the authorities, about the contribution of the Alash intelligentsia to the development of Soviet Kazakhstan; historical phenomena from the experience of the Kazakh statehood, the government of Alashorda, the autonomy of Alash and Turkestan Autonomy; the nature of the policy of the Soviet government towards representatives of the Alash movement and the sanctification of their activities in scientific literature; the tragic fate of the Alash intelligentsia during the period of political repression; **To be able to:** analyze aspects of socio-political and socio-economic development of Kazakh society at the beginning of the twentieth century; critically perceive, analyze and evaluate the diversity of socio-historical development of Kazakh society; be able to analyze historical information, guided by the principles of scientific objectivity and historicism; be able to explain and interpret historical events, assess their significance for the subsequent period of national and world history; to be able to navigate scientific concepts that explain the unity and diversity of the historical process, the specifics of the interpretation of the past by various schools and trends in historical science; to be able to use general scientific principles and methods of cognition in the analysis of concrete historical problems; to carry out the selection, analysis and interpretation of historical sources, historical facts, historical information in solving problems in the field of professional activity; to carry out a comparative analysis of historical facts, events and phenomena of public life on the basis of historical sources. **Skills:** categorical and conceptual apparatus of historical disciplines; methods of historical analysis of the main stages and patterns of development of society in different historical periods; possess the basics of analysis of historical sources and documents, possess the basics and systematization of scientific research and publications; skills of selection and study of scientific literature and its use in educational and research activities; to identify cause-and-effect relationships, common features and differences of the compared historical processes and events.
BASIC DISCIPLINES					
Be sure to select(BSS)					
1	Global Information Systems	5	Information and communication technologies (in English)	Computer networks, Production practice I	**Aim:** the study of the discipline consists in familiarizing students with modern world information systems and technologies **Content:** The discipline "Global Information Systems" is aimed at studying systems designed for storing, searching and processing information, and the corresponding organizational resources that supply and distribute information; general principles of working

					with information resources. Forms knowledge of the market of software and hardware, information products and services, the market of information resources for solving applied problems and creating information systems, commercial bases for the use of information resources. **Learning Outcome:** **Know:** methods of storing information on local media; technology of working with relational databases; basic concepts from the field of expert systems; promising areas of database development; methods of data storage and protection; areas of purpose and application of modern DBMS. **To be able to:** develop an infological data model; design a relational data model; formulate queries to an existing database using QBE and SQL; design a knowledge base. **Skills:** database development skills; techniques for using desktop DBMS; methods for ensuring data integrity.
1	World Information Resources	5	Information and communication technologies (in English)	Information technology and telecommunications	**Aim:** the purpose of studying the discipline is to familiarize students with modern world information resources **Content:** The discipline "World Information Resources" is aimed at forming students' understanding of the place and role of information resources in modern society, understanding the basic principles of creating and using information resources. The task of the discipline is to consider the peculiarities of the formation of the world market of information resources, products and services, the peculiarities of pricing and marketing of information products and services, the problems and prospects of state information policy, the peculiarities of the formation and dissemination of state information resources, legal aspects of the use of information resources, the specifics of the search for subject–oriented information in the world online databases, rules and techniques creation of own electronic information resources. **Learning Outcome:** **Know:** characteristics of the main sectors of the global information market and the use of business information in economic decision-making in government and commercial structures. **To be able to:** to organize work on access to business information on the basis of modern information technologies. **Skills:** skills for obtaining and using real information resources
2	Operating systems	5	Information and communication technologies (in English)	Application software packages, Information security and information protection	**Aim:** Training in the knowledge and skills of using modern software, obtaining knowledge about modern operating systems, their functional architecture, the resources and methods implemented by them, and resource management of computer complexes. To teach knowledge and skills in the use of modern software, to familiarize with effective algorithms for solving various scientific and technical problems. **Content:** The discipline "Operating Systems" is aimed at teaching students the concepts of building modern operating systems; features of process planning in multitasking operating systems; means of interprocess communication; methods of memory allocation; ways to implement protection in the OS. **Learning Outcome:**

					Know: concept, principles of construction, types and functions of operating systems; operating environment; machine-independent properties of operating systems. **To be able to:** install and maintain operating systems; take into account the specifics of working in a particular operating system, organize support for applications of other operating systems; use the tools of the operating system. **Skills:** skills of security and fault tolerance of operating systems; principles of building operating systems; ways of organizing support for devices, hardware drivers, network operating systems.
2	Operating systems and environments	5	Information and communication technologies (in English)	Integrated application software packages	**Aim:** Studying the theoretical principles and algorithms underlying the development of modern operating systems and shells, mastering the problems of this area, reviewing research directions, gaining skills in installing, configuring and administering operating systems of the Win32 and UNIX families. **Content:** The discipline "Operating systems and environments" is aimed at mastering by students the characteristics of operating systems and the principles of their operation, consideration of various application and system software for PCs; acquisition of practical skills of working with standard utility programs of modern operating systems. **Learning Outcome:** **Know:** the current state of the level and directions of development of computer technology and software; the main stages, methods, tools and standards of software development; the main types of operating systems, principles of resource management in the operating system; features of work in specific operating environments and shells; service software; ways of organizing, storing and processing information on a computer. **To be able to:** work in the selected environment; master a new operating system or software shell; receive information about users, processes, directories, help about system commands; exchange messages with other users; create and view directories, copy, move and delete files, manage file access mode; create, view and merge text files, perform a template search, search for files by specified properties, use pipelines and I/O redirection. **Skills:** skills of security and fault tolerance of operating systems; principles of building operating systems; ways of organizing support for devices, hardware drivers, network operating systems.
3	Computer networks	6	Global information systems	Electronics, Digital circuitry	**Aim:** Expanding the theoretical base in the subject area, and instilling practical skills in students to work with special information support capabilities. **Content:** The discipline "Computer Networks" is aimed at the formation of basic knowledge in the field of architecture, principles of construction and functioning of computer networks, communication tools, protocols and standards of networks. The objectives of the discipline are: the study of modern trends in the construction and organization of computer networks, the application of basic topologies, network models and principles of interaction of network devices at various levels of the open systems interaction model. **Learning Outcome:** **Know:** the main components of the network, types of communication lines, types of IP addresses; methods and

