ALIKHAN BOKEIKHAN UNIVERSITY

MODULAR EDUCATIONAL PROGRAM

6B06101 -«Applied Computer Science»

(code and name of the OP)

Semey,2022

Developed by the Department of "Information and Technical Sciences" Discussed and approved at the meeting of the Department of Information and Technical Sciences

Protocol No. 9 of April 13, 2022

Reviewed and recommended for approval at a meeting of the Academic Quality Council of the Faculty

Protocol No. 7 of May 19, 2022

Reviewed and recommended for approval at a meeting of the Educational and Methodological Council of the University

Protocol No. 5 of May 25, 2022

Discussed and approved at the meeting of the Department of Information and Technical Sciences

Protocol No. 1 of September 8, 2022

Reviewed and recommended for re-approval at a meeting of the Academic Quality Council of the Faculty

Protocol No. 1 of September 21, 2022

Reviewed and recommended for re-approval at a meeting of the educational and Methodological Council of the University

Protocol No. 1 of September 22, 2022

Content

1. Explanatory note

The modular educational program (MOE) is compiled on the basis of regulatory documents of the Ministry of Education and Science of the Republic of Kazakhstan and internal regulatory documents of Alikhan Bokeikhan University:

- The State standard of higher and Postgraduate education approved by the Order of the Minister of Science and Higher Education of the Republic of Kazakhstan dated July 20, 2022 No. 2; - Rules for the organization of the educational process on credit technology of education, approved by the Order of the Minister of Education and Science of the Republic of Kazakhstan dated April 20, 2011 No. 152

- Standard rules of activity of organizations of higher and (or) postgraduate education, approved by the Order of the Minister of Education and Science of the Republic of Kazakhstan dated October 30, 2018 No. 595; - Структура модульной образовательной программы, редакция №3 от 08.10.2021 г.

- Professional standard "Database Administration", approved by the Deputy Chairman of the Board of the National Chamber of Entrepreneurs of the Republic of Kazakhstan "Atameken", Order No. 171 dated 17.07.2017.

The MEP is designed as a set of sequential training modules for the entire period of study and is aimed at mastering the competencies necessary for awarding a bachelor's degree in information and communication technologies under the educational program 6B06101 -«Applied Computer Science».

The modules of the GD block (56 academic credits in total) include disciplines common to all educational programs, during the study of which the graduate must master the following competencies: general education.

The BD block includes disciplines of the university component (OC) – 42 academic credits and elective components (EK) - 70 academic credits. Modules of these disciplines form a set of competencies: basic, professional.

The MS block includes disciplines of the university component (OC) - 18 academic credits and elective components (EK) - 42 academic credits. Modules of these disciplines allow you to form a complex of professional competencies acquired by a graduate.

The criterion for the completion of the educational process is the student's mastering of at least 240 credits, including at least 228 academic credits of theoretical training and 12 credits of final certification. The MEP consists of 20 modules.

During the development of the modular educational program, the wishes and recommendations of potential employers were taken into account, aimed at the formation of additional professional competencies that meet the requirements of the labor market (round table with employers "Employer - Higher education institution - Future specialist" dated 08.02.2022)

Social partners who took part in the discussion of the MOU:

Khalilov Sh.T. - Technical Director of the iMAS GROUP LLP branch;

Duisenbayeva A.K. – Head of the Competence Center "Radio Engineering, Electronics and Telecommunications" on the basis of the GD East Kazakhstan region "College of Radio Engineering and Communications", head instructor and "Cisco Network Academy";

Kanapin T.K. – Programmer of the Automated Control System Department of Semey Vodokanal;

T. Zhubanov is a Java Developer, medware Atlanta, Georgia.

The purpose of the modular educational program is to prepare graduates with solid foundations of fundamental education in the field of information technology. This allows them to become in-demand IT specialists in the republican and regional labor market, work as programmers (Software Developer), information systems designers (Software Architect), software project managers (Project Manager), IT specialists in the field of science and knowledge.

Expected results of the modular educational program 6B06101 -«Applied Computer Science»:

ON 1 - identify the main models, methods, tools used in computer systems to automate computer operation and solve intellectual tasks.

ON 2 – compare the current state and trends in the development of computer architectures, computing systems, computing complexes and networks; timely modernization and change of software versions (operating systems, utilities, application software packages, special purpose programs).

ON 3 – to identify problems in the areas of development of programming technology, in the main methods and means of design automation; standard classes of models and methods of modeling complex systems; algorithmic methods for programming languages; problems of a technical, logical nature in the analysis of specific situations for programming, to suggest ways to solve them and evaluate the expected results.

ON 4 – summarize information, prepare references and reviews on professional activities, edit, refer, review texts. Demonstrate knowledge of the documentation requirements accepted in professional communication, understanding of oral speech within professional topics, select the necessary information from foreign language sources.

ON 5 – analyze the results obtained and generalize; assimilation of basic mathematical concepts and methods; classify algorithms for solving formulated problems; analyze the results obtained.

ON 6 – calculate methods of mathematical, simulation and computer modeling of processes and capabilities of computing devices; coordinate indicators for graphic images; have a good understanding of mathematics, statistics and their applications.

ON 7 – classify theoretical and practical problems of computational informatics as areas of knowledge and practical human activity related to the need for information analysis.

ON 8 is a security tool that ensures the smooth operation of modern computing systems; software and hardware complexes and protection systems.

ON 9 – to show the skills of practical implementation of artificial intelligence systems; the capabilities of neural networks; methods of software development for artificial intelligence systems, IT technologies, multimedia technologies and smart technologies.

ON 10 – integrate basic approaches and concepts related to object-oriented software design; structure and design for a web page. Review work with software and development and debugging tools for specialized applications.

ON 11 – choose a database programming environment designed for the development and solution of economic and scientific and technical problems; database models using CASE tools. Confirm the degree of reliability of the results obtained using experimental or theoretical research methods.

ON 12 – describe the procedure for the system analysis of the formulation and formalization of the tasks of the information system, in determining the conceptual model of information systems.

ON 13 – draw conclusions based on the main approaches and concepts related to object-oriented software design. Formulate logical problems and apply mathematical logic tools to solve them.

ON 14 – meet the detailed requirements of a wide range of special-purpose applications, know how they are developed and used in professional activities. Draw conclusions on system analysis, design, coding, debugging and testing, as well as on documentation and release of a software product.

ON 15 – systematize, summarize legal and economic information for use in professional, including entrepreneurial activities. Analyze, summarize economic information and systematize safety standards for use in professional activities.

In order to create special conditions for people with special educational needs to receive education, the graduate's competence model is supplemented with professional competencies that ensure the adaptive nature of the main educational program. For this purpose, courses for the formation of the ability of persons with special educational needs to successfully socialize in society and actively adapt to the labor market, taking into account the characteristics of the disease, are introduced into the catalog of courses of the additional educational program "Minor".

