

**Л.Б.ГОНЧАРОВ
АТЫНДАҒЫ
ҚАЗАҚ
АВТОМОБИЛЬ-ЖОЛ
ИНСТИТУТЫ**



**КАЗАХСКИЙ
АВТОМОБИЛЬНО-
ДОРОЖНЫЙ
ИНСТИТУТ
ИМ. Л.Б.ГОНЧАРОВА**

**KAZAKH AUTOMOBILE ROAD INSTITUTE
named after L. B. GONCHAROV**



"APPROVED"

**Rector KazARI
named after L.B. Goncharov
R.A. Kabashev**

MODULAR EDUCATIONAL PROGRAM

**Code and classification of training areas:
6B061 Information and communication technology
Name: 6B06106 - «Information Systems»
Level of training: bachelor degree**

Almaty 2022

The modular educational program in the direction of the preparation of the ICT educational program 6B06106 - "Information Systems" was drawn up in accordance with the State Educational Standard of Higher Education, approved by the Order of the Minister of Education and Science of the Republic of Kazakhstan dated October 31, 2018 No. 604 (as amended on 23.07.2021); Classifier of areas for training personnel with higher and postgraduate education, approved by the Order of the Minister of Education and Science of the Republic of Kazakhstan dated October 13, 2018 No. 569 (as amended on June 5, 2020); Classifier of occupations of the NK RK 01-2017, approved by the Order of the Committee for Technical Regulation and Metrology of the Ministry for Investment and Development of the Republic of Kazakhstan dated May 11, 2017 No. 130) -od., Methodological recommendations for universities on the design of educational programs, MES RK, 06.11.2020, normative documents of KazARI.

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The modular educational program was discussed at the meeting of the Department "HK, GED and IS" and recommended for approval.

Protocol No. 10 from "14" april 2022

The modular educational program was reviewed at the meeting of KazARI Education and Methodological Council and recommended for approval.

Protocol number 10 from "14" april 2022

CONTENT

1	Passport of the educational program	4
1.1	Explanatory note	4
1.2	Terms and definitions	5
2	Description of the educational program	7
3	Matrix of correlating learning outcomes for the educational program as a whole with the competencies being formed	11
4	Competency Map	12
5	Training module map	12
6	Information about the disciplines of the educational program	14

1 PASSPORT OF THE EDUCATIONAL PROGRAM

1.1 Explanatory note

With the intensification of globalization and integration processes, human capital acts as a tool to increase the country's competitiveness. For successful competition on the world stage, countries need to train highly qualified personnel who can use their knowledge and skills to develop the country's economy. Human capital is considered as the basis for economic growth in connection with the departure of many countries from the raw material orientation of the economy, labor-intensive production and stimulating the development of innovations and technologies. Therefore, special emphasis is placed on the development and improvement of the quality of higher education, which is aimed at the formation of demanded personnel in accordance with the new realities. The new education system in Kazakhstan is a stage in the creation of an effective educational model, the purpose of which is to increase the functional literacy of university graduates.

The educational program is developed in accordance with the following regulatory documents:

- 1) State Program for the Development of Education and Science of the Republic of Kazakhstan for 2020-2025 Decree of the Government of the Republic of Kazakhstan dated December 27, 2019 No. 988
- 2) The Law of the Republic of Kazakhstan "On Education" dated July 27, 2007 No. 319-III on July 11, 2017 (with amendments and additions as of May 3, 2022)
- 3) The rules for organizing the educational process on credit technology of education, approved by the Order of the Minister of the Ministry of Education and Science of the Republic of Kazakhstan No. 152 dated 20.04.2011 (as amended on 06.05.2022.);
- 4) State compulsory standard of higher education, approved by the Order of the Minister of Education and Science of the Republic of Kazakhstan dated October 31, 2018 No. 604. Registered with the Ministry of Justice of the Republic of Kazakhstan on November 1, 2018 No. 17669 (as amended from 23.07.2021 No. 182)
- 5) Professional standard "Development of highly loaded and real-time applications" Appendix No. 32 to the order of the Deputy Chairman of the Board of the National Chamber of Entrepreneurs of the Republic of Kazakhstan "Atameken" dated 12.24.2019. Number 259
- 6) Professional standard "Business analysis in information and communication technologies" Appendix No. 10 to the order of the Deputy Chairman of the Board of the National Chamber of Entrepreneurs of the Republic of Kazakhstan "Atameken" No. 171 dated July 17, 2017
- 7) Professional standard "Software developers and specialists in testing, web and multimedia applications" Appendix No. 2 to the order of the Deputy Chairman of the Board of the National Chamber of Entrepreneurs of the Republic of Kazakhstan "Atameken" No. 171 dated July 17, 2017
- 8) Professional standard "Creation and management of information resources" Appendix No. 8 to the order of the Deputy Chairman of the Board of the National Chamber of Entrepreneurs of the Republic of Kazakhstan "Atameken" No. 171 dated July 17, 2017
- 9) Professional standard "Development of technical documentation" Appendix No. 4 to the order of the Deputy Chairman of the Board of the National Chamber of Entrepreneurs of the Republic of Kazakhstan "Atameken" No. 171 dated July 17, 2017