					means of network protection; PHP syntax; SQL syntax; types of domain and types of hosting. **To be able to:** create LAN schemes, clean PC from viruses, apply EDS, apply encryption principles, create PHP applications, create websites with databases, create databases using phpmyadmin and SQL, process form data. **Skills:** skills to create a LAN scheme, configure and administer the network, create applications in PHP, create and maintain websites, publish websites on the Internet, system and network administration.
	Information Technologies and Telecommunications	6	World Information resources	Circuit design, Fundamentals of digital electronics and microprocessor technology	**Aim:** The development of professional competencies of students necessary for the implementation of professional activities, the formation of skills and abilities to perform work related to maintenance and repair and communication systems. **Content:** The discipline "Information Technologies and Telecommunications" is aimed at studying information technologies and telecommunications, acquiring practical skills in their use and management, provides students with a set of conceptual knowledge necessary for studying modern information technologies. **Learning Outcome:** **Know:** features of monitoring and diagnostics of hardware and software systems devices; basic diagnostic methods; application of service tools and built-in test programs; hardware and software configuration of computer systems and complexes. **To be able to:** to monitor, diagnose and restore the operability of computer and communication systems; to carry out system maintenance of computer and communication systems. **Skills:** skills of control, diagnostics and restoration of computer and communication systems operability; system maintenance of computer and communication systems.
4	Data Mining	6	Fundamentals of information systems	Database systems	**Aim:**развитие skills, methods and techniques of analysis applicable to big data: methods of the Data Mining class. **Content:** The discipline "Data Mining" is aimed at studying modern methods of Data Mining; understanding the main problems arising in data analysis and ways to solve them; forms the possession of data analysis skills of various nature, which the student demonstrates and applies in his further professional activity. **Learning Outcome:** **Know:** basic models and methods of machine learning and data development. **To be able to:** adequately apply models and methods of machine learning and data development, as well as software tools in which they are implemented. **Skills:** skills of analyzing real data using the studied methods.
4	Data Science	6	Intelligent information systems and technologies	Databases in IS	**Aim:** study of modern methods of data analysis **Content:** The discipline "Data Science" is aimed at mastering the basic concepts and methods of data analytics, the specifics of their application areas and their use as a ready-made decision-making tool when working with structured and unstructured large-volume data; the formation of students' theoretical knowledge and practical skills on data analysis; the search for managerial solutions; the development of modern mathematical methods of machine learning; formation of knowledge and skills necessary for effective

					management of technical, organizational and economic systems. **Learning Outcome:** **Know:** basic concepts and terminology of big data; basic principles of using big data in enterprise architecture; basic methods of analytical processing of big data. **To be able to:** create programs for analytical processing of big data in the R language. **Skills:** skills in using Hadoop and MapReduce technologies when working with big data.
5	Database programming	6	Algorithms, data structures and programming	Computer-aided design systems, Programming technology	**Aim:** Study of database design techniques used in the development of information systems used in various fields of economiф activity; mastering the theoretical foundations of database construction. **Content:** The discipline "Database Programming" is aimed at studying the theoretical foundations of data modeling, the principles of designing and maintaining database systems (DBMS), data access control and data protection from destruction; forms practical skills in designing conceptual models, implementing databases (DB) and interfaces for working with them, and applying this knowledge. **Learning Outcome:** **Know:** methods of designing and developing applications with databases. **To be able to:** to characterize the means of ensuring the integrity and security of databases. **Skills:** possess the skills of forming SQL queries to a database interactively and from programs in a high-level language
5	Database organization and security	6	Fundamentals of information systems	Information protection	**Aim:** theoretical and practical training of students in the field of creation and application of databases in management systems, acquisition **Content:** The discipline "Organization and security of databases" is aimed at familiarizing students with the basics of organizing secure databases, their application to solve real problems, the use of database technology to solve practical problems of database development and database applications. **Learning Outcome:** **Know:** the essence and concept of information, information security and the characteristics of its components, the role and place of information security in the national security system of the Republic of Kazakhstan. **To be able to:** analyze and evaluate threats to the information security of an object, develop models of threats and violators of information security of automated systems. **Skills:** professional terminology in the field of information security, methods of forming requirements for the protection of information, skills in the selection, development and application of effective methods of protecting computer systems.
6	Computer-aided design systems	5	Database programming	Computer-adided design system, Modeling of information systems	**Aim:** Advanced training and knowledge on the development and application of computer-aided design and production systems, the possibilities and widespread use of computer-aided design systems, automation of work at the stages of design and pre-production of IPR in the life cycle of industrial products, design and drawings using computers. **Content:** The discipline "Computer-aided design systems" (CAD) is aimed at theoretical and professional

					training of students in the field of graphic representation of information and CAD, obtaining by students the skills of using modern computer technologies in the preparation of technical and technological documentation, the formation of skills of independent work. The main purpose of the study is to develop the knowledge and skills necessary for students to perform and read technical drawings, perform sketches of parts, compile design and technical documentation of production. The discipline is aimed at familiarization with the technology of designing and creating information systems (IS) using modern CASE-development tools. **Learning Outcome:** **Know:** the main types of CAD according to their purpose, their comparative properties and application features; have an idea about the ways of creating CAD for various purposes, trends in their development and the CAD market. **To be able to:** create and edit drawings and three-dimensional models of objects in CAD; fill out documentation using CAD; use CAD software tools to create industry drawings. **Skills:** skills of practical work on a specific CAD system installed on a personal computer, practical use of methods and means of automation of project work.
6	Design of information management systems	5	New information technologies	Automated information processing and management systems, Modern principles of project IT team management	**Aim:** get acquainted with the basic concepts of IS design technology. To carry out the development of IS. Learn how to analyze and model IS. To form an idea of the specification of the functional requirements for the IS. **Content:** The discipline "Design of information management systems" is aimed at familiarization with the basic ideas and methods underlying the design of modern information management systems; teaching students the principles of building functional and information models of systems, analyzing the results obtained; familiarization with the tools to support the design of information systems. **Learning Outcome:** **Know:** modern practical approaches to the problem of designing information systems in management; to study the composition and content of the stages and stages of design; to get acquainted with the technology of design inspection of the management object. **To be able to:** to implement distributed algorithms for information processing; to choose the technology of distributed information, to choose the data model of a distributed system; to organize the security of distributed data. **Skills:** modern technologies for designing information systems, CASE-tools for designing information systems.
7	Programming technology	5	Database programming	Programming in the PHP environment, Internet technologies, Production practice II	**Aim:** teaching students a systematic view of the principles of building and designing software systems. Familiarization with the methods of analysis, design, implementation and testing of software systems necessary for software development, as well as familiarization with existing, existing principles and technologies. **Content:** The discipline "Programming technology" is aimed at practical mastering of general principles and modern methods of programming technology; theoretical foundations and modern information technologies of analysis, design and software development are studied;