2. The graduate's competence model

Competencies that a graduate of the educational program 6B06101 -«Applied Computer Science» should have:

Competencies of general education:
- aimed at the formation of ideological, civil and moral positions of the future specialist, competitive on the basis of knowledge of information and communication technologies, building communication programs in Kazakh, Russian and foreign languages, orientation to a healthy lifestyle, self-improvement and professional success;
- form a system of general competencies that ensure the socio-cultural development of the personality of the future specialist on the basis of the formation of his ideological, civil and moral positions;
- develop the ability to interpersonal social and professional communication in Kazakh, Russian and foreign languages;
- contribute to the development of information literacy through the mastery and use of modern information and communication technologies in all areas of their lives and activities;
- form skills of self-development and education throughout life;
- form a personality capable of mobility in the modern world, critical thinking and physical self-improvement;
- to evaluate the surrounding reality on the basis of worldview positions formed by knowledge of the fundamentals of philosophy, which provide scientific understanding and study of the natural and social world by methods of scientific and philosophical cognition, to reveal the meaning of the content and specific features of the mythological, religious and scientific worldview;
- to show a civic position based on a deep understanding and scientific analysis of the main stages, patterns, peculiarities of the historical development of Kazakhstan, to use methods and techniques of historical description to analyze the causes and consequences of events in the history of Kazakhstan;

- assess situations in various spheres of interpersonal, social and professional communication, taking into account basic knowledge of sociology, political science, cultural studies, psychology, arguing their own assessment of everything happening in the social and industrial spheres, as well as synthesize knowledge of these sciences as a modern product of integrative processes;
- to use scientific methods, methods of research of a specific science, as well as the entire socio-political cluster, to select a methodology, analyze and summarize the results of the study;
- to develop their own moral and civic position on the basis of social, business, cultural, legal and ethical norms of the Kazakh society;
- to put into practice knowledge in the field of social sciences and humanities, which has worldwide recognition, synthesize new knowledge and present it in the form of humanitarian socially significant products;
- to engage in communication in oral and written forms in Kazakh, Russian and foreign languages, using language and speech means based on grammatical knowledge to solve problems of interpersonal, intercultural and industrial (professional) communication, as well as to analyze information, actions and deeds of communication participants in accordance with the communication situation;
- to use various types of information and communication technologies in personal activities: Internet resources, cloud and mobile services for the search, storage, processing, protection and dissemination of information;
- to build a personal educational trajectory throughout life for self-development and career growth, to focus on a healthy lifestyle to ensure full-fledged social and professional activities through methods and means of physical culture;
- to know and understand the basic laws of the history of Kazakhstan, the basics of philosophical, socio-political, economic and legal knowledge, communication in oral and written forms in Kazakh, Russian and foreign languages;
- apply the acquired knowledge for effective socialization and adaptation in changing socio-cultural conditions, possess the skills of quantitative and qualitative analysis of social phenomena, processes and problems.

Basic competencies:

- to use fundamental concepts of mathematics in professional activity;
- carry out the proof of mathematical statements, solve mathematical problems and problems, identify their essence, translate problems into mathematical language;
- to use the basic concepts and methods of discrete mathematics, the basics of mathematical logic, methods of probability theory and mathematical statistics in the study of mathematical models of the subject area;
- use methods for constructing various models of data types, algorithms for information processing;
- rationally use the opportunities provided by the algorithmization technique to solve practical problems;
- assessment (to evaluate) the level of reliability of the results obtained using experimental or theoretical research methods;
- conducting qualitative mathematical research based on mathematical analysis;
- build mathematical models, set mathematical problems, choose suitable mathematical methods and algorithms for solving problems, use numerical methods using modern computational methods to solve problems;
- work with various operating systems and their administration;
- development of a database for solving economic, scientific and technical problems;
- configuring the security features installed in the operating system;
- installation of operating systems;

- basic methods of data collection and processing in Python, gaining an understanding of how to work with the Python programming language.
- timely upgrade and replacement of software versions;
- develop and implement in the form of a software module an algorithm for solving a theoretical or applied problem based on a mathematical model;
- practical implementation of the artificial intelligence system;
-the main methods of solving artificial intelligence problems and the role of logic programming.

Professional competencies:
- apply modern methods of object-oriented programming when coding software systems of various levels of complexity;
- apply system analysis in setting tasks and algorithmization of an information system, defining a conceptual model of information systems;
- use basic visual techniques and materials;
- use computer graphics tools in the process of design design;
- designing a BP model using case tools;
- develop the structure and design of a web page;
- work in an algorithmization and programming environment;
- system analysis in the formulation and formalization of information system tasks, definition of the conceptual model of information systems;
- work with raster, two-dimensional and three-dimensional vector graphics software;
- work with tools for processing and debugging client and server clocks of Internet applications.
- creation of various programs using fundamental computational algorithms;
- system analysis, design, coding, debugging and testing, software product release;
- creation and formatting of HTML files;
- sample classes and methods for modeling complex systems;
- methods of designing interface components;
- construction of parallel analogs of computational algorithms;
- a web page creation tool;
- practical implementation of the artificial intelligence system;
- develop web scripts to program in PHP;
- simulation of physical situations using a computer;
- features of business communication in English, Kazakh and Russian for professional use in the future field of activity.
- install, configure, use and interact with the relational database management system to present data using various models, to make SQL queries;
-methods of mathematical, simulation and computer modeling of processes and devices of computer technology;

Table 1. The sequence of mastering disciplines in the process of forming special competencies

№	Kompetencies	The list of compulsory, elective disciplines and the sequence of their study		Expected results
		List of disciplines	The sequence of their study (sem.)	
1	Professional competencies	The economy of the enterprise	2nd semester	**Know:** legislative and regulatory legal acts regulating the activities of economic entities; the basics of calculating the modern system of indicators characterizing the activities of the enterprise; **Must be able to:** calculate on the basis of standard methods and the current regulatory framework economic and socio-economic indicators characterizing the activities of the enterprise; analyze the results of calculations and substantiate the conclusions **Skills:** modern methods of calculating socio-economic indicators characterizing the activity of the enterprise
		Labor market economics	2nd semester	**Know:** the main elements and types of the labor market, factors of formation of demand and supply in the modern labor market; the mechanism of functioning of the labor market, basic theories, types and forms of employment; theoretical aspects of labor market regulation; **Must be able to::**navigate the main elements, types and mechanisms of the functioning of the labor market; classify and typify labor market models; structure modern problems of employment and unemployment in the labor market; navigate the main directions of state policy in the labor market. **Skills:** the skills of structural and logical analysis of the factors of demand and supply formation in the modern labor market; the skills of developing practical recommendations for managing the processes of formation and functioning of regional labor markets; the basics of using mathematical tools to solve the problems of statistical research of the labor market; optimal formation of the framework in the segmentation criteria for the application of the skills of proportions in the segments of the labor market.
2	Professional competencies	Probability theory and mathematical statistics	3rd semester	**Know:** the basic concepts of probability theory and mathematical statistics, their main results and mathematical methods of analysis. **Must be able to::**apply mathematical methods and models to the analysis of random phenomena for their adequate description and understanding. • **Skills:** skills in solving standard problems of probability theory and mathematical statistics, as well as the use of basic analytical tools for the analysis of probabilistic and statistical problems.
		Discrete mathematics	3rd semester	**To know:** algebraic methods for describing models.; simplest functions, properties of the algebra of logic and their analytical expression; fundamentals of logical calculation of words and predicates; methods for solving classical problems formulated in terms of combinatorics **Be able to:** apply combinatorial configurations to solve problems, determine the type of binary relation and its properties, perform sets, represent columns in various ways, perform operations on graphs, find the shortest path to graphs, compile a truth table of the bul function, perform similar transformations, find SDNF, SKNF, determine the minimum DNF. **Possess:** the use of basic means of discrete mathematics for solving applied problems;

