

Ministry of agriculture of the Republic of Kazakhstan  
S. Seifullin Kazakh Agrotechnical University

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"CLAIM "

President

JSC " S. Seifullin Kazakh  
Agrotechnical University"

A.K. Kurishbayev



« 30 » 05 2019

**EDUCATIONAL PROGRAM**

**«Business - Informatics»**

(program name)

Code and classification education	6B06 Information and communication technology
Code and classification of training areas	6B061 Information and communication technologies
Code in the International standard classification of education	0613
Degree awarded	Bachelor's degree in the field of information and communication technologies in the educational program 6B06102 – "Business Informatics»
Duration of training	4 years
Form of training	resident instruction
Language of instruction	National language/ Russian

Nur-Sultan, 2019

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Educational program 6B06102 – "Business Informatics" was considered at the meeting of the Department "Information and communication technologies", Protocol № 12 from 13.02.2009, and approved by the scientific Council of the faculty of computer systems and vocational education, Protocol № 11 from 14.02.2019.

Dean of the faculty of CSVT



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## 1 Passport of the educational program

Code and classification education	6B06 Information and communication technology
Code and classification of training areas	6B061 Information and communication technology
Code in the International standard classification of education	0613
Name of educational program	Business- Informatics
Type of educational program	New
Purpose of educational program	Training of professionals in the development and use of information systems and technologies in business, with knowledge in the field of Informatics, Economics and business administration, taking into account innovations in science, education, industry and business.
Level on NFQ	6
Level on IQF	5-8
Learning outcome	<ol style="list-style-type: none"> <li>1. Logically correct, reasoned and clear construct oral and written speech in the native/foreign language in the corresponding number of social and cultural contexts.</li> <li>2. Analyze worldview, socially and personally significant philosophical problems; driving forces and laws of historical process; events and processes of economic history; the place and role of the country in the history of mankind and in the modern world; socially significant problems and processes occurring in society.</li> <li>3. Describe the essence and importance of information in the development of modern society; apply the basic methods, methods and means of obtaining, storing, processing information, information and communication technologies.</li> <li>4. Have a sufficient level of physical readiness and performance; professionally significant physical and psychomotor abilities. Use methods and means of physical culture for increase of adaptive reserves of an organism and strengthening of health; apply knowledge and skills of a healthy lifestyle, ways of preservation and strengthening of health.</li> <li>5. Apply the basic methods of natural science disciplines in professional activity for theoretical and experimental research; to use the appropriate mathematical apparatus and tools for processing, analysis and systematization of information.</li> </ol>

	<p>6. Classify patterns of economic development and law; analyze the state and trends of socio-economic development of the national and world economy. Analyze and interpret financial and accounting information; analyze socially significant problems and processes occurring in society, and predict their possible development in the future.</p> <p>7. Apply basic algorithms of information processing to solving applied problems, evaluate the complexity of algorithms, program and test programs.</p> <p>8. Use the protocols of data exchange in the network; the possibility of building web sites. Develop user interfaces and applications. Use tools to develop mobile, cloud and web applications. Solve problems arising at different phases of the life cycle of software systems. Apply the basic methods of software testing, use application programs for software testing.</p> <p>9. Determine the purpose and main components of database systems, the basic concepts of the relational data model. Build a conceptual model of a given subject area; apply database design techniques to solve practical problems in the field of corporate information systems.</p> <p>10. List the principles of data analysis and processing, methods of their presentation and storage; the main tasks and methods of data mining; the possibilities of modern and advanced software development tools, hardware.</p> <p>11. Design objects of professional activity and their elements according to the specification and normative and technical documentation, observing various requirements, and also to carry out a feasibility study of design decisions and the presentation of results of work.</p>
Legal and regulatory framework	<ul style="list-style-type: none"> <li>• Constitution of the Republic of Kazakhstan.</li> <li>• Law of the Republic of Kazakhstan dated July 27, 2007 № 319-III "On education" (with amendments and additions as of 01.01.2009).</li> <li>• Order of the Minister of education and science of the Republic of Kazakhstan dated October 31, 2018 №604 "On approval of state educational standards at all levels of education".</li> <li>• National qualifications framework of 16.03.2016</li> <li>• Industry qualifications framework in the field of information and communication technologies, No. 1 of 20.12.2016.</li> <li>• Professional standards: “System analysis in information and communication technologies”, “Business analysis in information and communication technologies”, “Business analytics and IT project management”</li> </ul>
Department	Information and communication technologies

## **2 General characteristics of the educational program**

### **2.1 Relevance**

The need for business Informatics specialists in international and domestic companies is growing rapidly. This is a new and promising type of activity associated with the use of information technologies and resources to solve current economic and management problems of companies in all spheres and sectors of all forms of ownership.

The relevance of the educational program "Business Informatics" is due to the urgent need for specialists in the field of information and communication technologies that can improve business efficiency.

Currently, organizations working in a highly competitive environment and the need to constantly optimize their resources need specialists with interdisciplinary knowledge, able to solve the problems of business analysis, business process reengineering, design, implementation and operation of information systems.

Students have the opportunity to choose an individual learning path, participate in research and project work.

### **2.2 Competitive advantage**

The main and significant advantage of business Informatics is that this specialist has both deep knowledge of Economics, management and information and communication technologies.

- Experienced scientists and teachers train future specialists, preserving and developing rich traditions at the Department and faculty.

- The educational program "Business Informatics" was developed in cooperation with employers, representatives of the Kazakhstan Association of IT companies, taking into account the opinion of stakeholders.

- All specialized disciplines are provided with 4 laboratories, there is an IT training center.

- Full multimedia equipment of all classrooms with audio and video recording to control the quality of the educational process and ensure the safety of students.

- Full provision of educational and methodical materials in the state and Russian languages for classroom and independent work.

- Close relationship with potential employers.

### **2.3 Base of practices and employment**

Agrofirma "Rodina" Bayserke-Agro, JSC "Kazakhtelecom", LLP "ARTA Software", LLP "Kazdream Technologies", JSC NC "Kazakhstan gharysh Sapary".