- 10) Professional standard “Database Administration” Appendix No. 9 to the order of the Deputy Chairman of the Board of the National Chamber of Entrepreneurs of the Republic of Kazakhstan “Atameken” No. 171 dated July 17, 2017
- 11) Sectoral framework for qualifications “Information and communication technologies” Approved by the minutes of the meeting of the Sectoral Commission in the field of information, informatization, communications and telecommunications dated December 20, 2016 No. 1
- 12) National classifier of the Republic of Kazakhstan. Classifier of occupations of the Tax Code of the Republic of Kazakhstan 01-2017
- 13) Legal documents of KazARI

The educational program of specialty 6B06106 - “Information Systems” is implemented on the basis of State license number KZ59LAA00017181, issued by the Committee for Control in the Field of Education and Science of the Ministry of Education and Science of the Republic of Kazakhstan dated October 10, 2019 and Certificate No. AB0859 of 04/01/16 specialized accreditation Independent Agency for accreditation and rating for the specialty 5B070300 "Information Systems" for a period of five years (04/01/16 - 03/31/21)

The educational program "Information Systems" has two learning paths:

- 1) Information systems in the road sector.
- 2) Information systems in business and management.

The mission of the educational program is focused on providing high quality educational services in the field of higher education while training specialists who will have knowledge of the methodological foundations of designing and implementing automated information systems, modern technologies of developing information systems, administering and designing databases, server and network infrastructure in implementation projects.

The objective of the educational program is to train broad-based specialists with a focus on the implementation of Kazakhstan and international high-tech projects and work in companies with significant intellectual capital, as well as in high-tech companies offering innovative methods and developments in the field of automated information systems, the information technology industry and the automotive transport.

1.2 Terms and definitions

In this educational program, terms and definitions are used in accordance with the Law of the Republic of Kazakhstan “On Education”, as well as terms adopted in the Kazakh Automobile and Road Institute named after L.B.Goncharov (KazARI):

Higher special education is an educational program of higher education aimed at training specialists with qualification in the relevant specialty with a normative education period of at least 4 years.

Bachelor - an academic degree awarded to persons who have mastered the relevant educational programs of higher education.

Type of professional activity – methods, ways, techniques, the nature of professional activity impact on the objects in order to change it, transform.

Dublin Handle - The European Higher Education Qualification Framework. Describes in a generalized form the learning outcomes for different skill levels. The system of descriptors is invariant, i.e. not tied to a specific educational context, which facilitates the comparison of qualifications. Dublin descriptors represent the agreed requirements for the assessment of learning outcomes in each cycle of higher education and can be applied in national higher education systems with a greater degree of detail.

Credit unit (credit) - a measure of the complexity of the educational program.

Competences - the ability to practical use acquired in the process of learning knowledge and skills in professional activities;

Inclusive education is a process that ensures equal access to education for all students, taking into account special educational needs and individual opportunities.

Module - a set of parts of the discipline (course) or disciplines (courses), which has a certain logical completeness in relation to the established goals and results of education, training.

National qualification framework - a structured description of the qualification levels recognized in the labor market.

National qualifications system - a set of mechanisms of legal and institutional regulation of supply and demand for qualifications of specialists from the labor market.

The direction of training is a set of educational programs of various levels aimed at training specialists for the relevant professional field.

Sectoral Qualifications Framework - A structured description of the qualification levels recognized in the industry.

The field of professional activity is a set of objects of professional activity in their scientific, social, economic, industrial manifestation.

The object of professional activity - systems, objects, phenomena, processes, which are directed to impact.

A professional group is a set of professional subgroups that has a common integration basis (similar or similar purpose, objects, technologies, including means of labor) and assumes a similar set of labor functions and competencies for their implementation.

A professional subgroup is a set of professions formed by an integral set of labor functions and competencies necessary for their fulfillment.

Professional standard - a standard that defines the requirements for the level of qualification and competence, content, quality and working conditions in a specific field of professional activity.

Profession is the main occupation of a person’s labor activity, requiring certain knowledge, skills and practical skills acquired as a result of special training and confirmed by relevant documents on education.

Learning outcomes - acquired knowledge, skills and acquired competencies.

Labor function - a set of interrelated actions aimed at solving one or more tasks of the labor process.

KazARI is a higher education institution that:

- implements educational programs of higher and postgraduate professional education in a wide range of areas of training;
- performs fundamental and applied research in a wide range of sciences.

2 DESCRIPTION OF EDUCATIONAL PROGRAM

The purpose of the educational program	Providing comprehensive and high-quality training of qualified, competitive specialists for research, development, implementation and maintenance of information systems and technologies through the development of personal qualities in students and the formation of general cultural and professional competencies in accordance with SES.
Training of the map dirRCtion in the educational program	
Code and classification of the field of education	6B06 Information and communication technology
Code and classification of the edacational training	6B061 Information and communication technology
Code and name of the educational program	6B06106 - Information sistems
Qualification characteristics of the graduate	
Academic degree	Bachelor in Information and Communication Technology for the educational program 6B06106-Information Systems
The list of professions	Graduates of the specialty 6B06106 - “Information Systems” can work in the following positions: software engineer; analyst programmer; Specialist in support of EP / PP; software architect; Mobile app developer; multimedia developer; software developer; web master; website designer; ICT business analyst; ICT auditor; artificial intelligence engineer; systems consultant; system engineer; computer game developer; IT designer; System Administrator; network engineer; network administrator; information security auditor; information security specialist; database maintenance engineer; DB administrator; IT infrastructure architect; BigDate Specialist; Project Manager in the field of information technology; Highly loaded application development specialist; specialist for the development of technical documentation (technical writer); Content manager;
Professional field	Industry, science, education, culture, health, agriculture, government and other areas of human activity, directly or indirectly related to information systems and technologies.
The object of professional activity	The objects of professional activity of bachelors are: information processes, technologies, systems and networks, their instrumental (software, technical, organizational) software, methods and methods of design, debugging, production and operation of information technologies and systems.
Functions of professional activity	Design and development of highly loaded systems. Administration and operation of software and hardware of highly loaded systems. Monitoring the content of the organization’s Internet resources.