				methods of construction, analysis and application of discrete models in professional activity.
3	Professional competencies	IT efficiency	3rd semester	**To know:** the basics of building, calculating and analyzing a modern system of indicators characterizing the design activity. **Be able to:** analyze economic phenomena and processes in their interrelation and apply them in the design of the enterprise architecture. **Possess:** project management technology, methodology of economic research.
		Modern and effective IT technologies	3rd semester	**To know:** the main elements of the technology of informatization of enterprises and organizations; **Be able to:** justify the choice of technology for informatization of enterprises and organizations; **Possess:** the skills of applying the technology of automation of information processes and informatization of enterprises..
4	Professional competencies	Statistics	3rd semester	**To know:** methods of search, critical analysis and synthesis of information, basic principles of critical analysis, methods of evaluation of modern scientific achievements; features of the methodology of conceptual approaches to understanding the nature of information as a scientific and philosophical category, the main types of information sources; **Be able to:** acquire new knowledge based on analysis, synthesis of information to solve economic problems in the field of culture; collect data on complex scientific problems related to the professional field; search for information and solutions based on actions, experiment and experience; determine the value properties of various types of information sources; **Possess:** research of problems in the sphere of culture and art with the use of analysis; synthesis and other methods; identification of scientific problems and the use of adequate methods to solve them; skills of internal and external criticism of various types of information sources; the ability to analyze and synthesize information related to the problems of modern society.
		Socio-economic statistics	3rd semester	**To know:** the essence and significance of statistical information in the development of modern information society; the main economic and statistical classifications and groupings, including the fundamental concepts and postulates of the system of national accounts **Be able to:** choose tools for processing economic data in accordance with the task, analyze the results of calculations and substantiate the conclusions; the ability to calculate economic and socio-economic indicators characterizing the activities of economic entities on the basis of standard methods and the current regulatory framework; analyze and interpret statistical information contained in the reports of enterprises of various forms of ownership, organizations, departments, etc. and use the information obtained to make management decisions. **Possess:** tools for processing economic data in accordance with the task, analyze the results of calculations and substantiate the conclusions; the ability to collect and analyze the initial data necessary for the calculation of economic and socio-economic indicators characterizing the activities of economic entities

5	Professional competencies	Intelligent information systems	3rd semester	**Know:** the theoretical foundations of the construction and functioning of modern personal computers; types of computer networks; principles of using multimedia; functions and technologies of information and telecommunication services.; **Be able to:** search for necessary data using query languages and catalogs in various information systems (databases, electronic libraries, websites), organization of access to information resources, organization of work of specialists with information resources: **Skills:** methods of searching and analyzing information on the Internet; searching for information from various sources;
6	Professional competencies	3D graphics and animation	3rd semester	**To know:** current trends in the development of graphics and design; the field of use of computer graphics; architecture of the main hardware and software tools for working with network technologies; color representation model. **Be able to:** use basic visual techniques and materials; use computer graphics tools in the process of design design. **Skills:** work with software for raster, two-dimensional and three-dimensional vector graphics; basic functionality of modern graphics systems; organization of dialogue in graphics systems.
7	Professional competencies	Information systems and technologies	4th semester	**Know:** the theoretical foundations of the construction and functioning of modern personal computers; types of computer networks; principles of using multimedia; functions and technologies of information and telecommunication services.; **Be able to:** search for necessary data using query languages and catalogs in various information systems (databases, electronic libraries, websites), organization of access to information resources, organization of work of specialists with information resources: **Skills:** Methods of searching and analyzing information on the Internet; search for information from various sources;
		Information technology	4th semester	**Know:** the legal norms of information activity , the state of the global information technology market, the process of formation of information technology, the structure of information technology, prospects for the development of information resources and information society. **Be able to:** use personal computers to search and process information, create and process documents; use of computer programs, Internet technologies; work with electronic documents. **Skills:** access to electronic information technologies, as well as libraries, archives.
8	Professionalcompetencies	Web--programming	4 semester	**Know:**IHTML hypertext markup language; aboutagainworking with programs for creating web pages Programming languagesJavaScript, VRML **Be able to:**plan the amount of work in the developmentWeb-pages; develop structure and designWeb-pages; createWeb-pages in programming languagesJavaScript; publish pages on the global networkInternet. **Skills:**work with development and debugging tools for client and server parts of Internet applications.
		Programming on the Internet	4 semester	**Know:**information sources (including the Internet) necessary for work in the professional field; **Be able to**: Spanishuse network information resources in professionalo activities with protection. **Skills:**skills to use network information resources with security.

9	Professionalcompetencies	Operating systems, environments and shells	4 semester	**Know:**principles of operation of operating systems and their services; main features of operating systems and services; **Be able to**: install and configure software for various operating systems; operate software services based on technical documentation; **Skills:**skills of working with operating systems and their services; the skills of obtaining information about the possibilities of using the services of operating systems;
10	Professionalcompetencies	Information management	4 semester	**Know:**about the risks; subject and information technologies; information systems, decision-making process, functional IT, IT structure; place of IP at a manufacturing enterprise, functional sections of IP; **Be able to:**assess the expected risks of acquiring IP, implement IP and use IP; analyze **Skills:**definition of information management tasks and methods for their solution.
11	Professionalcompetencies	BasicsBigData	5 semester	**Know:**methods for analyzing and storing large amounts of data, stages of the life cycle of processing big data, languages most adapted for processing and analytics of big data, ways to organize storage and access to big data **Be able to:** perform elements of data analysis and interpret the results, distinguish between the characteristics of SQL andNoSqlDB, formulate algorithms in a paradigmMapReduce, choose the right big data analytics tool, choose the right big data storage technology **Skills** :mathematical methods of data analysis, languages and computer processing methods
		Servicescloudcalculation	5 semester	**Know:**basic concepts and terminology of cloud technologies; scopes of cloud technologies; the concept of cloud computing as applied tobusiness activities; principles of cloud computing, principles and methods of developing applications for cloud systems using various platforms; cloud computing infrastructure; **Be able to:**use cloud programming techniques, assess the effectiveness of the application, long-term prospects, study the economics of cloud computing; **Skills** cloud software development, system administration skills to develop and maintain applications deployed in the clouds
12	Professionalcompetencies	Fundamentals of the theory of taxation	5 semester	**Know:**the economic nature and essence of taxes as a financial and economic category; -legislative basis for the organization of the tax system ,types of tax regimes; elements of taxes, rules for the formation and calculation of tax liabilities; rules for developing an organization's accounting policy for tax purposes and organizing tax planning. **Be able to:** -andidentify the elements of the tax, determine their place and role in the tax mechanism; calculate tax liabilities and keep records of income and expenses and performance results, prepare financial statements; analyze the tax indicators of the organization for making managerial decisions; analyze situational problems in the field of tax legal relations and find ways to solve them. **Skills** methods for calculating tax indicators and paying taxes; ways of forming the tax base for various taxes, accounting for income and expenses; skills in interpreting economic information necessary for management decisions in the field of tax burden
		taxes andtaxation	5 semester	**Know:**information on taxes, the legal framework in the field of taxation and tax rates, contained in the reports of enterprises of various forms of ownership, organizations, departments. **Be able to:**analyze and interpret information on taxes, the legal framework in the field