#### **Places of potential employment:**

- companies of all branches and spheres of activity, any organizational and legal form, using information and communication technologies;

- structures of public administration bodies and national companies developing and operating information and communication technologies, implementing IT projects;
- business structure, implementing IT-projects;
- consulting firms on IT-technologies of business support.

## **2.4 Potential activity**

- system architects;
- specialist in conducting business analysis in ICT;
- business intelligence in IT;
- managers of IT-projects and IT-programs of enterprises, organizations;
- managers of business units and organizations involved in the development and operation of information and communication technologies;
- managers of business processes on the basis of information and communication technologies;
- information support managers for projects and programs using professional computer programs;
- specialists in sales and services, business development.

### 3 Competence model (portrait) of a graduate

#### 3.1 Areas of professional activity

- Conducting theoretical and applied research in the field of practical application of IT.
- Development, adaptation and implementation of IT solutions.
- Strategic planning for the development of information systems (is) and information and communication technologies (ICT) for enterprise management.
- Organization of the life cycle processes of IP and ICT enterprise management.
- User support in the implementation of hardware and software solutions.
- Analytical support of decision-making processes for enterprise management.

#### 3.2 Types of professional activity

A bachelor graduate can solve the following professional tasks in accordance with the types of professional activity:

- **analytical:**
  - enterprise architecture analysis;
  - ICT market research and analysis;
  - analysis and evaluation of ICT application for business management;
  - analysis of innovations in Economics, management and ICT;
- **organizational and managerial:**
  - survey of activities and it infrastructure of enterprises;
  - management of it services and content of information resources of the enterprise;
  - planning and organization of work of small design and implementation groups;
- **design:**
  - development of projects to improve business processes and it infrastructure of the enterprise;
  - development of project documentation for the implementation of works to improve the strategy and objectives, business processes and it infrastructure of the enterprise;
- **research:**
  - search, collection, processing, analysis and systematization of information in the economy, management and ICT;
  - preparation of reviews, reports and scientific publications;
- **consulting:**
  - audit of business processes and it infrastructure of enterprises;
  - training and advising users in the implementation and operation of ICT;
- **innovation and entrepreneurship:**
  - describe the target segments of the ICT market;



- development of business plans for the creation of new business projects based on innovation in the field of ICT;
- to use the best practices of promoting innovative software and information products and services
- creation of new business projects based on ICT innovations.

### **3.3 General competences**

- A graduate of the bachelor's program must have the following General competences:
- Logically correct, reasoned and clear construction of oral and written speech in the native/foreign language in a number of social and cultural contexts.
- Analyze worldview, social and personally significant philosophical problems; driving forces and laws of the historical process; events and processes of economic history; the place and role of the country in the history of mankind and in the modern world; socially significant problems and processes taking place in society.
- Describe the nature and importance of information in the development of modern society; apply the basic methods, methods and means of obtaining, storing, processing information, information and communication technologies.
- Have a sufficient level of physical readiness and performance; professionally significant physical and psychomotor abilities. To use methods and means of physical culture for increase of adaptive reserves of an organism and strengthening of health; to apply knowledge and skills of a healthy lifestyle, ways of preservation and
- To classify patterns of economic and legal development; to analyze the state and trends of socio-economic development of the national and world economy; to implement an interdisciplinary approach in solving economic and legal problems; to use normative legal documents in their professional activities.

### **3.4 Core competencies**

A graduate of a bachelor's program must have the following basic competencies:

- Apply the basic methods of natural science disciplines in professional activities for theoretical and experimental research; use the appropriate mathematical apparatus and tools for processing, analysis and systematization of information.
- Describe basic abstract types (structures) of data (containers), their characteristics, applicable operations and methods of implementation in the programming language.
- Develop programs in one of the programming languages that implement specified algorithms and use certain data structures.

- Create a user-friendly interface for software, including console applications, applications with external data sources, etc. to solve application problems.
- List the main provisions of the theory of databases, data warehouses, knowledge bases, conceptual, logical and physical data models.
- Develop information-logical, functional and object-oriented models of information systems, data models of information systems.
- Choose methods and means of presenting data and knowledge about the subject area, methods and means of analysis of information systems, technologies of implementation, implementation of the information system project; information processing tools.
- Make optimal and rational decisions from a variety of alternatives. To apply methods of system analysis, synthesis and control technologies for solving applied problems.
- To describe the essence of economic phenomena and processes, their interrelation and interdependence; to analyze the architecture of the enterprise, to evaluate the results of the enterprise, to identify reserves for improving the efficiency of business and entrepreneurial projects.
- To collect the initial data necessary for the calculation of economic and socio-economic indicators characterizing the activities of economic entities; on the basis of standard techniques and the current regulatory framework to calculate the economic and socio-economic indicators characterizing the activities of economic entities.
- Analyze and interpret financial, accounting and other information contained in the reports of enterprises of various forms of ownership, organizations, departments and use the information to make business decisions; analyze socially significant problems and processes occurring in society, and predict their possible development in the future.

### **3.5 Professional competence**

Bachelor degree graduates must have the following professional competences:

- Describe the basics of scientific organization and regulation of labor, the essence of leadership; theory of motivation, conflict resolution. Effectively organize team work on the basis of knowledge of the principles of team formation and processes of group dynamics. To solve problems related to improper execution and conflict situations.
- Identify quantitative and qualitative economic relationships through mathematical and statistical methods and models.
- Develop Internet applications. Use web application development tools.
- Prepare scientific and technical reports, presentations, scientific publications on the results of the research.
- Design and implement IT infrastructure components of the enterprise that ensure the achievement of strategic goals and support of business processes.
- To conduct a survey of the activities and IT-infrastructure of enterprises, to use modern standards and methods, to develop regulations for the management of the processes of the life cycle of IT-infrastructure of enterprises.
- Develop and manage the content of the enterprise and Internet resources, manage the processes of creation and use of information services (content services)

- Conduct research and analysis of the it and ICT market, describe the target segments of the ICT market, choose rational it and ICT solutions for business management.
- Prepare and maintain contract documentation for the development, acquisition, or supply of it and ICT.
- To position the electronic enterprise in the global market; to design the architecture of the electronic enterprise, to form the consumer audience and to interact with consumers, to organize sales in the Internet environment
- Plan and organize project activities based on project management standards.
- Carry out a feasibility study of projects to improve and regulate business processes and IT infrastructure of the enterprise.