	<p>Office of IP organization. Support for the processes of modernization and promotion of the organization's Internet resources. Planning and designing a game architecture and developing a code algorithm. Implementation of technical standards in the gameplay, graphics, sound and functionality. Obtaining source materials for the development of technical documentation. Development of a documentation plan. Development of technical documentation. Testing technical documentation. Duplication and distribution of technical documentation. Installation and configuration of software. Maintenance and functioning of the database. Monitoring and managing database backups. Provision of information security database. Analysis and tuning of DBMS performance. Ensuring the uninterrupted operation of the DBMS. Database Development Management. Planning for business analysis and monitoring their implementation. Management of requirements for business processes and / or ICT projects of an organization. Evaluation and decision-making to improve the business processes and / or ICT projects of the organization. Design and development of highly loaded systems. Administration and operation of the software and hardware of highly loaded systems. Analysis of software requirements and coordination of the development of technical specifications. Coordination and design of software.</p>
<p>Types of professional activity</p>	<p>Execution and management activities within the framework of the enterprise's activity strategy, involving work on complex tasks, where the analysis of the situation or information requires an in-depth assessment of various factors, as well as the management of employees with responsibility for the result on a specific part of the technological process in a structured unpredictable environment.</p> <p>Developed ability to show in-depth knowledge and skills in the technical field. Demonstrates leadership and is responsible for the effectiveness of the team, for its development in an unpredictable environment.</p> <p>Management activities in the framework of the enterprise's activity strategy, which involves the management of a group or at the unit level with the adoption of responsibility for their own activities and the effectiveness of the team in a structured, unpredictable environment.</p> <p>Developed ability to apply communication skills depending on the specific situation.</p>
<p>Personal competency requirements</p>	<p>Responsibility. Diligence. Logical thinking. The flexibility of thinking. Focus on the result. Organization. Initiative. Mindfulness. Discipline. Decision making. The desire to improve the professional level of creativity, teamwork.</p>
<p>List of competencies</p>	<p>(EC-1): understand the surrounding reality on the basis of ideological positions, formed by the knowledge of the foundations of philosophy, which provide scientific understanding and study of the natural and social world by the methods of scientific and philosophical knowledge.</p> <p>(EC-2): own a cognitive-linguistic-cultural methodology for solving communication problems in a multilingual and multicultural society of</p>