					skills to design and develop various types of software based on an object-oriented approach are formed; skills to develop programs of medium complexity; also have an idea of class libraries and tools used in software development. **Learning Outcome:** **Know:** basics of algorithmization of tasks, types and data structures used in the selected language, master the basic operators of the programming language, routines, built-in functions, procedures and functions, dynamic structures, basics of programming technology, software design methods, programming style, debugging and testing methods, programming algorithms for data processing using pointers, programming with using graphic editors. **To be able to:** develop block diagrams of various algorithms, organize the necessary data structures depending on the requirements of the task, choose the right methods for solving problems and develop programs using language tools, write programs in a good style, debug and test programs, compile high-quality software documentation. **Skills:** skills to develop and debug programs in one of the professional programming languages; to solve problems using standard information technologies in a PC environment.
7	Web programming	5	Algorithms, data structures and programming	Web programming and the basics of Web design	**Aim:** The goal is to master practical techniques of Web design and Web programming. **Content:** The discipline "Web programming" is aimed at mastering the basic skills of algorithmization, web programming using the PHP language, building web pages using HTML, as well as a general understanding of the relationship between the main technologies in the field of programming and the web; understanding the problems, goals and objectives of programming; knowledge of modern programming technologies (structural, modular programming); knowledge of debugging and testing methods of programs; ability to develop basic program documents; ability to use application programming systems; to give an idea of the trends in the development of modern programming methods; formation of the scientific outlook of the future specialist. **Learning Outcome:** **Know:** technologies for developing static web sites; techniques for using multimedia (graphics, video, animation) on web pages; client-side software used to create web pages. **To be able to:** design and develop the site structure; use the HTML hypertext markup language and cascading style sheets (CSS) to create web pages; develop scripts in the JavaScript programming language. **Skills:** web site creation skills.
8	Electronics	5	Physics, Computer networks	Modern information systems and telemedicine	**Aim:** "Electronics" to study the principle of operation, description, operational parameters and application of semiconductor devices and devices. Expansion of the concept of the possibilities of "electronics", identification and consolidation of theoretical materials related to the laws, principles of electrical conductivity of various materials. **Content:** The discipline «Electronics» is aimed at mastering students' knowledge about the purpose, fields of application, physical principles of operation, methods of physical and mathematical modeling and basic

					technical parameters of semiconductor devices and microelectronic technology, the principles of their operation and purpose. Provides basic training in electronics necessary for the operation of existing and the development of new effective electrical and electronic systems, automation devices, transmission technology, information reproduction. **Learning Outcome:** **Know:** purpose, scope and physical principles of operation of the main electronic systems and devices; the history of the development of electronics and modern microelectronics. **To be able to:** use reference literature to select elements of electronic circuits, make the necessary calculations, make a mathematical description of the functioning of devices and determine their characteristics. **Skills:** calculation and design skills of electronic devices, circuits and devices of various functional purposes in accordance with the terms of reference and with the use of design automation tools, voltage measurement on electronic circuits (using a digital voltmeter, oscilloscope, etc.); the use of materials and tools from the field of electronics in cases of simple maintenance, installation and repair work (manual tools, various soldering techniques)
8	Fundamentals of digital electronics and microprocessor technology	5	Information technology and telecommunications	Special purpose information systems	**Aim:** formation of students' knowledge of the basics of electronics methods of design and calculation of electronic devices. **Content:** The discipline "Fundamentals of digital Electronics and Microprocessor technology" is aimed at studying the basics of designing digital devices based on basic logic elements; mastering the mathematical apparatus of describing algorithms for digital devices; studying the basic concepts and principles of microprocessor technology, gaining knowledge about the design and functioning of microprocessors and microprocessor systems. **Learning Outcome:** **Know:** the basic concepts of the principles of operation of integrated and microprocessor technology, the structure and manufacturing technology of integrated circuits, various aspects of the application of the integrated element base of electronics in practice. **To be able to:** apply knowledge in determining the main characteristics and parameters of electronic devices and microcircuits. **Skills:** skills of constructing the simplest electronic circuits on electronic devices and microcircuits, skills of practical application of measuring equipment.
9	Circuit design	5	Physics, Information technology and telecommunications	Architecture of computer systems	**Aim:**подготовка специалистов к производственной и исследовательской работе в области создания и эксплуатации средств измерения, электронных измерительных приборов и элементов систем автоматического управления технологическими установками. **Content:** The discipline "Circuit design " is aimed at mastering the basics of building digital circuits and knowledge of the principle of operation of the main components of digital devices, the functionality of frequently used microchips of small and medium-sized integrations in modern computers, the structure and organization of microprocessors and microprocessor kits, conditional graphical designations of elements, trends

					and prospects for the development of computer technology, as well as the basics of programming. **Learning Outcome:** **Know:**общие information about the element base of circuitry (resistors, capacitors, diodes, transistors, microchips, optoelectronics elements), determination of parameters of semiconductor devices and system engineering elements. **To be able to:** determine the parameters of semiconductor devices and system engineering elements. **Skills:** skills in designing functional nodes (decoders, encoders, multiplexers, demultiplexers, digital comparators, adders, triggers, registers, counters).
9	Digital circuitry	5	Computer networks	Архитектура информационных систем	**Aim:** reflects the current state of physics and its applications. It naturally combines macro and microscopic approaches, each section reflects internal logical connections. **Content:** The discipline "Digital circuitry" is aimed at the formation of competencies in the main sections of circuit engineering, the study of the circuit fundamentals of the construction of both individual elements and computing systems as a whole, mastering methods and means of analysis and development of hardware components of computer technology, as well as familiarization with the basic principles of circuit implementation of digital devices; consideration of the principles of interaction of digital circuits; the study of methods synthesis of combinational circuits on digital microcircuits; consideration of examples of the implementation of digital devices. **Learning Outcome:** **Know:** general information about the element base of circuitry (resistors, capacitors, diodes, transistors, microchips, ontoelectronics elements), functional nodes (decoders, encoders, multiplexers, demultiplexers, digital comparators, adders, triggers, registers, counters), storage devices for basic BIS/VLSI, logic elements and logic design in the bases of microcircuits, digital-to-analog and analog-to-digital converters. **To be able to:** determine the parameters of semiconductor devices and system engineering elements. **Skills:** skills in selecting types (families) of digital elements according to specified parameters; design and simulation of basic electrical circuits of digital devices; work with software packages of virtual laboratories and real measuring instruments.
10	Software information systems	6	Fundamentals of information systems, Integrated application software packages	Mathematical methods of information processing	**Aim:** The software of personal computers, the study of the processes of PC computers, the development of their algorithmization. **Content:** The discipline "Software information systems" is aimed at forming ideas about the direction of development of computer software, knowledge of the principles of algorithm construction, data types and basic constructions of high-level programming languages, basic programming techniques, as well as the ability to work in modern development environments, make block diagrams of algorithms, create programs in a high-level structural programming language level. **Learning Outcome:** **Know:** the process of development and support of software products; theoretical foundations of version control systems; automatic testing environments; existing approaches to software verification.