#### 4 Structure of the educational program

№	Name of cycles and disciplines	Total labor intensity		
		in academic hours	in academic credits	
1	2	3	4	
1	The cycle of General educational disciplines (OOD)	1680	56	
1)	Required component	1530	51	
	Kazakh (Russian) language	300	10	
	Foreign language	300	10	
	Information and communication technologies (English)	150	5	
	Module of socio-political knowledge (sociology, political science, cultural studies, psychology)	240	8	
	Physical culture	240	8	
	Modern history of Kazakhstan	150	5	
	Philosophy	150	5	
2)	High school component	150	5	
	Fundamentals of Economics and law	150	5	
2	Cycle of basic disciplines (DB) (list of disciplines according to RUE OP)	3360	112	
1)	High school component	1680	56	
	Mathematical foundations of information technologies	150	5	
	Applications of discrete mathematics and numerical methods	210	7	
	Probability and statistics in computer science	150	5	
	Algorithms and data structures	180	6	
	Programming technology	150	5	
	Data management	150	5	
	Design of software systems	120	4	
	Systems analysis and decision making	150	5	
	Business Economics	150	5	
	Educational practice	30	1	
	Manufacturing practice	240	8	
	2)	Component of choice	1680	56
		Leadership and team management	120	4
Business statistics /statistical software Packages		120	4	
Information processes, systems and networks		120	4	
Econometrics for business solutions / game Theory		150	5	

	Python programming / Java Programming / C/C++Programming	150	5
	Web application development	150	5
	Business process analysis	150	5
	Basics of information design and visualization	120	4
	Occupational safety and health	60	2
	Requirements development and software testing	150	5
	Corporate information system	150	5
	Business process modeling	120	4
	Cloud and mobile technologies	120	4
3	Cycle majors (AP)	1800	60
	High school component	1500	50
	Data analysis	180	6
	It services and content management	180	6
	E-business	150	5
1)	Neural network basics	150	5
	Information security	150	5
	It project management	150	5
	Design work	240	8
	Professional practice (industrial, pre-diploma)	300	10
	Component of choice	300	10
2)	IT-marketing / ICT Markets and sales organization	150	5
	The foundations of the digital economy	150	5
4	Additional training (Feb)		
1)	Optional component (military training and other educational activities determined by the student independently)		
5	Final certification	360	12
1)	Writing and defense of diploma work (project) or preparation and submission of comprehensive exam	360	12
	Subtotal	7200	240





2. Матрица модулей / 2. Module specialisation matrix / 2. Specialty modules

1	Корытцыз аттестация Итоговая аттестация Final validation	КА ИА FE	ЖБП ООД GES UC	ЖК БК UC	NZDRP401	12,00	360,00	Дипломная жұмысты (жобаны) жазу және қорғау Написание и защита дипломной работы (project)	12,00	360,00	Writing and defense of thesis (project) English	12,00	360,00	Мәхкімдік бойынша мемлекеттік емтихан Государственный экзамен по специальности	12,00	360,00	State examination in major	12,00	360,00	Экономика және құқық негіздері Основы экономики и права	5,00	150,00	50,00	20,00	30,00	80,00	Четвертый триместр
2	Экономикалық білім берушілік Экономико-управленческий Economic and managerial	ЖБП ООД GES UC	ЖК БК UC	ЖК БК UC	OEPR2102	5,00	150,00	Экономика және құқық негіздері Основы экономики и права	5,00	150,00	50,00	20,00	30,00	80,00	Четвертый триместр												
		БП БД БС	ЖК БК UC	ЖК БК UC	LUK2202	4,00	120,00	Қабылдамалық және компания білім берушілік Лидерство и управление командой	4,00	120,00	40,00	20,00	20,00	64,00	Четвертый триместр												
		КП ПД ПС	ЖК БК UC	ЖК БК UC	M4302	5,00	150,00	IT-маркетинг	5,00	150,00	50,00	20,00	30,00	80,00	Десятый триместр												
		БД БС	ЖК БК UC	ЖК БК UC	BS2003	4,00	120,00	Бизнес-статистика	4,00	120,00	40,00	20,00	20,00	64,00	Пятый триместр												
		БП БД БС	ЖК БК UC	ЖК БК UC	PSP2204	4,00	120,00	Статистикалық бағдарламалар Пакеты статистических программ	4,00	120,00	40,00	20,00	20,00	64,00	Пятый триместр												
		КП ПД ПС	ЖК БК UC	ЖК БК UC	KOP4304	5,00	150,00	АКТ нарықтары және сату Рынок ИКТ и организации продаж	5,00	150,00	50,00	20,00	30,00	80,00	Десятый триместр												
		БП БД БС	ЖК БК UC	ЖК БК UC	EBR2205	5,00	150,00	Бизнес-кейстерді арналар Эконометрика для бизнес-решений	5,00	150,00	50,00	20,00	30,00	80,00	Шестой триместр												
		БП БД БС	ЖК БК UC	ЖК БК UC	T2210	5,00	150,00	Обық теориясы Теория игр	5,00	150,00	50,00	20,00	30,00	80,00	Шестой триместр												
		БП БД БС	ЖК БК UC	ЖК БК UC	ABP3218	5,00	150,00	Бизнес-рефераттар талдау Анализ бизнес-процессов	5,00	150,00	50,00	20,00	30,00	80,00	Седьмой триместр												
		БП БД БС	ЖК БК UC	ЖК БК UC	EP3220	5,00	150,00	Кәсіптік экономикасы Экономика предпринимательства	5,00	150,00	50,00	20,00	30,00	80,00	Восьмой триместр												
3	Бизнес-процестерді және жүзделерді модельдеу және талдау Моделирование и анализ бизнес-процессов и систем Modeling and analysis of business processes and systems	КП ПД ПС	ЖК БК UC	ЖК БК UC	AD3301	6,00	180,00	Деректерді талдау Анализ данных	6,00	180,00	60,00	30,00	30,00	96,00	Восьмой триместр												
		КП ПД ПС	ЖК БК UC	ЖК БК UC	ONS4307	5,00	150,00	Нейрондық желілердің негіздері Основы нейронных сетей	5,00	150,00	50,00	20,00	20,00	80,00	Десятый триместр												
		БП БД БС	ЖК БК UC	ЖК БК UC	UD2213	5,00	150,00	Деректерді білім берушілік Управление данными	5,00	150,00	50,00	20,00	20,00	80,00	Пятый триместр												
		БП БД БС	ЖК БК UC	ЖК БК UC	SAPR3217	5,00	150,00	Жүйелік талдау және шешім қабылдау Системный анализ и принятие решений	5,00	150,00	50,00	20,00	20,00	80,00	Седьмой триместр												
		БП БД БС	ЖК БК UC	ЖК БК UC	KIS3226	5,00	150,00	Корпоративтік апараттық жүйелер Корпоративные информационные системы	5,00	150,00	50,00	20,00	20,00	80,00	Восьмой триместр												
		БП БД БС	ЖК БК UC	ЖК БК UC	MBP3227	4,00	120,00	Бизнес-үздіктерді модельдеу Моделирование бизнес-процессов	4,00	120,00	40,00	20,00	20,00	64,00	Десятый триместр												
4	АТ инфрақұрылымын жобалау IT-проектирование IT infrastructure design	КП ПД ПС	ЖК БК UC	ЖК БК UC	USK3303	6,00	180,00	IT-сервистерді және контентті білім берушілік Управление IT-сервисами и контентом	6,00	180,00	60,00	30,00	30,00	96,00	Десятый триместр												
		КП ПД ПС	ЖК БК UC	ЖК БК UC	EB4305	5,00	150,00	Электрондық бизнес Электронный бизнес	5,00	150,00	50,00	20,00	20,00	80,00	Десятый триместр												
		КП ПД ПС	ЖК БК UC	ЖК БК UC	OCE4306	5,00	150,00	Салық экономикасы негіздері Основы цифровой экономики	5,00	150,00	50,00	20,00	20,00	80,00	Десятилетний триместр												
		БП БД БС	ЖК БК UC	ЖК БК UC	ASD2208	6,00	180,00	Алгоритмдер және деректер құрылымдар Алгоритмы и структуры данных	6,00	180,00	60,00	30,00	30,00	96,00	Четвертый триместр												