	<p>the Republic of Kazakhstan.</p> <p>(EC-3): show citizenship based on a deep understanding and scientific analysis of the main stages, patterns and originality of the historical development of Kazakhstan.</p> <p>(EC -4) use scientific methods and techniques for researching a specific science; summarize the results of the study; synthesize new knowledge and present it in the form of humanitarian socially significant products; make a choice of methodology and analysis.</p> <p>(EC-5): to develop one’s own moral and civic position: to operate on the social, business, cultural, legal and ethical standards of Kazakhstani society; put into practice knowledge in the field of social sciences and humanities, which are recognized worldwide.</p> <p>(EC-6) assess situations in various spheres of interpersonal, social and professional communication, taking into account the basic knowledge of sociology, political science, cultural studies, psychology.</p> <p>(EC-7): to analyze the particular and general problems of the functioning of the biosphere and environmental management in order to reduce the impact on human health and the environment.</p> <p>(EC-8): independently apply modern computer technologies to solve research and production-technological problems of professional activity.</p> <p>(EC-9): demonstrate personal and professional competitiveness: build a personal educational path for self-development and career growth, focus on a healthy lifestyle to ensure a full social and professional activity through physical culture methods and means.</p> <p>(BC-1): demonstrate basic knowledge in the field of mathematics and natural sciences, their use in their professional activities.</p> <p>(BC-2): to realize the need to form new competencies to solve practical problems in the field of information systems and technologies.</p> <p>(BC -3): use communication opportunities in oral and written form in the state, Russian and foreign languages for solving problems of interpersonal and intercultural interaction.</p> <p>(BC-4): build work in a team, tolerate social, ethnic, confessional and cultural differences.</p> <p>(BC-5): to realize the need for self-organization and self-education, to critically rethink the accumulated experience, to change, if necessary, the type and nature of their professional activities.</p> <p>(BC-6): understand the nature of entrepreneurship and ways of managing it as a process, identifying areas in which entrepreneurship manifests itself, including a startup in professional activities.</p> <p>(BC -7): use in the professional and personal activities various types of ICT (Internet resources, cloud and mobile services for searching, storing, processing, protecting and distributing information).</p> <p>(PC-1): demonstrate possession of the techniques and methods of operation of modern computing equipment and equipment.</p> <p>(PC -2): apply methods and means of protecting information infrastructure, information resources and technologies.</p> <p>(PC-3): identify requirements for the design of network architecture, software and hardware of the computer network.</p> <p>(PC-4): develop, adapt and implement highly loaded applications</p>
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	<p>software.</p> <p>(PC-5): develop information systems infrastructure, including databases, operating systems, application software, etc.</p> <p>(PC-6): apply software solutions that combine text, graphic, multimedia materials, as well as other interactive tools.</p> <p>(PC -7): prepare technical documentation for designing information systems and developing software.</p>
<p>Training results</p>	<p>After successful completion of the educational program, the student will:</p> <p>TR1: to possess a system of subject, psychological, pedagogical, methodical, social, humanitarian, Ecological, Economic knowledge, the ability to carry out their further professional development.</p> <p>TR2: to use the methods and techniques of historical description to analyze the causes and consequences of the events of modern history of Kazakhstan, understand the principles of academic integrity.</p> <p>TR3: to show sociability and psychological preparedness for work, including when working in a team and to make management and technical decisions</p> <p>TR4: enter into communication in oral and written forms in Kazakh, Russian and foreign languages to solve problems of interpersonal, intercultural and industrial (professional) communication, express your thoughts by means of a sufficiently convincing scientific text.</p> <p>TR5: to apply in professional activity modern programming languages, system engineering methodology, design automation systems, modern information technology standards, including methods and tools for constructing information protection systems of modern ICT.</p> <p>TR6: show the ability to incorporate into the innovative structure of interaction in the sphere of professional activity, developing critical, problem-oriented thinking and the desire for physical self-improvement.</p> <p>TR7: carry out the installation, configure, test and maintain system and application highly loaded software for computer systems and networks.</p> <p>TR8: support the processes of creation, management, modernization and promotion of information resources (IR) of an organization (web content, text, graphic and multimedia content of websites, information support of business processes of organizations), formulate requirements for the structure and services of an organization's IR, model business processes, test IR organization.</p> <p>TR9: develop and / or use software, hardware, information, mathematical, functional and organizational support of information systems, including algorithms and methods of information security.</p> <p>TR10: to develop and use technical and program documentation of various types based on domestic and foreign documentation standards.</p> <p>TR11: apply the skills of entrepreneurship, innovation, creativity, business process reengineering; management of possible risks in business processes.</p> <p>TR12: develop models of information system components, including database models and models of human-electronic-computer interfaces.</p>

3 MATRIX OF COMPLIANCE OF TRAINING RESULTS ON THE EDUCATIONAL PROGRAM IN GENERAL WITH FORMED COMPETENCES

	TR1	TR2	TR3	TR4	TR5	TR6	TR7	TR8	TR9	TR10	TR11	TR12
RC1	+	+										
RC 2			+	+								
RC 3		+	+									
RC 4	+	+										
RC 5		+		+						+		
RC 6	+		+	+								
RC 7	+				+		+					
RC 8					+	+	+	+				
RC 9	+		+			+						
BC1	+				+				+			+
BC 2						+		+		+	+	
BC 3			+	+								
BC 4		+	+	+								
BC 5			+			+		+			+	
BC6						+					+	
BC7					+		+	+	+			
PC1			+				+	+				
PC2					+			+	+			
PC3					+		+			+		+
PC4					+		+		+	+		+
PC5								+	+			+
PC6					+	+		+				
PC7					+		+			+		

4 COMPETENCE MAP

General educational competencies	Training results
(RC-1)	TR1; TR 2
(RC -2)	TR 3, TR 4
(GRC -3)	TR2, TR 3
(GRC -4)	TR 1, TR 2
(GRC -5)	TR 2, TR 4, TR 10
(GRC -6)	TR 1, TR 3, TR 4
(GRC -7)	TR 1, TR 6
(GRC -8)	TR 5, TR6, TR 7, TR 8
(GRC -9)	TR1, TR 3, TR 6
Basic competencies	Training results
(BC-1)	TR 1, TR 5, TR 9, TR 11
(BC -2)	TR 6, TR 8, TR 10, TR 11
(BC -3)	TR 3, TR 4
(BC -4)	TR 2, TR 3, TR 4
(BC -5)	TR 3, TR 6, TR 8, TR 11
(BC -6)	TR 6, TR 11
(BC -7)	TR 5, TR 7, TR 8, TR 9
Professional competences	Training results
(PC-1)	TR 3, TR 7, TR 8
(PC -2)	TR 5, TR8, TR 9
(PC -3)	TR 5, TR 7, TR 10, TR 12
(PC -4)	TR 5, TR 7, TR 9, TR 10, TR 12
(PC -5)	TR 8, TR 9, TR 12
(PC -6)	TR 5, TR 6, TR 8
(PC -7)	TR 5, TR 7, TR 10