					To be able to: modernize the information system based on a detailed study of its subject activities; organize control of the source code generated during software development; draw up software specifications; choose verification methods. **Skills:** modern tools (CASE-tools) for designing automated systems; practical skills in developing the architecture of a software product; skills in finding the causes of inconsistencies between artifacts and processes formed during software development; skills in describing the results of software verification.
10	Design and development of IS software	6	Computer-aided design systems	Modern principles of project IT team management, Computer technologies of three-dimensional graphics and animation	**Aim:** to familiarize students with the principles, methods and tools of software design and related software development tools. **Content:** The discipline "Design and development of IS software" is aimed at providing students with knowledge and skills in the field of design, testing, debugging, implementation and maintenance of computer hardware software using modern CALS technologies and CASE tools. **Learning Outcome:** **Know:** software design principles are concrete embodiments of these principles when programming on the Java platform, the most widely used in software development at the present time and related software development tools. **To be able to:** design and develop software on the Java platform in various application areas using modern development tools and tools. **Skills:** the skills of developing IP software and applying the acquired knowledge in practice.
11	Architecture of computer systems	5	Circuit design	3D modeling, Administration of information systems	**Aim:** it consists in preparing a specialist for activities related to the operation and maintenance of equipment and equipment containing modern computing equipment. **Content:** The discipline "Architecture of computer systems" is aimed at studying the architecture of computer systems, interaction and process control, principles of construction of hardware and software and their interaction in the process of input, processing and output of information in modern computer systems. **Learning Outcome:** **Know:** the concept of computer architecture, principles of organization of multiprocessor and multi-machine computing systems, directions of development of computers with traditional, parallel and non-traditional architecture, reasons for building data transmission networks, protocols and layered models of protocol description and implementation. **To be able to:** formulate technical requirements taking into account the functions performed by computing systems and justify a rational architecture, determine the tools for the performance of computing systems, configure the computer to work in a local network and the Internet. **Skills:** skills of architecture selection and integration of modern computers, systems and networks; system administrator.
11	Architecture of information systems	5	Цифровая схемотехника	Методы обработки эксперементальных данных, Основы компьютерного моделирования	**Aim:** the study of the functioning and basics of creating information systems based on computer network architectures. **Content:** The discipline "Architecture of information systems" is aimed at mastering knowledge about the principles of building open information systems,

					architecture, models and resources of information systems; mastering and systematizing theoretical knowledge in the field of architectures of modern information systems, forming general theoretical ideas and concepts about the organization and principles of construction, models of functioning of information systems in various fields, and acquiring practical skills and work skills in the field of design and development of information systems. **Learning Outcome:** **Know:** fundamentals of the ARIS methodology; features of the ERP (Enterprise Resource Planning) standard as the basis of modern ISPs; principles of implementation of ISPs based on computer communication technologies; modern models of distributed computing and principles of implementation of the unified information space of the enterprise. **To be able to:** independently develop structural and functional models of business processes in the IDEF0 methodology; independently model the deployment of business processes over time in the IDEF3 standard. **Skills:** skills of multilevel modeling of business processes for designing the architecture of an information system designed for their management and automation; skills of working in CASE-modeling tools of business processes
12	Information security and information protection	6	Operating systems	Theory of automatic control, IT project Management	**Aim:** Formation of students' knowledge system in the field of information security and application of information security methods in practice. **Content:** The discipline "Information security and information protection" is aimed at forming a system of knowledge in the field of information security and the practical application of methods and means of information protection in the process of its processing, transmission and storage using computer tools in information systems. **Learning Outcome:** **Know:** means and methods of intrusion prevention and detection; technical channels of information leakage; possibilities of technical means of information interception; methods and means of information protection from leakage through technical channels and monitoring the effectiveness of information protection; organization of information protection from leakage through technical channels at informatization facilities. **To be able to:** use regulatory documents on countering technical intelligence; evaluate the quality of the finished software. **Skills:** methods and means of technical protection of information; methods of calculation and instrumental control of indicators of technical protection of information.
12	Information protection	6	Database organization and security	Programming in Python 3	**Aim:** Formation of students' knowledge and skills in the protection of computer information with the use of modern software and hardware. **Content:** The discipline "Information protection" is aimed at studying modern problems in the field of information security in information systems, as well as studying the development of the information security program of the Republic of Kazakhstan. Practical issues of building multi-level protection systems in information systems are considered: identification and authentication methods,

					cryptographic algorithms and security models of IS subsystems. **Learning Outcome:** **Know:** the main requirements of the regulatory and legal framework of information security for the protection of information from unauthorized access, software tools of hidden information impact, information leakage through technical channels; information security objectives, the main trends and directions of the formation and functioning of a comprehensive information security system. **To be able to:** apply methods for determining the causes, types, sources and channels of leakage, distortion of information. **Skills:** skills in applying methods and forms of information protection.
13	Database systems	6	Data Mining	Database administration in the MS SQL Server platform	**Aim:** Students acquire theoretical foundations and practical skills in designing and maintaining databases by means of specific DBMS. To teach the basics of database design methodology: conceptual, logical and physical design on the example of hierarchical, network and relational databases. Outline the basics of description languages, database manipulation, as well as description languages, database manipulation, and query creation languages. To give an idea of the architecture, the main approaches to the design and application areas of database systems, promising models of databases and information management using Web technologies. **Content:** The discipline "Database Systems" is aimed at gaining knowledge about the stages of database development, about promising areas of DBMS development; acquiring skills in the field of database design, development and administration; forming students' conceptual ideas about the basic principles of database construction, database management systems, mathematical models describing databases, as well as about the main DB implementation technologies. **Learning Outcome:** **Know:** principles of designing a database structure that meets the requirements of AIS functionality, modern technologies for developing database applications. **To be able to:** to use modern tools and programming technologies, to develop the functionality of an automated information system, to develop software components for working with databases, to develop the user interface of an automated information system. **Skills:** skills of working with various DBMS and their administration, methods of designing the database structure, ADO technology.NET and Entity Framework for accessing the database of various DBMS.
13	Database concept	6	Data Science	Theory of automatic control	**Aim:**Организации баз данных и систем управления базами данных, принципов построения, функционирования и оценки характеристик баз данных и их систем управления, приобретение студентами знаний и навыков в области проектирования и использования баз данных. **Content:** The discipline "Database Concept" is devoted to the study of theoretical foundations, practical methods and tools for building databases, as well as issues related to the lifecycle, support and maintenance of databases (DB). The basic concepts of databases, methods of their classification, principles of organization of data structures and corresponding types of database