### Appendix 3. Description of the disciplines of compulsory and university components

<b>1. Basic information about the discipline:</b>	
Name of the discipline:	<b>Kazakh (Russian) language</b>
<b>2. Prerequisites:</b>	
<b>3. Post requisites:</b>	
<b>4. The content of the discipline:</b>	The formation of the socio-humanitarian worldview of students in the context of the national idea of spiritual modernization, which involves the development on the basis of national consciousness and the cultural code of the qualities of internationalism, a tolerant attitude to world cultures and languages as translators of world-class knowledge, advanced modern technologies, the use and transfer of which can ensure the country's modernization and personal career growth of future specialists

<b>1. Basic information about the discipline:</b>	
Name of the discipline:	<b>Foreign language</b>
<b>2. Prerequisites:</b>	
<b>3. Post requisites:</b>	
<b>4. The content of the discipline:</b>	The main purpose of the discipline "Foreign Language" is to form a communicative competence, i.e. ability and willingness to carry out foreign language interpersonal and intercultural communication with native speakers

<b>1. Basic information about the discipline:</b>	
Name of the discipline:	<b>Information and communication technology</b>
<b>2. Prerequisites:</b>	School course of informatics, mathematics, physics
<b>3. Post requisites:</b>	Algorithms and data structures, Programming technology, Data management, Information design and visualization basics
<b>4. The content of the discipline:</b>	The role of information and communication technologies (ICT) in key sectors of society. ICT standards. Architecture of computer systems. Software. OS. Human-computer interaction. Database systems. Data analysis. Data management. Networks and telecommunications. Cybersecurity. Internet technologies. Cloud and mobile technology. Multimedia technology. Smart technology. E-technology. E-government. ICT Development Prospects

<b>1. Basic information about the discipline:</b>	
Name of the discipline:	<b>Political Science and Sociology</b>
<b>2. Prerequisites:</b>	
<b>3. Post requisites:</b>	Modern History of Kazakhstan, Philosophy, Fundamentals of Economics and Law
<b>4. The content of the discipline:</b>	The section "Political Science" forms knowledge about the laws and laws of world politics and modern political processes, explaining the essence and content of the policies of nation-states. The formation of a socio-humanitarian worldview as the basis for the modernization of public consciousness. The section "Sociology" is designed to form the ability of a critical understanding of the system of interpersonal relations in society, awareness of the nature of society, the system of its groups and institutions

<b>1. Basic information about the discipline:</b>	
Name of the discipline:	<b>Physical education</b>
<b>2. Prerequisites:</b>	
<b>3. Post requisites:</b>	
<b>4. The content of the discipline:</b>	Discipline will help students become a harmoniously developed personality, acquire knowledge in the field of physical education, strengthen health. Ensuring a sufficient level of physical readiness of future specialists, a high level of working capacity, the development of professionally significant physical and psychomotor abilities, improving the sportsmanship of student athletes

<b>1. Basic information about the discipline:</b>	
Name of the discipline:	<b>The modern history of Kazakhstan</b>
<b>2. Prerequisites:</b>	Political Science and Sociology
<b>3. Post requisites:</b>	Culturology and Psychology, Philosophy, Fundamentals of Economics and Law
<b>4. The content of the discipline:</b>	Attention is focused on the characterization of history, the specificity of historical processes and phenomena. The course examines the features and specifics of historical processes, the formation of a patriotic spirit among students. Studying the specifics of the subject and methods of historical culture. Discipline is based on theoretical and methodological concepts. Priority given to national ideas and movements