				of taxation and tax rates contained in the reports of enterprises of various forms of ownership, organizations, departments and use the information received to make management decisions. **Skills** methods of analysis and interpretation of the legal framework in the field of taxation, taxes and tax rates.
13	Professionalcompetencies	Information systems in business	5 semester	**Know:**principles of behavior of economic agents and markets; methods of economic analysis of the behavior of economic agents and markets; technology for evaluating the effectiveness of business process management; **Be able to:**analyze the behavior of economic agents and markets in the global environment; prepare analytical materials for business process management; evaluate the effectiveness of business process management; **Skills** information technologies for economic analysis of the behavior of economic agents and markets; information technologies for the preparation of analytical materials for managing and evaluating the effectiveness of business processes.
		Information technology in business	5 semester	**Know:** technology for evaluating the effectiveness of business process management. **Be able to:** prepare analytical materials for business process management using information technology; - evaluate the effectiveness of business management processes using information technology. **Skills** andinformation technologies for preparing analytical materials for managing and evaluating the effectiveness of business processes.
14	Professionalcompetencies	Language programmingPython	5 semester	**Know:**paradigms, architectural features, semantics and syntax of the Python programming language, the purpose, structure and properties of the main structures and constructions of the Python language, modules and packages for solving various applied and scientific problems. **Be able to:**develop mathematical methods and algorithms for solving various problems, - use an integrated development environment for developing and debugging a program. **Skills** skills in reading, writing, debugging and testing programs in a high-level programming language in an integrated design environment.
		Fundamentals of programming in the languagePython	5 semester	**Know:**basic data collection and processing methods in Python; **Be able to:**find the data necessary for working in a programming language **Own:** programming skills in Python; ◦ Ability to work with different data file formats.
15	Professionalcompetencies	Computer networks	5 semester	**Know:** evaluation and control of LAN performance; computer, server equipment and peripheral devices, types of their compatibility, technical characteristics; resource management; calculation of costs for the design and installation of LAN. **Be able to:** organize updating of software versions; development of regulations for the organization for servicing the LAN; control software version updates; develop a preventive action plan. **Skills** own: methods of building a network; current protocols and their features; skills about network optimization methods
16	Professionalcompetencies	Database Administration	5 semester	**Know:**principles of organization of modern databases and database systems; main categories and the concept of a database; relational data format; database design methods; **Be able to:**build the form of the subject area and create databases associated with it; organize the processing of information in the database; organize the maintenance of the

				integrity of the database. **Skills:** work in a special database management system, training in the creation of basic objects in the database; distribution of the main functions, the need to release the task; creating applications in the work of the database.
17	Professionalcompetencies	Fundamentals of computer modeling	6 semester	**Know:**aboutmainconcepts of modeling theory, classification of models and areas of their use, modeling tasks; the main modeling tools used in the system design process at different stages of project detailing; methods of modeling and analysis of systems; principles of building models. **Be able to:** incarry outanalysis of the system or process under study; reasonable choice of modeling method; build an adequate model of a system or process using modern computer tools; interpret and analyze simulation results. **Skills:**the main criterion for evaluating the obtained simulation results; experience and use in the course of modeling scientific and technical information
		Economic and mathematical modeling	6 semester	**Know**: basic research methodseconomic processesin logistics and management–supply chains by means of applied mathematics; ways of constructing mathematical models of control and decision-making problems; methods of forecasting, optimization of business **Be able to:** compose and use economic and mathematical methods and models for a comprehensive solution of economic and social problems; **Skills:** in solving optimization problems using the methods of linear and nonlinear dynamic stochastic programming.
18	Professionalcompetencies	Accounting automation	6 semester	**Know:**technology and methods of processing accounting information; tools and software for designing automated accounting and auditing systems; classification and types of information accounting systems; intellectual technologies and their application in the creation of information systems in the field of accounting and auditing; application of telecommunication technologies in accounting and auditing; the role and place of an accountant at the stages of the life cycle of an information system; **Be able to:**use tools that support the development of software for professionally oriented information systems; describe business processes for valuation and management of property and decision-making schemes; - use network technologies;-inChoose tools and technologies for database development **Skills:**skills in developing, configuring, installing, creating an environment for documenting programs using software.; application of the standards of our state and foreign countries used in the processing of the software product; - skills in the use of software and tools for the analysis and processing of accounting and auditing.
		Computer technologies in accounting	6 semester	**Know:** basic principles, techniques and methods of working with the program "1C: Accounting";basic provisions and requirements for maintainingautomated accounting based on "1C: Accounting"in accordance with the current legislation of the Republic of Kazakhstan. **Be able to**: create a new information base in the 1C: Accounting program and configure accounting parameters; to conduct in an automated mode the maintenance of primary documentation; form accounting transactions and postings in the program "1C: Accounting"; generate standard reports; unload the infobase and restore data; to form regulated, tax, statistical reporting. **Skills:**skillswork with the configuration "1C: Accounting" forautomated accounting and

				tax accounting in various organizational and legal forms of the organization
19	Professionalcompetencies	Data analysis and economic forecasting	6 semester	**Know:** about mathematical methods of bringing statistical data of economic nature into a convenient form for analysis and management decision making; about mathematical methods of data analysis; on mathematical methods for obtaining a forecast of socio-economic indicators, assessing its reliability and reliability **Be able to:** bring statistical data in a form convenient for analysis; graphically represent data; calculate the numerical characteristics of variational series and formulate conclusions based on the results; identify the presence and degree of dependence of socio-economic values and indicators; identify trends and patterns in socio-economic development; analyze time series; **Skills:**skills in building a forecast using mathematical modeling.
		Statistical Methods in Economics	6 semester	**Know:**on the appointment and implementation of the main methods of statistical data analysis and forecasting. **Be able to:**use the methods of statistical data analysis on a computer to solve practical problems. **Skills:**statistical data analysis skills using statistical packages
20	Professionalcompetencies	System analysis of design structuresON	6 semester	**Know:**basic principles and approaches of system analysis and design, allowing to explore complex information systems; **Be able to**:apply the acquired knowledge for the system analysis of business processes; **Skills:**system analysis and designON
		System Analysis	6 semester	**Know:**methods and models of systems theory and system analysis;–patterns of functioning and development of systems. **Be able to:** apply methods of system analysis at the mathematical and algorithmic levels, programming applications;apply a systematic approach and mathematical methods in formalizing the solution of applied problems and creatingbe their software prototypes. **Skills:**the ability to conduct a systematic analysis of the applied area and selectsystems modeling methods;methods of formalized representation and modeling of systems.
21	Professionalcompetencies	UX/UI design	6 semester	**Know:**the essence of the concepts of UI design and UX design, the main trends in the development of interface design, the role of analysis and design of user experience in the development of interfaces, the main project management systems in UI design based on information and communication technologies, the main visual components of a website, the main trends development of type culture in web design **Be able to:**identify trends, the main trends in the development of modern web design based on information retrieval, develop a website prototype, use the principles of moderntypographyin designweb-interface **Skills:**complex user interface design skills, development skillsdesign projectsite, taking into account ergonomic requirements and modern trends in the development of visual culture
		Development of user interfaces	6 semester	**Know:**the XAML markup language for creating dynamic user interfaces; and the WPF platform technology.Net. **Be able to:**describe application interfaces; define the appearance and behavior of the application; describe user interfaces; add vector graphics to XAML applications.