					management systems (DBMS) are considered. The means and methods of data storage at the physical level are being studied. The relational data model corresponding to this DBMS model, the standard query language for relational DBMS - SQL, methods of representing complex data structures by means of a relational DBMS are studied in detail. The issues of organizing collective access to data are considered, the concepts of referential integrity and semantic integrity of data, transactions, blocking (capture), deadlock, related problems and methods of their solution are introduced. An overview of specialized hardware and software designed to build an economic-oriented database is given. **Learning Outcome:** **Know:** database design methods based on the normalization process and entity–relationship diagrams, database design methods based on the normalization process and entity–relationship diagrams. **To be able to:** define the domain, design a relational database, define integrity constraints. **Skills:** skills of working with modern DBMS, developing data models, developing database applications.
14	Modeling of information systems	5	Computer-aided design systems	IT project management	**Aim:** This discipline is an introduction to the basic principles of modeling, as well as the construction of static and dynamic models using modern software tools. Studying the basics of modeling will allow students to form the necessary amount of special knowledge in the field of modeling methods and analysis of systems. **Content:** The discipline "Modeling of information systems" is aimed at studying the basics of the theory of modeling information systems and the processes occurring in them, methods of developing computer models, methods and means of constructing mathematical models and processing the results of computational experiments, as well as forming an idea of working with modern instrumental modeling systems. **Learning Outcome:** **Know:** structure, composition and properties of information systems, methods of system analysis and modeling of information systems. **To be able to:** use the tools of information description of objects and processes in accordance with the training profile, apply analysis and modeling methods to solve applied problems, build models of systems of various classes using Visual UML and Bpwin tools. **Skills:** skills of collecting the necessary information, systematization and generalization, application of the acquired knowledge in modeling information systems.
14	Fundamentals of computer modeling	5	Architecture of information systems	Database administration in the MS SQL Server platform	**Aim:** Mastering the theory, methods and technology of computer modeling in the study, design and application of information systems. **Content:** The discipline "Fundamentals of computer modeling" is aimed at mastering the theory, methods and technology of computer modeling in the study, design and application of information systems. As a result of studying the discipline, students should: know the typical classes of models and methods of modeling complex systems, the apparatus of the Monte Carlo method, the principles of constructing models of the processes of functioning of complex systems, methods of formalization and algorithmization; be able to use a

					systematic approach in the research, design and operation of information systems, develop modeling algorithms and implement them using algorithmic languages and modeling application software packages, automate the design process using modeling databases; master the skills of using computer modeling tools; have competencies about the purpose of modeling tools, hardware and software, as well as in the development of object models for various purposes. **Learning Outcome:** **Know:** typical classes of models and methods of modeling complex systems; principles of the system approach in system modeling; types of system modeling; typical mathematical schemes of system modeling: the sequence of development and computer implementation of system models. **To be able to:** apply knowledge and skills to build models of information systems using standard mathematical schemes, use system models to conduct simulation experiments with variations of different source data. **Skills:** methods and technologies of building models of systems, as well as their implementation with the help of information technologies.
15	Programming in PHP environment	5	Programming technology	IT project management	**Aim::** Currently, it is one of the most popular languages for implementing web applications. This course is devoted to the study of its basics. The emphasis is on the practical application of the acquired skills. The PHP language was created to solve a specific practical problem in the Internet environment. Familiarity with the PHP language, development of web application design and programming skills. **Content:** The discipline "Programming in the PHP environment" is aimed at obtaining theoretical knowledge and mastering practical techniques of Web programming in PHP, familiarization with the principles of functioning of the global computer network Internet, general approaches to the search and selection of information on the network; are trained in the development of Web pages based on an integrated approach; are trained in programming on the Internet on the client and server side; training in the use of databases in the development of Web projects. **Know:** purpose, functions, classification of PHP programming, principles of operation of Internet services; principles of organization and operation of technologies for processing web information and the Internet. **To be able to:** create static and dynamic pages, create a conceptual proposal in WEB pages using technologies to create a website and publish it on the Internet. **Skills:** programming skills and client-server technologies.
15	Programming in Python 3	5	Information protection	Modern principles of project IT team management	**Aim:** The main purpose of this training course is to familiarize with the object-oriented Python programming language, the syntax of the language, technology and methods of programming in the Python environment, teaching practical programming skills in Python to solve typical problems of mathematics and computer science. **Content:** The discipline "Programming in Python 3" is aimed at gaining knowledge and skills in creating modern cross-platform applications in Python 3 using the PyQt5 universal graphics platform, interacting with the

					Internet, office documents, databases, graphics, multimedia and printing. **Know:** paradigms, architectural features, semantics and syntax of the Python programming language, purpose, structure and properties of the basic data structures and constructions of the Python language, modules and packages for solving various applied and scientific problems. **To be able to:** develop mathematical methods and algorithms for solving various problems, use integrated development environments for the development and debugging of programs. **Skills:** skills in reading, writing, debugging and testing programs in a high-level programming language in an integrated development environment.
16	Web programming and the basics of Web design	3	Web programming	Production practice III	**Aim:** Expanding the theoretical base in the subject area, and instilling practical skills in students to work with special information support capabilities. **Content:** The discipline "Web programming and the basics of Web design" is aimed at the formation of skills and abilities that ensure successful activity in the field of modern Web programming and practical use of the basics of web design, graphic programs; common web browsers; learning HTML, CSS, JavaScript, technology for creating and editing Internet advertising objects (banners, buttons, flash objects); the basics of web design; technologies for creating hypertext documents; techniques for creating and optimizing graphic elements of the site; client web programming technologies; technologies for creating web applications; HTML document management tools. **Know:**основы web-дизайна; технологию создания гипертекстовых документов; приемы создания и оптимизации графических элементов сайта; клиентские технологии web-программирования; технологии создания web-приложений; средства управления HTML – документами. **To be able to:** to create software applications based on modern WEB technologies; to apply hypertext markup languages and CSS to the creation of web documents; to develop navigation; to layout a website taking into account ergonomics (web-usability); to develop dynamic elements; to create interactive web applications. **Skills:** skills in the field of mastering technologies, principles of organization and functioning of the Internet, as well as designing applications for use in the Internet environment.
16	Internet technologies	3	Programming technology	Modern principles of project IT team management	**Aim:** formation of students' knowledge and skills in the field of combining computers into local networks, combining local networks into a global telecommunication network Internet, data exchange protocols used on the Internet; acquisition by students of skills in developing Internet resources using hypertext markup language, cascading style sheets, client and server scripting programming languages. **Content:** The discipline "Internet Technologies" is aimed at mastering technologies, principles of organization and functioning of the Internet, as well as teaching methods for designing applications for use in the Internet environment. As a result of studying the discipline, students should have an idea of: current prospects and trends in the development of the Internet; Know: the principles of organization, functioning of the