<b>1. Basic information about the discipline:</b>	
Name of the discipline:	<b>Culturology and Psychology</b>
<b>2. Prerequisites:</b>	The modern history of Kazakhstan
<b>3. Post requisites:</b>	Philosophy
<b>4. The content of the discipline:</b>	The section "Culturology" is aimed at developing a social and humanitarian worldview, the ability to analyze and evaluate cultural situations, the specifics of cultural objects, and the role of cultural values in intercultural communication. The section "Psychology" includes the basics of general psychology, personality psychology, individual and typological characteristics of the personality; emotional and volitional sphere of personality; cognitive processes. Psychology of professional communication

<b>1. Basic information about the discipline:</b>	
Name of the discipline:	<b>Philosophy</b>
<b>2. Prerequisites:</b>	Political Science and Sociology, Contemporary History of Kazakhstan, Cultural Studies and Psychology
<b>3. Post requisites:</b>	
<b>4. The content of the discipline:</b>	Formation of openness of consciousness, understanding of one's own national code and national identity, spiritual modernization, competitiveness, realism and pragmatism, independent critical thinking, the cult of knowledge and education, the assimilation of such key philosophical concepts as justice, dignity and freedom, as well as the development and strengthening of values tolerance, intercultural dialogue and a culture of peace

<b>1. Basic information about the discipline:</b>	
Name of the discipline:	<b>Fundamentals of Economics and Law</b>
<b>2. Prerequisites:</b>	Political Science and Sociology, Contemporary History of Kazakhstan
<b>3. Post requisites:</b>	Business Statistics, Econometrics for Business Solutions
<b>4. The content of the discipline:</b>	Fundamentals of social production and forms of social economy. The mechanism of functioning of the market system. Production, costs and income of the company. National economy. Economic growth and market instability. Inflation and unemployment are a manifestation of economic instability. Fundamentals of the theory of state and law, constitutional law, administrative law, civil law, labor law, family law, criminal law

<b>1. Basic information about the discipline:</b>	
Name of the discipline:	<b>Mathematical Foundations of Information Technology</b>
<b>2. Prerequisites:</b>	School course in mathematics and physics
<b>3. Post requisites:</b>	Discrete mathematics applications and numerical methods, Probability and statistics in computer science, Algorithms and data structures
<b>4. The content of the discipline:</b>	Methods and typical problems of linear algebra, vector algebra, analytic geometry, differentiation of functions of one variable, integration of functions of one variable, differentiation of functions of several variables, multiple integrals, solution of ordinary differential equations of the first order, solution of ordinary differential equations of higher orders, number theory, theory functional series

<b>1. Basic information about the discipline:</b>	
Name of the discipline:	<b>Discrete mathematics applications and numerical methods</b>
<b>2. Prerequisites:</b>	Mathematical Foundations of Information Technology
<b>3. Post requisites:</b>	Probability and Statistics in Computer Science, Algorithms and Data Structures
<b>4. The content of the discipline:</b>	Elements of mathematical logic. Boolean functions. Sets and ways of their task. Operations on sets. Cartesian factors. Combinatorics. Binomials. Fundamentals of graph theory. Ways to set graphs. Elements of coding theory. Hamming code. Elements of the theory of errors. Solutions of linear and nonlinear equations. Interpolation and approximation, simplex method, Transport problem, elements of the theory of matrix games

<b>1. Basic information about the discipline:</b>	
Name of the discipline:	<b>Probability and Statistics in Computer Science</b>
<b>2. Prerequisites:</b>	Mathematical Foundations of Information Technology
<b>3. Post requisites:</b>	Business Statistics, Statistical Software Packages
<b>4. The content of the discipline:</b>	Methods and typical problems of probability theory: random events, probability of a random event, discrete random variables, their characteristics, continuous random variables, their characteristics, distribution laws, elements of the correlation theory, the law of large numbers. Methods and typical problems of mathematical statistics: the basics of the selective method and elements of the statistical theory of estimation, statistical study of dependence, methods of statistical testing of hypotheses

<b>1. Basic information about the discipline:</b>	
Name of the discipline:	<b>Algorithms and data structures</b>
<b>2. Prerequisites:</b>	Information and communication technologies, Mathematical foundations of information technology, Discrete mathematics applications and numerical methods
<b>3. Post requisites:</b>	Programming Technology, Programming in Python / Programming in Java / Programming in C / C ++
<b>4. The content of the discipline:</b>	Introduction to Algorithms. The concept of an algorithm, the structure of algorithms: linear, branching, cyclic. Sorting algorithms, Shell algorithm, search algorithms, recursive algorithm. Formal languages and grammars, Turing machine automata, data and their types. Data structure: array, sets, records, stack, queue, linked list, tree, graph, prefix tree, hash table, file. Compression Algorithm - Huffman Algorithm, Euclidean Algorithm

<b>1. Basic information about the discipline:</b>	
Name of the discipline:	<b>Programming technology</b>
<b>2. Prerequisites:</b>	Information and Communication Technologies, Algorithms and Data Structures
<b>3. Post requisites:</b>	Python Programming / Java Programming / C / C ++ Programming, Requirement Development and Software Testing
<b>4. The content of the discipline:</b>	The life cycle of a software product. Software architecture (software). Development models, technologies. Software structure design. Programming paradigms: visual, functional, procedural, object-oriented, etc. Technology for creating software code, distributed computing, collective software development. Software tools for planning and managing the development process. Methods of debugging and testing programs. Documentation and quality assessment of software products

<b>1. Basic information about the discipline:</b>	
Name of the discipline:	<b>Data management</b>
<b>2. Prerequisites:</b>	Information and communication technology
<b>3. Post requisites:</b>	Software Systems Design, Data Analysis, Corporate Information Systems
<b>4. The content of the discipline:</b>	Basic concepts of database theory. Database system architecture. Data transfer control system. Distributed processing. Relational Databases Data Integrity Conditions. The main properties of relationships. Indices. Database Design. Normalization of data. Database management system

<b>1. Basic information about the discipline:</b>	
Name of the discipline:	<b>Software Design</b>
<b>2. Prerequisites:</b>	Python Programming / Java Programming / C / C ++ Programming, Data Management
<b>3. Post requisites:</b>	Development of requirements and software testing, design work
<b>4. The content of the discipline:</b>	Software design goals (software). Software Design Sequence. Unified modeling language UML. The main diagrams. Requirements analysis. Analysis classes. State diagrams (state machines). Software Architecture Quality assessment of software system architectures. Detailed software design. Design classes. Design patterns. Using components in software design. Design in concrete classes and design in interfaces