				Skills: Experience in developing graphical applications on the .Netusing the WPF system and the XAM markup language
22	Professionalcompetencies	Enterprise planning	6 semester	**Know:**methods of data analysis necessary for solving the set economic and managerial tasks; basic principles and standards of accounting and reporting of the organization **Be able to:**- collect, analyze and interpret the necessary information contained in various reporting forms and other sources of information and make sound investment, credit and financial decisions; determine the most rational ways to use resources and understand the structure of the environmentdstv prenterprises; **Skills:**the ability to analyze operational and statistical reporting and make informed investment, credit and financial decisions.
		Organization and remuneration at the enterprise	6 semester	**Know:**fundamentals of scientific organization and regulation of labor,-mMethods and tools for organizing lean production, - an algorithm for introducing lean production technology at an enterprise, - the principles and foundations for the formation of a system of motivation and incentives for personnel (including remuneration), the procedure for applying disciplinary sanctions. **Be able to:** to put into practice knowledge of the basics of scientific organization and labor rationing, analysis of work and analysis of jobs, develop systems of motivation and incentives for personnel, - draw up the results of monitoring labor and performance discipline, put into practice methods for assessing the effectiveness of the system of material and non-material incentives in the organization; use the company's cost management methods within the concept of lean manufacturing. **Skills:**skills in conducting job analysis and analysis of jobs, optimizing service standards and headcount, methods for effectively organizing group work based on knowledge of group dynamics processes and principles of team formation, skills in assessing the possible consequences of making managerial decisions when implementing lean production,
23	Professionalcompetencies	Economic analysis	7 semester	**Know:**The essence of the financial and economic activities of entities in general and individual business processes, economic categories and indicators, their relationships **Be able to:**Assess the behavior of consumers of economic goods and the formation of demand based on the activities of the economic foundations of the behavior of organizations, market structures and the competitive environment of the industry. **Skills:**: Use of all possible information sources of information about the internal and external environment of any business entity.
		Analysis of financial and economic activity	7 semester	**Know:**Fundamentals of the company's economics; Features of entrepreneurial activity ; **Be able to:**analyze various sources of informationinformation about the work of the enterprise;apply knowledge of the fundamentals of the company's economy to identify economic problems of the financial and economic activities of enterprises; **Skills:**knowledge of the main indicators of the financial and economic activities of the company and their diagnostics;
24	Professionalcompetencies	Information Security	7 semester	**Know:**methodology for analyzing the effectiveness of the functioning of the SI;basic concepts, goals and objectives of the SI at the enterprise; the essence and components of the GI; principles of organization and stages of development of SI; factors influencing

				the organization of GI **Be able to:**the wireitanalysis of the effectiveness of the functioning of the SI;anduseprinciples of organization and stages of development of SI;allocatefactors influencing the organization of GI **Skills:**security audit of information systems, methods of system analysis of information systems.
		Fundamentals of cryptography	7 semester	**Know:** basic encryption algorithms with secret and public keys; **Be able to:**perform elementary operations on ciphers-mit- and polyalphabetic substitutions, encryption systemsThe visionary, permutations,scaling; block ciphers; use the El algorithmGamal, cryptosystems without key transfer; write authentication protocols; apply a digital signature. **Skills:**main methods and ways of cryptographic protection of information.
25	Professionalcompetencies	Parallel programming systems	7 semester	**Know:**efficient parallel computing algorithm for solving applied problems. **Be able to**it is justified to use computer technology in automation systems; **Skills:**selectedaboutRa optimaloh networkohTechnologyandfor information support of control systems
		Parallel Computing	7 semester	**Know:** main models of parallelcomputers; basicsparallel data processing; **Be able to:** to program and create software products using parallel algorithms in programming languages that support parallelization, as well as using MPI technologies,OpenMP, VAT **Own**:Pconstruction of parallel analogues of computational algorithms.
26	Professionalcompetencies	Multimediatechnologies and systems	7 semester	**Know:**digital video and sound for the development of design projects and presentations of design objects; functionality of modern programs used to create multimedia products; **Be able to:**implement, store, process, transmit and publish digital information, including audio, video, video and multimedia products on a personal computer and global computer networks; store finished multimedia products on modern storage devices. **Skills:**programming in the Flash Professional environment. methods and meanscreationmodern multimedia products
		multimedia software	7 semester	**Know:**digital video and sound for presentation of design objects and development of design projects; functionality of modern programs used to create multimedia products.; **Be able to:**implement, store, process, transmit and publish digital information, including audio, video, video and multimedia products on a personal computer and global computer networks; store finished multimedia products on modern storage devices. **Skills:**programming in the Flash Professional environment. methods and meanscreationmodern multimedia products
27	Professionalcompetencies	Econometrics	7 semester	**Know:**basic concepts of econometrics and the scope of its application;-mthe least squares method and its modifications, the main applications of linear regression models and the method for estimating their coefficients, the basic concepts of systems of econometric equations, their criterionidentifiability, parameter estimation method **Be able to**: build linear regression models on real economic data; evaluate the parameters of models, check the reliability of a linear relationship **Own:**modern mathematical tools and applied programs used in econometric research
		Mathematical Methods in Economics	7 semester	**Know:** classes and schemes of mathematical models; stages of computer modeling; simulation tools **Be able to:**formulate modeling goals; create an information and mathematical model;