					Internet and information processing technologies used on the Internet; To be able to: create software applications based on modern Internet technologies. **Know:** basics of web design, graphic programs; common web browsers, HTML, CSS, JavaScript, technologies for creating and editing Internet advertising objects (banners, buttons, flash objects). **To be able to:** to analyze technical, communication, software methods for solving problems of organizing work with users using the Internet. **Skills:** to analyze technical, communication, software methods for solving problems of organizing work with users using the Internet.
PROFILING DISCIPLINES					
Components of choice (CC)					
1	Intelligent information systems and technologies	5	Information and communication technologies (in English)	3D modeling, Computer graphics	**Aim:** to provide students with theoretical and practical knowledge on the basic concepts of intelligent information systems and the possibilities of their use in various subject areas. **Content:** The discipline "Intelligent information systems and technologies" introduces students to the problems and areas of use of intelligent information systems and technologies, highlights theoretical and organizational and methodological issues of the construction and functioning of knowledge processing systems, provides instilling skills of practical work on the design of knowledge bases; promotes theoretical and practical knowledge and skills of using neural network technologies for information processing.**Learning Outcome:** **Know:** the main types and procedures of information processing, models and methods for solving information processing problems (data analysis, artificial intelligence, image processing); the theory of artificial intelligence technologies. **To be able to:** solve applied issues of intelligent systems, static expert systems, real-time expert systems. **Skills:** information technology skills of information retrieval and ways of their implementation, data mining technologies, intelligent decision support technologies, building knowledge representation models, approaches and techniques for solving artificial intelligence problems, information knowledge models, knowledge representation methods, knowledge engineering methods.
1	New information technologies	5	Information and communication technologies (in English)	Graphic tools in EIS	**Aim:** on the basis of expanding the basic knowledge of students to improve the information culture and creative abilities of students. **Content:** The discipline "New Information Technologies" is aimed at familiarizing students with the basics of modern information technologies, trends in their development, in teaching students the principles of building information models, analyzing the results obtained and applying new information technologies in professional activities. **Learning Outcome:** **Know:** principles of using modern information technologies in professional activity; sources of information and principles of working with them; principles and possibilities of using information technologies in practice. **To be able to:** analyze information sources; navigate the information flow; use information tools to gain new knowledge.

					Skills: skills of acquiring and using new knowledge and skills with the help of information technology.
2	Application software packages	5	Operating systems	Computer graphics	**Aim:** Familiarization of students with software that can be used in the preparation of printed publications on a computer, as well as with the technical means of integrated publishing systems, practical computer development, obtaining practical skills in working with desktop publishing systems. **Content:** The discipline "Application software packages" is aimed at familiarizing students with the variety, structure, functioning and features of the development of application software packages; with the theoretical foundations of the development of effective algorithms and modern software development tools for various subject areas; provides skills for the practical application of various application software packages in professional activities. **Learning Outcome:** **Know:** the concept of an application software package; the stages of development of application software packages; the history and stages of the development of printing in Kazakhstan; the concept of office application software packages; the concept of desktop publishing systems; the concept and purpose of technical means of publishing systems; the basics of working with the Adobe Page Maker publishing system. **To be able to:** classify software products depending on their purpose; classify application software packages into types; create texts with publications in AdobePageMaker; work with objects in AdobePageMaker; format texts in AdobePageMaker. **Skills:** skills of creating publications using Microsoft Word software with layout and layout capabilities; creating documents in Microsoft Office Publisher; techniques and methods of creating booklets and layout layouts of work in Microsoft Office Publisher; work in publishing systems.
2	Integrated application software packages	5	Operating systems and environments	Information systems software	**Aim:** familiarization of students with the basics of modern information technologies, trends in their development, in teaching students the principles of building information models, analyzing the results obtained, using modern information technologies in professional activities. **Content:** The discipline "Integrated application software packages" is aimed at the formation of skills for the effective use of integrated control systems in the development, modification, adaptation, configuration and maintenance of software for automated information systems. The objectives of studying the discipline: to give an idea of the composition and structure of the package, the types of interfaces of the package, the functional and system content of the package, language tools, the possibilities of integrating the package with other programs; to form the ability to configure automated information systems by means of the package; to teach how to develop software modules for data processing. **Learning Outcome:** **Know:** interfaces of integrated office application development environments; application software development tools. **To be able to:** to form methods for debugging programs and processing execution errors; basic technologies for

					obtaining data from external sources. **Владеть навыками**: development, testing and documentation of application software; programming access to external data.
3	Modern information systems and telemedicine	5	Electronics	Database administration in the MS SQL Server platform	**Aim:** To form students' knowledge about the essence and significance of health informatization in general, modern information technologies for providing the medical and diagnostic process, management in healthcare and biomedical research. **Content:** the discipline "Modern information systems and telemedicine" is aimed at the formation of students' knowledge about the essence and significance of healthcare informatization in general, modern information technologies for providing the medical and diagnostic process, management in healthcare and biomedical research; provides information about the types and classification of modern medical information systems; studies the principles of obtaining, entering, storing, searching, processing and analysis of biomedical information with the help of modern information technologies and its protection. **Learning Outcome:** **Know:** application of modern information technologies in medicine, medical science and healthcare; general structure, software and hardware for obtaining, entering, storing, searching, processing and analyzing biomedical information and its protection; types and classification of modern information systems and technologies. Be able to implement and use modern information and telemedicine systems. **Skills:** skills of using modern information and telemedicine systems for processing medical and biological information.
3	Special purpose information systems	5	Fundamentals of digital electronics and microprocessor technology	Modern principles of project IT team management	**Aim:** to provide students with basic knowledge, terminology, outlook and confidence that will help them understand and evaluate the multidimensional role of information systems (IS). **Content:** The discipline "Special purpose Information systems" is aimed at obtaining students theoretical knowledge and practical skills in organizing automated processing of economic information in various enterprises and organizations. **Learning Outcome:** **Know:** the main approaches to the design of special-purpose information systems; problems of choosing a special-purpose IP in accordance with the objectives of the organization; problems of standardization and unification. **To be able to:** apply system and application software to solve practical problems. **Skills:** the skills of setting up and using special-purpose information systems in practical application and developing individual information products to solve the functional tasks of the organization.
4	Computer graphics	5	Intelligent information systems and technologies, Application software packages	Production practice III	**Aim:** the study of modern methods of creating computer graphics and the formation of skills for their application in professional activities. **Content:** The discipline "Computer Graphics" is aimed at mastering the mathematical foundations, algorithms and methods of functioning of modern graphics systems. The main objectives of the discipline are: the study of trends in the construction of modern graphic systems and standards in the field of their development; the