<b>1. Basic information about the discipline:</b>	
Name of the discipline:	<b>System analysis and decision making</b>
<b>2. Prerequisites:</b>	Mathematical Foundations of Information Technology, Information and Communication Technologies
<b>3. Post requisites:</b>	Data Analysis, Project work
<b>4. The content of the discipline:</b>	Methodology of system analysis and decision making. Typical classes of operation control tasks. Mathematical methods of system analysis and decision making. Application of methods and methodologies of system analysis and decision making in the development of computer systems

<b>1. Basic information about the discipline:</b>	
Name of the discipline:	<b>Business Economics</b>
<b>2. Prerequisites:</b>	Fundamentals of Economics and Law, Business Statistics
<b>3. Post requisites:</b>	ICT Markets and Sales Organization, E-Business, IT Project Management
<b>4. The content of the discipline:</b>	Entrepreneurship: concept, essence, types and forms. The resource potential of the organization. Rationing and remuneration. Costs, financial performance. Economic efficiency of the organization and business projects. Marketing and organization management. State support for entrepreneurship. Business planning. Organization of business transactions. Responsibility of subjects. Risks in entrepreneurial activity. Entrepreneurial secret and ways to protect it. Termination of Entrepreneurship

<b>1. Basic information about the discipline:</b>	
Name of the discipline:	<b>Data analysis</b>
<b>2. Prerequisites:</b>	Mathematical Foundations of Information Technologies, Information and Communication Technologies, System Analysis and Decision Making
<b>3. Post requisites:</b>	Business Process Modeling, Project work
<b>4. The content of the discipline:</b>	Concepts, techniques, mathematical methods and models intended for organizing the selection of the units to be examined from the studied set, their standard recording, systematization and processing in order to conveniently present and interpret them, and to obtain scientific and practical conclusions. General and sample population. Correlation analysis. Regression analysis. Classification of multidimensional spaces. Time Data Analysis

<b>1. Basic information about the discipline:</b>	
Name of the discipline:	<b>IT Services &amp; Content Management</b>
<b>2. Prerequisites:</b>	Information and communications technology, Internet application development
<b>3. Post requisites:</b>	IT Marketing, Basics of the Digital Economy, Project Work
<b>4. The content of the discipline:</b>	Management of information resources and content. General concepts of IT services: definition, business value, usefulness and quality that make up IT services, life cycle of IT services. IT service management processes. Organizational issues of IT services management

<b>1. Basic information about the discipline:</b>	
Name of the discipline:	<b>Educational practice</b>

<b>2. Prerequisites:</b>	Information and communication technology
<b>3. Post requisites:</b>	Algorithmization and programming, programming technology
<b>4. The content of the discipline:</b>	Acquaintance with the organizational structure of the university, with the organization of the educational process; tour of the educational buildings and classrooms; familiarization with the functions and contents of the work; familiarization with safety in classrooms; familiarization with regulatory and technical documentation; preparation of a report on practice. Basics of programming. Branching algorithms. Cycles. Data arrays. Functions Strings and characters. Files

<b>1. Basic information about the discipline:</b>	
Name of the discipline:	<b>Internship</b>
<b>2. Prerequisites:</b>	Data Management, Python Programming / Java Programming / C / C ++ Programming, Software Design
<b>3. Post requisites:</b>	Course and diploma design
<b>4. The content of the discipline:</b>	Issuance of tasks, paperwork. Safety briefing (general). Safety study and instruction at the workplace. Familiarization with the activities of the organization / enterprise. Fulfillment of production tasks for automation and / or software development. The study of theoretical material. Independent work with literature and technical documentation. Collection, processing, systematization and analysis of factual and literary materials

<b>1. Basic information about the discipline:</b>	
Name of the discipline:	<b>E-business</b>
<b>2. Prerequisites:</b>	Internet Application Development, Business Economics, Cloud and Mobile
<b>3. Post requisites:</b>	Fundamentals of the Digital Economy, Project Work
<b>4. The content of the discipline:</b>	The essence of electronic business, its advantages and disadvantages. Classification of e-commerce systems. Supplier Relationship Management (CSM) and Customer Relationship Management (CRM) systems. Corporate portals and e-business tools in the corporate sector. Electronic trading platforms. Payments in e-commerce systems. Classification of payments and payment systems. Payment Security

<b>1. Basic information about the discipline:</b>	
Name of the discipline:	<b>The basics of neural networks</b>
<b>2. Prerequisites:</b>	Mathematical foundations of information technology, Discrete mathematics applications and numerical methods, programming technology
<b>3. Post requisites:</b>	Project work
<b>4. The content of the discipline:</b>	Basic concepts of the theory of neural networks. Models of neurons. Classification of neural networks. Teaching methods for an individual neuron. Algorithms and analytical methods for training neural networks. Programming neural networks. Genetic Algorithms. Computational capabilities of an individual neuron, direct distribution networks, recurrent neural networks. Analysis of neural network training logs. Selection of the optimal architecture of neural networks

<b>1. Basic information about the discipline:</b>	
Name of the discipline:	<b>Information Security</b>
<b>2. Prerequisites:</b>	Information and communication technologies, Information processes, systems and networks, Corporate information systems
<b>3. Post requisites:</b>	Project work
<b>4. The content of the discipline:</b>	Sources of threats. Technical, software, organizational, legal, cryptographic methods and means of information protection. Models and principles of protection against unauthorized access. Methods of antivirus protection of information. Legislative and regulatory framework in the field of information security of the Republic of Kazakhstan: "On personal data and their protection", Unified requirements in the field of ICT and information security, The concept of cybersecurity

<b>1. Basic information about the discipline:</b>	
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## Appendix 4 Description of Disciplines of the Optional Component