				analyze models; organize an experiment and interpret its results; formulate conclusions. **Skills:**skills in solving applied problems and develop the ability to model technological processes.
28	Professionalcompetencies	Electronic commerce	7 semester	**Know:**basic principles of functioning of modern electronic commerce; the basic principles of the industry of using new information technologies and products, telecommunication technologies, telecommunication services. **Be able to:**apply e-commerce tools in all aspects for all types of business; use e-commerce tools and acquired knowledge, skills and abilities in the field of economics;use informational computertechnologies in professional activity; develop an action plan for the implementation of an e-commerce system **Skills:**: the main directions of the functioning of electronic commerce; - technical and legal support of electronic commerce; - skills of information support for the commercial activities of the organization.
		Digital business and e-commerce management	7 semester	**Know:** basic principles and technologies of electronic business, electronic markets, legal support of electronic commerce **Be able to:** develop a business plan for creating your own e-business, assess the company's readiness and costs for the transition to e-business; apply digital signature **Skills:**Internet technology skills for effective marketing andadvertising,nhabitsindependent mastery of new knowledge in the field of e-business, use modern educational technologies.
29	Professionalcompetencies	Artificial intelligence in control tasks	7 semester	**Know:**the history of the development of artificial intelligence; tasks solved by artificial intelligence methods; classification of artificial intelligence systems; artificial intelligence languages. **Be able to:**represent knowledge in artificial intelligence systems; choose artificial intelligence methods for solving practical problems; calculate predicates; compose computer programs using object-oriented programming methods to solve practical problems using artificial intelligence methods. **Skills:**practical implementation of artificial intelligence systems; visual representation of the results obtained by artificial intelligence methods; application of artificial intelligence applications; development of computer programs for solving practical problems using artificial intelligence methods.
		Methodsartificial intellect	7 semester	**Know:**history of development of systems and methods of artificial intelligence; tasks solved by artificial intelligence methods; classification of artificial intelligence systems; artificial intelligence languages. **Be able to:**represent knowledge in artificial intelligence systems; choose artificial intelligence methods for solving practical problems; calculate predicates; compose computer programs using object-oriented programming methods to solve practical problems using artificial intelligence methods. **Skills:** practical implementation of artificial intelligence systems; visual representation o the results obtained by artificial intelligence methods; application of artificial intelligenc applications; development of computer programs for solving practical problems usin artificial intelligence methods.
30	Professionalcompetencies	Fundamentals of	8 semester	**Know:** mathematical models of robotic systems and automation of production processes

		Robotics and Artificial Intelligence		using modern data software products; development of algorithms aimed at the structure. **Be able to:** design automation and robotization systems; compare with the use of modern software products for robotization of technological complexes and automation systems for production processes in various industries, as well as artificial intelligence methods; **Skills:**formation of moderntrends in the development of industrial process automation systemsand robotization
		Robotic systems and complexes	8 semester	**WITHnat**: methods for constructing robotic complexes or automated control systems for technological processes and technical systems in various industries;; **Be able to:** develop and research mathematical models using modern software products systems of automation or robotization of production processes; **Own:**current trends in the development of technical means and systems for automation or robotization of production processes;
31	Professionalcompetencies	Introduction to technologyblockchain	8 semester	**Know:**fundamentals of technologyblockchain; cryptographic basics ttechnologiesblockchainon the platform.Net; creation technologiesblockchain-applications on the platform.Net **Be able to:**use technologyblockchain; apply cryptographic fundamentals of technologyblockchainon the platform .Net; createblockchainplatform applications.Net **Skills:**technology skillsblockchain; skills in the use of cryptographic technologiesblockchainon the platform .Net; creation skillsblockchain-applications on the platform.Net
		Client-server technologies	8 semester	**Know:**– client-server architecture of the application; – modern technologies for working with relational databases from client applications; – the main errors of data information security;; -regulatory documents on two-dimensional and three-dimensional bar coding of information; - Fundamentals of XML-technologies. **Be able to:**– developsoftwaresoftware with client-server architecture; – design the structure and functions of typical modulesbusiness applications; – use modern technologies for working with relational databases from client applications; – write stored procedures on the database server; - in practice, apply ways to optimize the construction of reports; **Skills:**practical skills in designing, developing, implementing and maintaining client-server applications aimed at solving the problems of automating banking and financial operations, accounting and warehouse accounting, workflow.

Table 2. Sequence of mastering disciplines of social and professional interaction.

Wel l	Supporting disciplines	Competencies	Expected Result
2	History of Kazakhstan	Competences of general education	**Know:**ddemonstrate knowledge and understanding of the main stages in the development of the history of Kazakhstan; **Be able to:**withto relate the phenomena and events of the historical past with the general paradigm of the world-historical development of human society through critical analysis; to be able to objectively and comprehensively comprehend the immanent features of the modern Kazakhstani model of development; **Skills:**into master the skills of analytical and axiological analysis in the study of historical processes and phenomena of modern Kazakhstan; systematize and give a critical assessment of historical phenomena and processes in the history of Kazakhstan
1.2	Kazakh (Russian) language	Competences of general education	**Know:**theoretical foundations of the course (language, its functions, forms of speech, text, its features, styles of speech, functional and semantic types of speech);aboutfeatures of dialogic and monologue speech; types of scientific information and the specifics of its implementation in a scientific text; elements of structural-semantic analysis and semantic analysis of a scientific text, components of a speech situation, speaker's intentions. **Be able to:**aboutto make the right choice and use of language and speech means for solving certain problems of communication and cognition based on knowledge of a sufficient amount of vocabulary, a system of grammatical knowledge, pragmatic means of expressing intentions; compose everyday, socio-cultural, official and business texts in accordance with generally accepted norms, functional orientation, using lexico-grammatical and pragmatic material of a certain certification level that is adequate to the goal;Pconvey the factual content of texts, formulate their conceptual information, describe inferential knowledge (pragmatic focus) of both the entire text and its individual structural elements;interpret text information, explain in the scope of certification requirements the style and genre specificity of texts of socio-cultural, socio-political, official business and professional spheres of communication; participate in communication in various situations of different spheres of communication in order to realize their own intentions and needs (everyday, educational, social, cultural), declaring them ethically correct, meaningfully complete, lexico-grammatically and pragmatically adequate to the situation;discuss ethical, cultural, socially significant issues in discussions, express their point of view, defend it with arguments, critically evaluate the opinion of interlocutors; build speech behavior programs in situations of personal, social and professional communication in accordance with the norms of the language, culture, specifics of the sphere of communication, certification requirements; request and communicate information in accordance with the situation of communication, evaluate the actions and deeds of participants, use information as a tool to influence the interlocutor in situations of cognition and communication in accordance with certification requirements. **Skills:**nskills of producing oral and written speech in accordance with the communicative purpose and professional sphere of communication; language skills in various situations of everyday, socio-cultural, professional communication; skills of searching, processing information in Russian; types of speech activity.
1.2	Foreign language	Competences of general education	**Know**:llexical minimum and language material of topics andsubtopicin this discipline (social and social and cultural spheres of communication). **Be able to:**Punderstand by ear not only individual phrases and frequently used words, but also more voluminous statements on topics directly related to him, understand the main content of short simple sentencesvenerationon the radio, at the airport, at the train station. understand when reading the content of short, simple texts, advertisements, brochures, menus, bus and train timetables, short simple personal letters, e-mails. communicate in simple typical situations that require the exchange of information within the framework of familiar topics and activities, be able to tellabout family, living conditions, studies. nwrite a simple letter of a personal nature, a note, an autobiography.