5 TRAINING MODULE MAP

Module Name	Competencies	Training results
General educational competencies		
Module of socio-political knowledge	EC1,EC3,EC4,EC5	RE1,RE2, RE3,RE4
Multilingual training module	EC2, EC6, EC9,BC3	RE3,RE4
Professional foreign language module	EC8, PC1,PC2,BC7	RE5,RE7,RE9
Security technology module	EC7	RE6
Physical training	EC9	RE6

module		
Basic disciplines		
Math Module	EC4,BC1,BC7	RE1, RE5,RE9
Technical module	EC4, BC1,BC2,BC7,PC1,PC6	RE1,RE5,RE7,RE9
Multilingual training module	EC2,EC6,EC9,BC3	RE3,RE4
Professional foreign module	EC7, PC1,PC2,BC7	RE5,RE7,RE8,RE9
Information Technology Module	EC4, EC8, BC2, BC5, BC7 PC1,PC2,PC3,PC4,PC5,PC6,PC7	RE5,RE6, RE7,RE8,RE9, RE10,RE12
Module of programming	EC8, BC2, BC6,BC7,PC1, PC3,PC4, PC6,PC7	RE5, RE7,RE8,RE9, RE10,RE12
Control module	EC8, BC2,BC4,BC5,BC6,BC7,PC4,PC6,PC7	RE3, PO5,PO6,PO8, PO10, PO11
Security technology module	OK7,OK8,БК7,ПК2	PO5,PO9
Profiling disciplines		
Information Technology Module	EC4, EC8, BC2, BC5, BC7 PC1,PC2,PC3,PC4,PC5,PC6,PC7	RE5,RE6, RE7,RE8,RE9, RE10,RE12
Professional foreign module	EC7, PC1,PC2,BC7	RE5,RE7,RE8,RE9
Technical module	EC4, BC1,BC2,BC7,PC1,PC6	RE1,RE5,PO7,RE9
Programming module	EC8, BC2, BC6,BC7,PC1, PC3,PC4, PC6,PC7	RE5, RE7,RE8,RE9, RE10,RE12
ATT		
Module of additional education	EC2,EC3, EC5, EC6,BC4,BC6	RE1,RE2

6 INFORMATION ABOUT THE DISCIPLINES OF THE EDUCATIONAL PROGRAM

№	Discipline name	Brief description of the discipline (50-60 words)	Number of credits	Generated learning outcomes (codes)
Cycle of general education disciplines - 56 credits Mandatory component of OOD -51 credit				
1	Modern History of Kazakhstan	The discipline provides knowledge about the main stages of the history of modern Kazakhstan; state and political development, including the construction of an independent state; the main directions of foreign policy and culture of Kazakhstan. It brings to the consciousness of students the essence of the fundamental problems of history, teaches them the scientific methods of historical knowledge, forms a scientific worldview, critical thinking and civic position. <i>Active teaching methods used:</i> brainstorming, case-study, round table, discussion, commented reading of primary sources.	5	ON 1, ON 2
2	Philosophy	Philosophy is a special form of knowledge of the world, which develops a system of knowledge about the fundamental principles and foundations of human existence, about the most general essential characteristics of the human relationship to nature, society and spiritual life in all its main manifestations. Philosophy synthesizes and generalizes the results of the practical and spiritual development of the world, proposing possible strategies and choices for the socio-cultural development of social life. Used active teaching methods: problem lectures, round table, discussion, commented reading of primary sources.	5	ON 1
3	Module of socio-political knowledge (Psychology, Culturology, Sociology and Political Science)	The discipline "Psychology" forms a holistic view of the psychological and personal characteristics of a person, reveals such issues as emotions, emotional intelligence, human will, psychology of self-regulation, individual typological characteristics, values, interests, norms - the spiritual basis. Considers the psychology of the meaning of life, professional self-	8	ON 1, ON 3, ON 4 ON 2 (Sociology, Political Science)

ROAD FACULTY

		<p>determination, health, communication between individuals and groups, as well as techniques for effective communication. Active teaching methods used: discussion, case method, fishbone, syncwine, inverted class method, project method.</p>		
		<p>The discipline "Culturology" reveals the foundations of the nature of culturological phenomena and processes, the specifics of the laws of functioning and development of culture; gives an idea of the basic concepts of cultural studies; methods of analysis of specific cultural phenomena, typology of cultures; ethnic and national, elite and popular culture; forms modern knowledge about culture and the place of cultural studies in the system of modern social and humanitarian, natural science and technical knowledge. Used active teaching methods: problem lectures, round table, discussion, presentations.</p>		
		<p>Sociology is a science about social life, about a person and society, about social interactions of a person. The more complex the problems of society, the greater the role of knowledge about a person and society in their solution. Sociology is a way to understand complex social systems and processes, the problem of preserving society as an integrity. Sociological knowledge allows us to consider any phenomenon in the human dimension, to see its social consequences. Used active teaching methods: problem lectures, round table, discussion, presentations.</p>		
		<p>The goal of the political science course is to develop students' skills for independent analysis of complex phenomena and trends in the sphere of political life, to give the necessary minimum knowledge about politics, about political institutions and their role in the modernization of Kazakhstani society, to contribute to the formation of a conceptual apparatus among students.</p>		