<b>1. Basic information about the discipline:</b>	
Name of the discipline:	<b>Leadership and Team Management</b>
<b>2. Prerequisites:</b>	Political Science and Sociology
<b>3. Post requisites:</b>	Business Economics, Project work
<b>4. The content of the discipline:</b>	Leader Function. Types of teams. Group thinking and group pressure as ways to influence its participants. Technologies of self-actualization and increasing the effectiveness of a leader. Planning as a function of a leader in an organization. Psychological mechanisms of promotion to a leadership position. The process of formation and development of a social group. Tools for managing the socio-psychological climate in a team. Management decisions of a team leader

<b>1. Basic information about the discipline:</b>	
Name of the discipline:	<b>Business statistics</b>
<b>2. Prerequisites:</b>	Information and Communication Technologies, Probability and Statistics in Computer Science, Fundamentals of Economics and Law
<b>3. Post requisites:</b>	Business Economics, IT Marketing
<b>4. The content of the discipline:</b>	Subject and methods of statistics. Statistical observation, systematization of data and their presentation. Statistical grouping, tables. Absolute and relative indicators, their graphic representation. Average values and indicators of variation. Selective method in statistical studies. Statistical hypothesis testing. Random variables and probabilistic models. A statistical study of the dynamics of business processes. Economic indices. Statistical study of the relationship of social phenomena

<b>1. Basic information about the discipline:</b>	
Name of the discipline:	<b>Statistical Packages</b>
<b>2. Prerequisites:</b>	Information and Communication Technologies, Probability and Statistics in Computer Science
<b>3. Post requisites:</b>	Project work
<b>4. The content of the discipline:</b>	Studying the interface of statistical software (software). General mathematical and special statistical graphs, methods for constructing and editing them. Sample characteristics, Student and Fisher criteria, one-way analysis of variance, correlation analysis, Chi-square uniformity and conjugacy criteria. Calculation of sample characteristics, construction of a histogram and EGF. Regression analysis. Cluster analysis

<b>1. Basic information about the discipline:</b>	
Name of the discipline:	<b>Information Processes, Systems and Networks</b>
<b>2. Prerequisites:</b>	Information and communication technologies, Mathematical foundations of information technology
<b>3. Post requisites:</b>	Internet Application Development, Software Design, Fundamentals of Neural Networks
<b>4. The content of the discipline:</b>	The basic principles of building computer networks. Network architectures. Hardware components of computer networks. Network models. Protocols Addressing in networks. Interworking. Information Systems. Information extraction: main phases. Forms and methods of data research. Information search methods on the Internet based on information retrieval systems. Transportation of information. OSI reference model

<b>1. Basic information about the discipline:</b>	
Name of the discipline:	<b>Econometrics for business solutions</b>
<b>2. Prerequisites:</b>	Mathematical Foundations of Information Technology, Fundamentals of Economics and Law
<b>3. Post requisites:</b>	Business Process Analysis, Data Analysis
<b>4. The content of the discipline:</b>	The subject and methods of econometrics. The characteristic of interconnections. The main stages of building an econometric model. Methods for selecting factors. Estimation of model parameters. Examples of econometric models. Paired

	regression analysis. Construction of the regression equation. Model specification. Estimation of parameters of nonlinear models. Correlation coefficients. Communication score. Point and interval prediction according to the linear regression equation. Coefficient of elasticity. Multiple Regression Analysis
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<b>1. Basic information about the discipline:</b>	
Name of the discipline:	<b>Game theory</b>
<b>2. Prerequisites:</b>	Information and communication technologies, Mathematical foundations of information technology, Probability and statistics in computer science
<b>3. Post requisites:</b>	System analysis and decision making, project work
<b>4. The content of the discipline:</b>	Classification and presentation of games. Formalization of decision making. The expanded and normal form of the game. Antagonistic games. The principle of minimax. Defensive and balanced strategies. The concept of a mixed strategy. Graphic method for solving games. Solving games using linear programming. Iterative Method Games with full and incomplete information. Endless games. Cooperative games. Billing Set. Pareto Optimality

<b>1. Basic information about the discipline:</b>	
Name of the discipline:	<b>Python Programming</b>
<b>2. Prerequisites:</b>	Algorithms and data structures, programming technology
<b>3. Post requisites:</b>	Software Design, Cloud and Mobile
<b>4. The content of the discipline:</b>	Basic concepts and syntactic constructions. The operators. Data types. Conditional statements, while and for statements. Design blocks of code. Functions, arguments, return values. Modules and libraries. Reading and writing files. Data structures. Arrays, addressing array elements, functions for working with arrays, slices of arrays. Python Standard and Custom Modules

<b>1. Basic information about the discipline:</b>	
Name of the discipline:	<b>Java Programming</b>
<b>2. Prerequisites:</b>	Algorithms and data structures, programming technology
<b>3. Post requisites:</b>	Software Design, Cloud and Mobile
<b>4. The content of the discipline:</b>	Development environments for Java. The syntax of the language. Data types. The operators. Control structures. Arrays Abstraction. Objects Abstract classes. Interfaces Access control. Encapsulation, inheritance and polymorphism. Error handling and exceptions. Interfaces Events. Libraries Layout controllers. Work with network protocols. Work with databases. Sound and graphics. Remote method call. Creating graphical applications

<b>1. Basic information about the discipline:</b>	
Name of the discipline:	<b>C / C ++ Programming</b>
<b>2. Prerequisites:</b>	Algorithms and data structures, programming technology
<b>3. Post requisites:</b>	Software Design, Cloud and Mobile
<b>4. The content of the discipline:</b>	Variables, constants and expressions. Basic data types. Standard features. The operators. Components. Basic preprocessor directives. Programming tasks of linear, branching, cyclic structures in console mode and with components in a programming environment. Arrays Array sorting. Work with files. User Features Global and local variables. Structures. Pointers. Reference data type. Creating dynamic variables. Graphic arts