					development of technical and software tools of computer graphics; the study of image processing and editing processes; the formation of students' skills necessary for the synthesis and editing of images using computer graphics. **Learning Outcome:** **Know:** the basic concepts of three-dimensional graphics; the main features of the 3D Studio MAX program. **To be able to:** create a stationary three-dimensional scene in accordance with the rules of artistic and technical design, taking into account color and texture solutions; create a simple animated three-dimensional scene using the 3D Studio MAX program. **Skills:** skills of creating 3D graphics in 3D Studio MAX, Autodesk 3ds Max and Autodesk Maya 3d, graphic and multimedia design development.
4	Graphic tools in EIS	5	New information technologies	Preparation of theses	**Aim:** It is the assimilation of the mathematical foundations, algorithms and methods of functioning of modern graphics systems based on a PC. **Content:** The discipline "Graphic tools in EIS" forms a complex of knowledge and practical skills necessary for the effective use of graphic tools in the development and technical / maintenance of information systems. **Learning Outcome:** **Know:** modern graphic systems, understand their capabilities and belonging to existing subject areas, terminology, basic concepts, tools and algorithms for the representation, storage and processing of various types of graphic information. **To be able to:** apply graphics systems to solve various tasks, choose the tools of modern graphics tools and computer technologies to solve economic and other problems. **Skills:** the skills of using modern PP packages and software tools used to work with raster, vector and 3D graphics.
5	Mathematical methods of information processing	4	Mathematics I, Mathematics II, Information systems software	Undergraduate practice	**Aim:** Formation of a system of knowledge, skills and abilities related to the peculiarities of mathematical methods of presenting and processing information as a basis for the development of key competencies and the basis for the development of professional competencies. **Content:** The discipline "Mathematical methods of information processing" is aimed at acquiring systematic knowledge in the field of information processing technology, skills of effective use of mathematical apparatus, familiarization with methods of mathematical information processing. **Learning Outcome:** **Know:** basic methods of mathematical information processing. **To be able to:** to search and collect information necessary to solve a specific problem; to determine the type of mathematical model for solving practical problems; to use mathematical modeling methods in solving practical problems; to use basic methods of statistical processing of experimental data. **Skills:** mathematical information processing skills.
5	Methods of processing experimental data	4	Architecture of information systems	Preparation of theses	**Aim:** as a result of mastering this discipline, the student acquires knowledge, skills and abilities that ensure the achievement of the goals of the main educational program. **Content:** The discipline "Methods of experimental data processing" is aimed at the formation of fundamental

					knowledge among students about the principles of using mathematical models, methods and algorithms to choose effective solutions for solving various organizational and technical problems using modern computer science and computer technology. **Learning Outcome:** **Know:** conceptual provisions in the field of data processing. **To be able to:** apply mathematical approaches in the development of experimental processing software. **Skills:** skills related to the use of modern computer tools for modeling, processing and analysis of observational data.
6	3D modeling	4	Intelligent information systems and technologies, Architecture of computer systems	Preparation of theses	**Aim:** Formation and development of students' practical competencies in the field of 3D technologies. Increasing cognitive motivation and developing elements of engineering thinking of students in the process of acquiring knowledge, skills and 3D modeling skills and developing socially significant creative projects. **Content:** Formation and development of students' practical competencies in the field of 3D technologies. Increasing cognitive motivation and developing elements of engineering thinking of students in the process of acquiring knowledge, skills and 3D modeling skills and developing socially significant creative projects. **Learning Outcome:** **Know:** basic concepts of modeling theory, classification of models and areas of their use, modeling tasks; basic modeling tools used in the process of designing systems at different stages of project detail; methods of modeling and analysis of systems; principles of model construction. **To be able to:** perform an analysis of the system or process under study; reasonably choose a modeling method; build an adequate model of the system or process using modern computer tools; interpret and analyze the simulation results. **Skills:** the main criteria for evaluating the obtained modeling results; work experience and the use of scientific and technical information in the course of modeling.
6	Computer technologies of three-dimensional graphics and animation	4	Проектирование и разработка программного обеспечения ИС	Preparation of theses	**Aim:** to interest students, to show the possibilities of modern software tools for processing graphic images. **Content:** The discipline "Computer technologies of three-dimensional graphics and animation" is aimed at mastering deep theoretical knowledge and practical experience in the field of applied graphics systems; studying modeling technology and obtaining basic 3D modeling skills. **Learning Outcome:** **Know:** modern trends in the development of graphics principles of constructing graphic images on raster an vector information output devices; about working in 3d MAX, in Maromedia Flash MX. **To be able to:** independently create graphics, animation simulate space and objects in it (movement and statics) present models in algorithmic form; **Skills:** skills of using interactive computer graphics i professional activities; skills of working with moder packages of three-dimensional graphics and animation.
7	Administration of information systems	4	Architecture of computer systems	Production practice III	**Aim:** Studying the basics of system and network administration, Web administration, information security

					administration of computer networks, functional and architectural features of the Internet, TCP/IP protocol stack, basic protocols and network services, principles of configuration, configuration, maintenance and administration of information networks and network operating systems. **Content:** The discipline "Administration of information systems" is aimed at the formation of students' information culture of future specialists, adequate to the current level and prospects of development in the field of administration of information systems, as well as the development of knowledge on information, organizational and software services administration, operation and maintenance of information systems in various areas of management at all levels of the subject area. **Learning Outcome:** **Know:** basic information about the formation and functioning of management services; issues of ensuring information security and the functioning of information administration systems; functions and responsibilities of the network administrator's managerial decision-making in matters of preventing and neutralizing threats to the functioning of information systems. **To be able to:** use programming languages and systems to automate information processes for collecting information necessary for processing and making managerial decisions; work with general-purpose software, search for information using search rules (query construction) in databases, computer networks of normative reference information; apply instrumental software and mathematical models in the decision-making process, formulation and formalization of tasks of expert decision support, analysis and interpretation of the results obtained. **Skills:** management skills and methods of information processes and management decision-making technologies for the functioning of management information systems according to the requirements for software at various levels of administrative management, skills in the practical use of modern software and computer technology and peripheral devices.
7	Automated information processing and management systems	4	Design of information management systems	Preparation of theses	**Aim:** Development of scientific foundations for the construction of automated information processing and management systems. Development of theoretical foundations of algorithmization of functional tasks of management and processing of information, analysis of the effectiveness of automated control systems. Development of fundamentally new methods of organizing and maintaining an information database and data banks. Development of methods for converting and transmitting information in automated information processing and management systems. **Content:** The discipline "Automated information processing and management systems" is aimed at the formation of knowledge in the field of selection, implementation and operation of automated information processing and management systems; consideration of modern automation software products and advanced technologies; development of automated information processing and management systems. **Learning Outcome:** **Know:** the concept of automated information systems;

					characteristics of information systems, types of information systems, purpose of information systems; structure of AIS, processes and stages of the AIS life cycle; principles and stages of information system design; requirements for basic resources for the implementation of an information system project. **To be able to:** select the necessary hardware and software tools suitable for the specific needs of the information system; analyze, model and design information systems of various architectures. **Skills:** skills in the field of selection, implementation and operation of automated information processing and management systems; introduction of modern automation software products and advanced technologies; development of automated information processing and management systems.
8	IT project management	5	Information security and information protection, Modeling of information systems, Programming in PHP environment	Undergraduate practice	**Aim:** formation of theoretical knowledge, skills and practical skills for solving problems arising in the management of IT projects. **Content:** The discipline is aimed at studying the features of the IT project management process. formation of students' theoretical knowledge, skills and practical skills for solving problems arising in the management of IT projects; development of skills and practical skills for effective management of IT projects, ensuring the achievement of results defined in the project in terms of the composition and scope of work, cost, time, quality and satisfaction of project participants. **Learning Outcome:** **Know:** basic terminology related to project management; principles of development of project concepts and goals; principles of project risk management; principles of project time and cost management; methods of project implementation control; features of IT project management. **To be able to:** plan the project at all phases of its life cycle; calculate the project schedule using calendar network planning tools; manage interactions in the project; ensure effective change management; use software products for project management purposes. **Skills:** skills of project planning, project analysis, monitoring the progress of projects.
8	Modern principles of project IT team management	5	Programming in Python 3, Internet technologies, Special purpose Information systems	Preparation of theses	**Aim:** It is the acquisition of theoretical knowledge related to understanding the role of the project in the organization, and the formation of competencies necessary for the effective implementation of the project management process, project management techniques. **Content:** The discipline is aimed at obtaining theoretical knowledge related to understanding the role of the project in the organization, and the formation of competencies necessary for the effective implementation of the project management process, project management techniques; mastering modern methods and tools for managing collective software development, organizing the development of software products by a team of developers, planning and meeting deadlines for the development of software systems in conditions of limited resources, organization of feedback during the development of a software product. **Learning Outcome:** **Know:** the role of the project in the organization in the formation of competencies necessary for the effective implementation of the project management process and