ROAD FACULTY

4	Information and Communication Technologies (in English)	<p>The purpose of studying the discipline is to develop the ability to critically understand the importance of ICT in digital globalization, to acquire knowledge and skills in using modern ICT in various types of professional and social activities. The result of training is the ability to apply modern programming languages, system engineering methodology, ICT technological standards, understanding of methods and means of building information security systems in professional activities.</p> <p>Used active teaching methods: problem lectures, case-study, round table, discussion, presentations.</p>	5	ON 5, ON 7, ON 9
5	A Foreign language	<p>The discipline is designed to ensure the preparation of students in the general education discipline "Foreign language", as one of the compulsory disciplines that contribute to the formation of intercultural and communicative competence at a sufficient level. Students use language material with sufficient language means for a given level, correct mistakes in a timely manner and independently, analyze the causes and consequences of events in the texts and choose the forms and types of speech. Active teaching methods used: design method, role plays, round tables, etc.</p>	10	ON 3, ON 4
6	Kazakh (Russian) language	<p>The discipline is aimed at developing students' speech skills in mastering additional means of communication and professional education in relation to the Kazakh (Russian) language. Development of lexical and grammatical skills; improving listening skills; development of information culture, language acquisition. In the learning process, students learn methods and techniques of various text analysis, use a system of subject and linguistic knowledge to solve problems of educational and professional communication. Active teaching methods used: case-study, syncwine, pair and group forms of work, discussion.</p>	10	ON 3, ON 4

7	Physical education	<p>The discipline forms knowledge in the field of conditions for maintaining and strengthening human health, the ability to build a personal educational trajectory for self-development, focused on a healthy lifestyle to ensure full-fledged social and professional activity through the methods and means of physical culture, including planning activities aimed at maintaining and strengthening health, safety precautions in the process of physical education, organization and conduct of physical culture and health improvement work.</p> <p><i>Used active teaching methods:</i> situational-problematic, situation dossier, game training, heuristic conversations, work in small groups.</p>	8	ON 6
University component / Elective component - 5 credits				
1	Ecology and life safety	<p>The discipline forms knowledge in the field of ecology, determines its role in solving modern economic and political problems, considers the basic ecological concepts and patterns of functioning of natural systems, the tasks of ecology as a science. Environmental Safety Management. Legal aspects of nature protection. Ensuring the protection of the population from the consequences of accidents, catastrophes, natural disasters; carrying out rescue and other urgent work in the affected areas.</p> <p>Used active teaching methods: lecture press conference; method "515"; Case Study; method "Chains", etc.</p>	5	ON 1, ON2, ON 6
2	Ecology and sustainable development	<p>The discipline forms knowledge in the field of ecology and sustainable development. Studies the features and principles of interaction between human society and nature, the conditions for the development of an industrial society and the dehumanization of the planet's biosphere as a consequence of the demographic explosion and technogenic development. A number of global environmental problems have arisen: soil depletion, deforestation, the greenhouse effect, ozone</p>		ON 1, ON2, ON 6

		depletion, pollution of the world's oceans, a decrease in fresh water supplies, desertification, and others. Used active teaching methods: problem lectures; brain attack; round tables; game exercise.		
Cycle of basic disciplines-112 credits University component -54 credits				
1	Algorithms, data structures and programming	The discipline forms a systematic and holistic understanding of the theory of the development of algorithms, methods and technology for solving practical and scientific problems in the Python programming language. Considered: the concept of an algorithm; basic algorithmic structures; Python operators mutable and immutable data types, simple and structured data types and operations on them; functions, recursive functions and principles of their development; algorithms for sorting and retrieving data, greedy algorithms, etc. <i>Active teaching methods used:</i> problem lectures; problem business games; case study; decision tree method.	4	ON 5, ON 9
2	Mathematics1	The discipline is the foundation of the mathematical education of a specialist, contributes to the development of mathematical intuition, the upbringing of a mathematical culture, within the framework of this course, the basic concepts of linear and vector algebra, analytical geometry, mathematical analysis of a function of one variable are formed, simple mathematical models of specific problems are studied; orientation is carried out on the implementation of logical analysis of specific problems, on the application of mathematical methods in professional activities, on the creation of mathematical models of simple professional problems.	4	ON 1, ON2, ON5, ON 9
3	Physics	The discipline forms in students a system of basic concepts of physics and ideas about the modern physical picture of the world, as well as a truly scientific worldview. The discipline reveals the essence of the basic concepts,	5	ON 1, ON5, ON 9 ON2,

ROAD FACULTY

		<p>laws, theories of classical and modern physics in their internal interconnection and integrity. In laboratory classes, individual tasks are performed according to the schedule, aimed at acquiring skills and abilities in conducting physical experiments.</p> <p>Used active teaching methods: lecture visualization; case study; contextual learning; learning from experience.</p>		
4	Discrete Math	<p>The discipline forms knowledge in the use of basic mathematical models and algorithms, which make it possible to professionally formulate and solve many problems in specific areas of computer science. Considered: the concept of a set, operations on sets; relations, binary relations, properties of binary relations, operations on binary relations; Boolean functions, laws of Boolean algebra, disjunctive and conjunctive normal forms; fundamentals of propositional logic and predicate logic; the concept of a graph, etc. <i>Active teaching methods used:</i> lecture visualization; case study; contextual learning; learning from experience.</p>	4	ON 1, ON2, ON5, ON 9
5	Professionally oriented foreign language	<p>A professionally oriented foreign language (English) provides for learning to speak and write in a foreign language, forms a complex of knowledge, skills and abilities in the use of the basics of project management in accordance with international standards, the specifics of project management. The program provides for an introduction to the subject area of the specialty in a professional foreign language, as a disciplinary phenomenon serving all spheres of human activity. <i>Active teaching methods used:</i> design method, role-playing games, case-study, syncwine, pair and group forms of work.</p>	5	ON5,ON7,ON8, ON9, ON4