<b>1. Basic information about the discipline:</b>	
Name of the discipline:	<b>Internet Application Development</b>
<b>2. Prerequisites:</b>	Data management
<b>3. Post requisites:</b>	Requirement development and software testing
<b>4. The content of the discipline:</b>	Classification of Internet technologies. Client and server Internet technologies. Hypertext preprocessors. Ways to interact with the database. Hypertext preprocessor php. Using a preprocessor with a web server. The possibility of forming graphic images. Site management systems. Controls and system interface. Learning the



	principles and techniques of work in a visual editor. Information blocks. Web site templates. Security Considerations for Using Internet Applications
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<b>1. Basic information about the discipline:</b>	
Name of the discipline:	<b>Business process analysis</b>
<b>2. Prerequisites:</b>	Fundamentals of Economics and Law, Business Statistics
<b>3. Post requisites:</b>	Data Analysis, Business Economics
<b>4. The content of the discipline:</b>	Classification and elements of business processes. Stages and methods of modeling business processes. Building a system of analytical indicators for managing business processes. Current and normative models of the business process. Cost and cost models of a business process. Risk analysis. The main types of projects to optimize business processes. Methods for making and adjusting business decisions in the face of uncertainty

<b>1. Basic information about the discipline:</b>	
Name of the discipline:	<b>Fundamentals of Information Design and Visualization</b>
<b>2. Prerequisites:</b>	Information and communication technology
<b>3. Post requisites:</b>	Cloud and mobile technologies, IT project management, Project work
<b>4. The content of the discipline:</b>	Basic concepts of information design. Create presentations. Classification of infographics. General characteristics of tools for creating infographics. Create graphical models in Excel and Google Spreadsheets. Signs and data visualization, curly diagrams. Composition of building graphic schemes. Online infographic tools. Infographics as a means of visualizing economic information and as a marketing and advertising tool. Intelligence cards

<b>1. Basic information about the discipline:</b>	
Name of the discipline:	<b>Occupational health and safety</b>
<b>2. Prerequisites:</b>	
<b>3. Post requisites:</b>	Project work
<b>4. The content of the discipline:</b>	The principles of the organization of labor protection at the enterprise, the tasks and functions of the labor protection service, methods and methods for their implementation, creating a safe human environment, the formation of a technosphere comfortable for human life and work, minimizing the technogenic impact on the natural environment, preserving human life and health through the use of technical means, methods of control and forecasting

<b>1. Basic information about the discipline:</b>	
Name of the discipline:	<b>Requirement development and software testing</b>
<b>2. Prerequisites:</b>	Programming Technology, Internet Application Development, Data Management
<b>3. Post requisites:</b>	Project work
<b>4. The content of the discipline:</b>	An introduction to the design and architecture of software systems from the perspective of identifying requirements. Design concepts. Object-oriented design using UML in the context of requirements analysis. Designing the behavior of systems, their interaction. Documentation of design decisions. Transition from design solutions to program code. Place of testing in the software development life cycle. Test Design Testing Support Tools

<b>1. Basic information about the discipline:</b>	
Name of the discipline:	<b>Corporate Information Systems</b>
<b>2. Prerequisites:</b>	Programming Technology, Internet Application Development, Data Management
<b>3. Post requisites:</b>	Project work
<b>4. The content of the discipline:</b>	Introduction to corporate information systems (CIS). Corporate governance concept, methodology and standards. Corporate Information Systems. Modeling, designing and programming of corporate information systems (CIS). Enterprise Management Software

<b>1. Basic information about the discipline:</b>	
Name of the discipline:	<b>Business Process Modeling</b>
<b>2. Prerequisites:</b>	Programming Technology, Data Analysis, Data Management
<b>3. Post requisites:</b>	Project work, graduation project
<b>4. The content of the discipline:</b>	Process modeling. System modeling, organizational structure model, data structure. Fundamentals of functional modeling. IDEF models, principles of construction and limitations. Models of the main and auxiliary processes. The relationship of models with each other. Maps of organization processes. Audit processes in the organization. Stages of developing a process audit program, planning audits, formulating goals and objectives, designing an audit report

<b>1. Basic information about the discipline:</b>	
Name of the discipline:	<b>Cloud and mobile technology</b>
<b>2. Prerequisites:</b>	Python Programming / Java Programming / C / C ++ Programming, Internet Application Development
<b>3. Post requisites:</b>	Project work, graduation project
<b>4. The content of the discipline:</b>	Cloud computing. Service models in cloud computing. Classification of stages of development of virtualization technologies. Cloud architecture. Distributed information and communication platform architecture. User interaction with the platform. The virtualization subsystem of infrastructure resources in the cloud. The structure of the Android / iOS project. General management of settlements. Mobile carrier cloud technologies, modular and Blade servers. Creating user interfaces

<b>1. Basic information about the discipline:</b>	
Name of the discipline:	<b>IT marketing</b>
<b>2. Prerequisites:</b>	Programming Technology, Business Process Analysis
<b>3. Post requisites:</b>	IT project management, Project work, diploma project
<b>4. The content of the discipline:</b>	IT marketing as a specialized marketing area. The role of marketing in building a business. Types of IT projects, company life cycle. Segmentation, analysis and selection of target segments. The concept of competition, analysis of competitors, sources of information. Using the results of marketing decisions to make a positioning decision. Features of pricing for software products. The most popular monetization models of IT products. Sales policy for IT companies

<b>1. Basic information about the discipline:</b>	
Name of the discipline:	<b>ICT markets and sales organization</b>
<b>2. Prerequisites:</b>	Programming Technology, Business Statistics
<b>3. Post requisites:</b>	IT project management, Project work, diploma project
<b>4. The content of the discipline:</b>	Production technologies and market analysis of information products and services. The world's leading IT manufacturers, suppliers of IT products and IT services, their business development directions, features and current state of the IT market. The dynamics of supply and demand in the IT-market of Kazakhstan. Ways to promote an IT company, information product or service on the IT market; conducting marketing research, collection, systematization and processing of information

<b>1. Basic information about the discipline:</b>	
Name of the discipline:	<b>The basics of the digital economy</b>
<b>2. Prerequisites:</b>	Business Process Modeling, E-Business, IT Marketing
<b>3. Post requisites:</b>	Graduate design
<b>4. The content of the discipline:</b>	The concept of digital technology and the digital economy. Background and consequences of direct and indirect digitalization of public relations. Digital risks and security. State policy in the field of the digital economy. Industrial Internet. Components of robotics and sensorics. Areas of application of end-to-end technologies (cryptocurrencies, "smart city"). Platform technologies in the development of the digital economy. Examples of digital platforms. Industry transformation