					project management techniques; **To be able to:** organize the development of software products by IT project teams, plan and comply with the deadlines for the development of software systems in conditions of limited resources. **Skills:** skills in organizing feedback during software product development, modern methods and tools for managing collective software development.
9	Database administration on the MS SQL Server platform	5	Database systems, Information systems architecture, Modern information systems and telemedicine	Production practice III	**Aim:** building a conceptual database model and developing a database structure. **Content:** The discipline "Database administration on the MS SQL Server platform" is aimed at mastering the skills of developing and creating databases on the MS SQL Server platform that meet all the requirements of consistency, security and performance, familiarize yourself with the MS SQL Server administration tools that are designed to solve issues of developing and creating productive relational databases, as well as their further maintenance and analysis. **Learning Outcome:** **Know:** tasks and principles of database administration in the MS SQL Server platform, structured SQL query language. **To be able to:** use tools that support database administration in the MS SQL Server platform. **Skills:** skills of database development and administration in a modern DBMS environment using the SQL language.
9	Theory of automatic control	5	Information security and information protection, Database concept	Preparation of theses	**Aim:** preparation of a highly qualified bachelor who deeply knows the basics of the theory of automatic control and is able to carry out research and calculation work on the creation and commissioning of automatic systems with extensive use of modern computer technology. **Content:** The discipline "Theory of automatic control" is aimed at forming students' solid knowledge about the general principles of construction and laws of functioning of automatic control systems, basic methods of analysis and synthesis of linear control systems under deterministic external influences. **Learning Outcome:** **Know:** automatic devices as a means of controlling operating modes, protection and regulation of electrical engineering and electric power facilities; physical phenomena in automatic devices and the basics of the theory of automatic devices; experimental research tasks; theory and experimental technique in the design, testing and production of automatic devices. **To be able to:** apply the theory and technique of experiment in the design, testing and production of automatic device systems. **Skills:** skills of experimental research, theory and experimental technique.

LIST
elective courses for the educational program
In the specialty 6B06102 «Information system»
Duration of training: Full - time 4 years

№	Name of discipline	Cod of discipline	Number of credits	Semester
	1. General education disciplines			
1	**Компонент по выбору 1**			
	Module of economic and legal knowledge		5	
	Fundamentals of market economy and enterpreneurship	FMEE 1111	3	2
	Fundamentals of law and anti-corruption culture	FLACC 1112	2	2
	Модуль экономико-естественных знаний		5	
	Fundamentals of market economy and entrepreneurship	FMEE1111	3	
	Alash studies	AS 1112	2	2
	Fundamentals of life safety and and ecology	FLSE1112		
	2. Basic disciplines			
1	**Component of choice 1**			
	Global information systems	GIS 2210	5	3
	World Information resources	WIR 2210		
2	**Component of choice 2**			
	Operating systems	OS 2211	5	3
	Operating systems and environments	OSE 2211		
3	**Component of choice 3**			
	Computer networks	CN 2212	6	4
	Information technology and telecommunications	ITT 2212		
4	**Component of choice 4**			
	Data Mining	DM 2213	6	4
	Data Science	DS 2213		
5	**Component of choice 5**			
	Database programming database	DPD 2214	6	4
	Database organization and security	DOS 2214		
6	**Component of choice 6**			
	Computer-aided design systems	CADS 3215	5	5
	Design of information management systems	DIMS 3215		
7	**Component of choice 7**			
	Programming technologies	PT 3216	5	5
	Web programming	WP 3216		
8	**Component of choice 8**			
	Electronics	Ele 3217	5	5
	Fundamentals of digital electronics and microprocessor technology	FDEMT 3217		
9	**Component of choice 9**			
	Circuit design	CD 3218	5	5
	Digital circuitry	DC 3218		
10	**Component of choice 10**			

	Information systems software	ISS 3219	6	6
	Design and development of IS software	DDISS 3219		
11	**Component of choice 11**			
	Architecture of computer systems	ACS 3220	5	6
	Architecture of information systems	AIS 3220		
12	**Component of choice 12**			
	Information security and information protection	ISIP 3221	6	6
	Information protection	IP 3221		
13	**Component of choice 13**			
	Database systems	DS 3222	6	6
	Database concept	DC 3222		
14	**Component of choice 14**			
	Modeling of information systems	MIS 4223	5	7
	Fundamentals of computer modeling	FCM 4223		
15	**Component of choice 15**			
	Programming in the PHP environment	PPHPE 4224	5	7
	Programming in Python 3	PP3 4224		
16	**Component of choice 16**			
	Web programming and the basics of Web design	WPBWD 4225	3	7
	Internet technologies	IT 4225		
3. The main subjects				
1	**Component of choice 1**			
	Intelligent information systems and technologies	IIST 2305	5	3
	New information technologies	NIT 2305		
2	**Component of choice 2**			
	Application packages	AP 3306	5	5
	Integrated Application Packages	IAP 3306		
3	**Component of choice 3**			
	Modern information systems and telemedicine	MIST 3307	5	6
	Special purpose information systems	SPIS 3307		
4	**Component of choice 4**			
	Computer graphics	CG 4308	5	7
	Graphic tools in EIS	GTEIS 4308		
5	**Component of choice 5**			
	Mathematical methods of information processing	MMIP 4309	4	7
	Methods of processing experimental data	MPED 4309		
6	**Component of choice 6**			
	3D modeling	3DM 4310	4	7
	Computer technologies of three-dimensional graphics and animation	CTTDGA 4310		
7	**Component of choice 7**			

	Administration of information systems	AIS 4311	4	7
	Automated information processing and management systems	AIMPS 4311		
8	**Component of choice 8**			
	IT project management	ITPM 4312	5	8
	Modern principles of project IT team management	MPPITTM 4312		
9	**Component of choice 9**			
	Database administration in the MS SQL Server platform	DAMSSQLSP 4313	5	8
	Theory of automatic control	TAC 4313		