6	Mathematics 2	<p>The discipline forms the fundamental concepts of mathematical analysis of functions of several variables, differential equations, functional series, introduces the basics of the mathematical apparatus necessary for solving theoretical and professional problems; instills in students the ability to independently study educational literature on mathematics and its applications; develops the skills of mathematical research of applied issues and the ability to translate a technical problem into mathematical language; mastering numerical methods of mathematics and their implementation on a computer. <i>Used active teaching methods:</i> lecture visualization; case study; contextual learning.</p>	5	ON 1, ON2, ON5, ON 9, 4
7	Basics of information systems	<p>The discipline forms a complex of interrelated knowledge in the field of theoretical and methodological foundations of information systems, the patterns of their functioning and development; the main provisions of information theory, measurement; basic concepts of data compression, transmission of information over a communication channel, finding the most economical coding methods that allow you to transfer specified information using the minimum number of characters, determining the amount of storage devices intended for storing information. <i>Used active teaching methods:</i> lecture discussion; contextual learning; educational discussion; analysis of a specific situation.</p>	5	ON9, ON10, ON12
8	IT infrastructure	<p>The discipline examines issues related to the concept of infrastructure, its role in IP and in IT. The place of information infrastructure management in the general structure of enterprise management is determined. Introduces ITIL and ITSM methodologies. Examines methods and tools for managing information infrastructure. Describes the business architecture and IT architecture of the organization, methodological</p>	4	ON 5, ON 7 ON8, ON9, ON10, ON12

ROAD FACULTY

		foundations for managing the IT infrastructure of an enterprise, modern standards in the field of information technology service management (ITIL, COBIT). <i>Used active teaching methods:</i> lecture with analysis of microsituations; case-study; solution of practical problematic tasks.		
9	Object Oriented Programming	The discipline forms knowledge in application development using modern technologies of the Java development environment (IntelliJ IDEA, NetBeans, Eclipse, Android Studio), various tools, solving specific mobile tasks: refactoring, assembling, templating, finding the reasons for low productivity and its increase, also a difference methodology of procedural programming from object programming, stages of program development, features of object-oriented programming, graphic capabilities of Embarcadero RAD Studio XE8. <i>Used active teaching methods:</i> problem lectures; problem business games; case study; decision tree method.	5	ON9, ON10, ON12
10	Mobile Application Development	The course forms full and systematic understanding of mobile application development: starting with business analytics of the requirements for the mobile application, continuing with usage of modern approaches and instruments for teamwork and implementation of version control system, ending with testing and quality check of the mobile application (including DevOps methods). Practices are done in team's projects.	5	ON 3, ON 5, ON 6, ON 7, ON 9
11	3D modeling systems	Дисциплина изучает методы и приемы построения изображений пространственных фигур на плоскости, изучает способы решения и исследования пространственных задач при помощи чертежей, также методов компьютерной графики как нового инструмента конструирования. Дисциплина дает возможность студентам познакомиться с принципами работы в AutoCad.	4	ON 1, ON 5 ON7, ON9

		<p>Рассматриваются примеры построения двумерных и трехмерных объектов и редактирование графических примитивов средствами AutoCad. <i>Используемые активные методы обучения:</i> лекция-визуализация; ситуация-проблема; case-study.</p>		
12	Educational practice	<p>Educational practice is a necessary component of the educational process for the training of specialists in the specialty "Information systems". During the training practice, the skills of working on a personal computer, using the capabilities of application packages, special literature, searching for the necessary information on the Internet, developing algorithms for solving problems, writing and debugging programs in Python, preparation and execution of technical documentation are consolidated. <i>Used active teaching methods:</i> solving practical problem problems; exercise situation.</p>	1	ON 1, ON 6
13	The practical training	<p>The practical training of students is aimed at the stages of promoting the training of qualified specialists, the purpose of which is to consolidate in practice the theoretical knowledge gained by students in the learning process, as well as to deepen and develop the skills of practical work at enterprises, taking into account the peculiarities of the development and implementation of information technologies and information systems. <i>Used active teaching methods:</i> analysis of a specific situation; exercise situation; solution of practical problematic tasks.</p>	3	ON 5, ON 7
Optional Component - 58 Credits				
1	Electrical circuit theory	<p>The discipline is aimed at studying the theoretical and methodological foundations and experience of using the laws of electrical and magnetic circuits, the physical foundations of the theory of electrical and magnetic circuits, elements of linear electrical circuits, nonlinear elements of electrical circuits, basic concepts of the structure of</p>	4	ON 1, ON 5 ON7, ON9 4

ROAD FACULTY

		<p>an electrical circuit, analysis of complex electrical circuits of direct current. The discipline reveals the basic laws, properties and characteristics of electrical circuits. Introduces students to the methods of analyzing electrical circuits in steady-state and transient modes.</p> <p><i>Used active teaching methods:</i> problem situations; learning through play; method of heuristic questions; game design, etc.</p>		
2	Теоретические основы электротехники	<p>Дисциплина нацелена на изучение теоретико-методических основ и опыта использования линейных электрических цепей, синусоидального тока, принципов действия простейшего генератора синусоидальной э.д.с., законов Ома и Кирхгофа для цепей синусоидального тока, электрических цепей трёхфазного тока, принципов действия генератора трехфазной э.д.с, устройств и принципов действия машин постоянного тока, электромеханических аналоговых приборов, физических основ полупроводниковых приборов.</p> <p><i>Используемые активные методы обучения:</i> проблемные ситуации; обучение через игру; метод эвристических вопросов; игровое проектирование и др.</p>		<p>ON 1, ON 5 ON7,ON9 щл4</p>
3	Electronics Basics	<p>The discipline forms knowledge about the purpose and areas of application, the physical principles of work, the main technical parameters of semiconductor devices and microelectronic technology; practical skills in analysis, calculation and experimental research, reading and understanding ready-made circuitry solutions, the choice of semiconductor devices, blocks, components and integrated circuits in the development of simple electronics devices. In the classroom, situational tasks are considered, the student develops a technical solution for a real</p>	4	<p>ON 5, ON 6</p>