			Own: Punderstanding foreign language dialogic and monologue speech within the framework of general cultural and professional topics; a foreign language at a level that allows to carry out the main types of speech activity; various ways of oral and written communication; skills of adequate response in situations of everyday, academic and professional communication; skills of listening, reading, writing.
one	Information and Communication Technologies (onEnglish.)	Competences of general education	**Know:**what economic and political factors contributed to the development of information and communication technologies; - features of various operating systems, architecture. **Be able to:**aboutdetermine the main trends in the field of information and communication technologies; use information resources to search and store information; work with spreadsheets, perform data consolidation, build graphs; apply methods and means of information protection; design and build simple websites; to process vector and raster images; create multimedia presentations; use different communication platforms; calculate and evaluate performance indicators of supercomputers;anduse various forms of e-learning to expand professional knowledge; use various cloud services. **Skills:**development skillsdatabase structures;Pdesigning and creating presentations; receiving data from the server; creating video files; work with Smart-applications; work with services on the e-government website.
2	Sociology	Competences of general education	**Know:**patterns and stages of the historical process, basic historical facts, dates, events and names of world and domestic historical figures; main events and processes of national history in the context of world history **Be able to:**critically perceive, analyze and evaluate historical information, factors and mechanisms of historical changes; analyze civil and ideological positions in society, form and improve their views and beliefs, transfer the philosophical worldview to the field of material and practical activity; use various philosophical methods to analyze trends in the development of modern society, philosophical and legal analysis **Skills:**skills of a holistic approach to the analysis of society's problems; methods of philosophical, historical and culturological research, techniques and methods for analyzing the problems of society; causal relationships in the development of Kazakhstani society; the place of man in the historical process and the political organization of society; skills of respectful and careful attitude to the historical heritage.
2	Political science	Competences of general education	**Know:**the main stages in the development of political knowledge in the history of civilization; schools and directions of modern political science; the political life of society; the political system and its institutions; the essence of political processes in the country and the world. **Be able to:**analyze the features of political systems and the functioning of political institutions; critically evaluate the theoretical approaches of political science; identify interrelations and patterns of the political process; to compare political systems, institutions and actors in a cross-country and sub-national context, based on the knowledge gained and the methods mastered. **Skills:**skillwellwork with primary sources on the topics of the course; analysis of normative legal acts and other documents; search, processing and analysis of information; solving problems related to the assessment of the political course; group work, project activities, business games; public speaking; academic writing.
one	Culturology	Competences of general education	**Know:**basic theories of culture, basic concepts of cultural studies; the main directions of the methodology of modern cultural analysis; the history of the formation of world culture and civilization, the theoretical features of basic cultural concepts, various interpretations of culture and civilization in world and domestic literature; topical problems of the development of modern culture; the idea of culture as a socialhistorical phenomenon; regularities in the development of world cultures, as well as the typology of the classification of cultures; basic knowledge about the history of the most important cultures of mankind; about the ways of acquiring, storing and transmitting the basic values of culture - about the diversity and intrinsic value of various cultures, forms and types of culture, patterns of their functioning and development, the main cultural and historical regions - the history of Kazakh culture, its place in the system of world culture and civilization **Be able to:**divisionIto understand the features of a given culture, its dominant values; to explain the specifics of intercultural

			communication; to be able to conduct independent professional activities in a dynamically changing multicultural society; to be able to navigate in the cultural environment of modern society; to be able to explain the phenomenon of culture, its role in human life; to be able to navigate cultural issues to independently understand the influence of cultural factors on the behavior of individuals; **Skills:**practical skills in preserving and enhancing the national and world cultural heritage; practical skills in the practical use of knowledge and skills in taking into account the specifics of the cultural behavior of various individuals and groups in the current conditions of the formation of civil society in the Republic of Kazakhstan.
one	Psychology	Competences of general education	**Know:**the meaning and place of psychology in the system of sciences; the main directions of personality development in modern psychology; personal values and meanings in professional self-determination; the relationship and mutual influence of the psyche and body; techniques and methods of effective communication. **Be able to:**interpret basic psychological theories, concepts; use methods and mechanisms of regulation of emotions in everyday life; identify patterns of behavior in a conflict situation and conduct self-diagnosis. **Skills:**definitions of individual psychological characteristics of a person, value-semantic representations in the professional self-determination of a person; recognition of psychological impact and effective communication.
1,2, 3,4	Physical education	Competences of general education	**Know**:Rthe role of physical culture in developmenttii and training of a specialist;fundamentals of the state policy of the Republic of Kazakhstan in the field of physical culture and sports; - theoretical and methodological foundations of physical culture; the main achievements of the Republic of Kazakhstan in the field of physical culture; hygienic and organizational bases of physical culture and sports. **Be able to**:anduse in life practical skills that ensure the preservation and strengthening of health, the development and improvement of psychophysical abilities and qualitynatural; use physical educationsports and recreational activities to achieve life and professional goals; - apply the rules of safe conduct of physical exercises and sports. **Skills:**of organizing sports - mass competitions;exercises in professionalpedagogical physical training of general physical training, special physical training, as well as to put into practice special games; a system of practical skills that ensure the preservation and strengthening of health, the development and improvement of psychomotor abilities and qualities.
4	Philosophy	Competences of general education	**Know:**basic philosophical concepts and categories, patterns of development of nature, society and thinking; the essence of philosophical categories, the terminology of philosophy and the structure of philosophical knowledge, the functions of philosophy, the methods of philosophical research; the place and role of philosophy in public life; **Be able to:**use the foundations of philosophical knowledge to form a worldview position; analyze ideological, socially and personally significant philosophical problems; navigate the system of philosophical knowledge as a holistic view of the foundations of the universe and the prospects for the development of planetary society; understand the characteristic features of the current stage of development of philosophy **Skills:**the skills of philosophical analysis of various types of worldview; the skills of philosophical thinking to develop a systematic, holistic view of the problems of society; the skills of analyzing texts that have philosophical content
2	Fundamentals of market economy and entrepreneurship	Competence of general education	**Know:**functions of money, causes of differences in the level of wages; main types of taxes; organizational and legal forms of entrepreneurship; types of securities; economic growth factors; current state of the theory and practice of entrepreneurial activity; the specifics of entrepreneurial activity;

			Be able to:give examples of factors of production and factor income, public goods, Kazakh enterprises of various organizational forms, global economic problems; 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, use the basic terminology of modern entrepreneurship; use the methods of entrepreneurial activity; **Skills:**navykwellobtaining and evaluating economic information; family budgeting; evaluating one's own economic performance as a consumer, family member, and citizen.
2	Fundamentals of safety and life	Competence of general education	**Know:**the legislative framework for life safety and environmental control, as well as methods for identifying, eliminating the influence of harmful factors on humans and the environment, and providing comfortable conditions for human life and activity; **Be able to:**systematize safety standards for use in professional activities;choose methods of protection against dangers in relation to the scope of their professional activities and choose ways to ensure comfortable living conditions; **Skills:**skillsensuring life safety in industrial, living conditions and in emergency situations, first aid skills.
one	Algorithms, data structures and programming	Basic competencies	**Know:**varieties of data structures used at various levels of data representation, determined by the stages of program design; basic algorithms for processing data structures: replenishment, deletion, modification, search, sorting (ordering); language means of describing various data structures. **Be able to:**carry out the structuring of the information space of a given subject area; based on the analysis of the task (program) being developed, to choose the most rational and economical data structures that ensure the effective implementation of the task (program); develop efficient data processing algorithms and program them in well-known programming languages. **Skills:**methodology for designing programs with complex data organization, starting with the development of a domain model and ending with the description of algorithms and data structures by means of a programming language.
one	Mathsin economics	Basic competencies	**Know:**basic mathematical definitions, theorems, and other theoretical information of the course "Mathematics I", as well as types of problems, solvingobtained by mathematical methods. **Be able to**: to form applied practical problems by mathematical methods, as well as to apply known methods forsolution of the formulated tasks. **Skills:**nskills on their own or in order to meet modern requirements of the profession to improve their skillsin the field of mathematical knowledge.
one	Physics	Basic competencies	**Know:**the essence of the basic concepts, laws, theories of classical and modern physics in their internal interconnection and integrity, the concept of physical laws, the limits of their applicability, which makes it possible to effectively use in specific situations; laws and models of mechanics, molecular physics, electricity and magnetism, thermodynamics and statistical physics; fundamental phenomena in the field of physics. **Be able to:**solve generalized typical problems from various fields of physics as the basis for solving professional problems; assess the degree of reliability of the results of experimental andtheoretical research methods; use the achievements of fundamental science for the successful study of general theoretical and special technical disciplines, the development of mathematical thinking and logic. **Skills:**skillsevaluating the degree of reliability of the results obtained using experimental or theoretical research methods; conducting a physical experiment.
4	Professional Kazakh (Russian)language	Basic competencies	**Know:**Pprofessional vocabulary and terminology; specifics of oral communication in the professional field; linguistic features of oral and written communication; features of business communication and business etiquette. **Be able to:**use the Russian language in interpersonal communication and professional activities; to carry out business communication and conduct business conversations on professional topics;Pwrite down and transmit the necessary information; explain your point of view and critically evaluate the provisions put forward; create your own statements, essays, etc. apply the norms of business etiquette in speech. **Skills:**nskills of expressing one's thoughts and opinions in interpersonal and business communication in Russian; professional

			terms and concepts; professional text analysis; information competence: the ability to work with a book, textbook, reference literature, dictionaries, find the necessary information.
3	Professionally oriented foreign language	Basic competencies	**Know:**lexical material on the topics of this discipline; regulatory requirements for registration (official letter, essay, etc.).improve pronunciation skills; develop productive and receptive lexical and grammatical skills; improve the skills of dialogic speech of a general nature related to situations of everyday and professional communication; develop listening skills (with a full understanding of what was heard); develop and improve writing skills; improve the skills of introductory, studying, viewing and searching reading. **Be able to:**to automate the technical skills of reading to oneself; to develop the ability to transmit scientific information and literature of a socio-political nature; to develop the skills of monologue (prepared) speech - deployment of the thesis; to master reversed reading aloud of a prepared message; to teach abstracting skills. **Skills:**complexity in solving practical, educational, educational and developmental goals (at the same time, practical goals act as leading ones); communicative orientation of the learning process.

Table 3. List of modules included in the educational program

№	Module name	Name of disciplines	Block	Semester	Volume of credits by discipline	form of control	Total credits modulo
M.1	Socio-Political Knowledge Module	Philosophy	GD/OC	4	5	Exam	13
		Political science	GD/OC	2	8	Exam	
		Sociology	GD/OC	2		Exam	
		Culturology	GD/OC	1		Exam	
		Psychology	GD/OC	1		Exam	
M.2	Training program	Information and Communication Technologies (in English)	GD/OC	1	5	Exam	11
		Algorithms and data structures	BD OC	1	5	Exam	
		Educational practice	BD OC	2	1	report	
M.3	Mathematical Methods	Mathematics in Economics	BD OC	1	4	Exam	8
		Probability Theory and Mathematical Statistics/Discrete Mathematics	BD CC	3	4	Exam	
M.4	Information systems programming	Intelligent information systems	BD CC	3	5	Exam	17
		Operating systems, environments and shells	BD CC	4	5	Exam	
		Productionpractice I	BD CC	4	2	report	
		Statistics/Socio-economic statistics	BD CC	3	5	Exam	

M.5	Basicsknowlinguisticliteracy	Foreign language	GD/OC	1,2	10	Exam	20
		Kazakh (Russian) language	GD/OC	1,2	10	Exam	
M.6	History of Kazakhstan	Modern history of Kazakhstan	GD/OC	2	5	G	5
M.7	Fundamentals of Economics and Ecology	Fundamentals of market economy and entrepreneurship	GD/OC	2	3	Exam	5
		Fundamentals of life safety and ecology	GD/OC	2	2	Exam	
M.8	Professional languages	Professional Kazakh (Russian) language/	BD OC	4	3	Exam	6
		Professionally oriented foreign language	BD OC	3	3	Exam	
M.9	Information systems and databases	Computer networks	BD OC	5	5	Exam	24
		Database Administration	BD OC	5	5	Exam	
		Productionpractice II	BD OC	6	4	report	
		BasicsBigDate/Cloud Computing Services	BD CC	5	5	Exam	
		Fundamentals of the theory of taxation/Taxes and taxation	BD CC	5	5	Exam	
M.10	Economics and planning in IT	Business Economics/Labor Market Economics	BD CC	2	3	Exam	7
		Planning the activities of the enterprise / Organization and remuneration of labor at the enterprise	MS CC	6	4	Exam	
M.11	Computer and economic modeling	Fundamentals of computer modeling / Economic and mathematical modeling	BD CC	6	4	Exam	8
		Etoonomics / Mathematical methods	BD CC	7	4	Exam	
M.12	Accounting automation	Accounting automation/Computer technologies in accounting	BD CC	6	4	Exam	9
		E-Commerce/Digital Business and E-Commerce Management	MS CC	7	5	Exam	
M.13	Modeling and design	IT Efficiency/Modern and Efficient IT Technologies	BD OC	3	6	Exam	22
		Multimedia technologies and systems/Multimedia software	BD OC	7	3	Exam	
		3D graphics and animation	MS OC	3	5	Exam	
		Web programming/Internet programming	MS CC	4	3	Exam	
		UX/UIdesign/development of user interfaces	MS CC	6	5	Exam	
M.14	Information systems and technologies in business	Information management	MS OC	5	2	Exam	7
		Information systems in business/Information technologies in business	MS CC	5	5	Exam	
M.15	Economic analysis	Economic analysis/Analysis of financialeconomic activity	BD CC	7	5	Exam	15
		Productionpractice III	MS OC	8	5	Exam	
		Introduction to Blockchain Technology/Client-Server Technologies	MS CC	8	5	Exam	

M.16	Programming languages	Parallel Programming Systems/Parallel Computing	BD CC	7	3	Exam	8
		Etcprogramming in Python/ Fundamentals of Python Programming	MS CC	5	5	Exam	
M.17	Languages and intelligent systems	Fundamentals of robotics and artificial intelligence / Robotic systems and complexes	BD/OC	8	5	Exam	8
		Andartificial intelligence in taskscontrol/Artificial intelligence methods	MS CC	7	3	Exam	
M.18	Programming languages and big data	UndergraduateIpractice I	MS OC	8	3	report	13
		Systems Analysis of Software Design Structures/Systems Analysis	MS CC	6	5	Exam	
		Andinformationalsecurity/cryptography basics	MS CC	7	5	Exam	
M.19	Physical education	Physical education	GD/OC	1,2,3, 4	8	report	8
M.20	Final certification	Writing and defending a thesis or preparing and passing a comprehensive exam	FC	8	12	DW	12