		problem. Active teaching methods used: active teaching methods used: lecture-visualization; situation is a problem; case-study.		
4	Numerical Methods	The discipline forms knowledge in the field of theory and methods of using basic problems and algorithms of computational mathematics, solving problems of linear algebra; solutions of nonlinear equations and systems; function interpolation; numerical integration and differentiation; solving differential equations; methods of approximation and approximation of functions. The discipline is aimed at applying mathematical methods in professional activities, solving simple professional problems related to the road industry. Used active teaching methods: lecture visualization; case study; contextual learning.		ON 1, ON 5, ON 9 4
5	Digital road infrastructure management *	The discipline forms the knowledge of the world experience in the development of intelligent transport systems, about the main elements of intelligent transport logistics systems, traffic management, operation and maintenance of road infrastructure and road safety; develops practical skills in the development and use of hardware and software for the implementation of digital management of road infrastructure. Active teaching methods used: team projects (brainstorming, presentation and discussion).	4	ON 5, ON 6, ON 7 ON8, ON9, ON10, ON11, ON12
6	Digital logistics *	The discipline forms knowledge about the peculiarities of the transition to digital logistics, introduces modern solutions of Logistics 4.0 and Smart Supply Chains, the Internet of Things, solutions to the problems of hybrid supply chains, with robots and cobots in logistics; develops practical skills in the application and development of solutions for the use of hardware and software for the implementation of digital logistics. Active teaching methods used: team projects (brainstorming, presentation and discussion).		ON 5, ON 6, ON 7 ON8, ON9, ON10, ON12

7	IT-Project Management	The course forms complex of knowledge and skills for a project management on the basis of real cases according to international standards and PMI PMBOK guidance; modern practices in a project management including several types of agile software development (AGILE, KANBAN, SCRUM, LEAN and other); key features of IT-projects, different program products for project management.	4	ON 3, ON 5, ON 6, ON 8, ON 10, ON 11
8	Information systems in business and management	The discipline forms knowledge about the practical application of information systems in the enterprise. Influence of information technologies on competition, market; main trends in the application of information systems, the impact of IT on the economic potential of the enterprise. An understanding of how to support the processes of creation, management, modernization and promotion of information resources (IR) of the organization is formed, how to develop the structure and services of the organization's IR. <i>Used active teaching methods:</i> problem situations; "Brainstorm"; "Round table"; discussion; method of projects, etc.		ON 5, ON 6 ON8, ON9, ON11
9	Creating a startup**	The course is focused on modern approaches for development of new ideas as a startup. Starting with business-plan formation, then by step-by-step checks of hypotheses from the business-plan and by changes if required (customer discovery), ending with customer validation. All knowledge and skills are given by theory and reinforced by practice on a team projects throughout the course.		ON 1, ON 3, ON 6, ON 8, ON 11

ROAD FACULTY

10	Automation of business documentation **	<p>The discipline contributes to the understanding of the need to implement electronic document management systems in the business processes of any organization, to gain experience in assessing the capabilities and complexity of the selected system. Introduces the principles of work of automated document management systems. The article considers the theoretical foundations of electronic document management technologies and the practice of their application in enterprise IS for the purpose of document management. Using technology to collect, manage, store, protect and deliver information related to organizational processes. <i>Used active teaching methods:</i> problem lectures, round table, discussion, presentations.</p>	4	ON7,ON8, ON9,ON10
11	Digital interfaces of data transmission **	<p>The discipline forms a complex of knowledge, skills and abilities in the field of using digital interfaces for data transmission, the main functions of digital input / output interfaces, structures, exchange protocols, technical and operational characteristics of the main, most common digital interfaces of information and computing systems are considered. Systematizes knowledge, skills and competencies in the field of organizing interaction between electronic nodes, blocks and subsystems of computerized measuring and control systems. <i>Used active teaching methods:</i> problem situations; "Brainstorm"; discussion, method of projects.</p>		ON5, ON12
12	Metrology, standardization and quality management	<p>The discipline forms for students a complex of knowledge related to measurements, methods and means of ensuring their unity and ways to achieve the required accuracy, the essence of technical regulation, conformity assessment, standardization and certification. Improves practical skills in the use of various measuring instruments and high-precision instruments, the ability to assess the compliance of technical products with the requirements of conformity and quality standards based on the</p>		ON5,ON10

ROAD FACULTY

		knowledge of international and national systems of relevant regulatory documents. Used active teaching methods: problem lecture; case-study; discussion, presentations, etc.		
13	Methods, models in the management of the road industry	The discipline forms knowledge about modern methods of constructing mathematical models of technical systems, about transport modeling, the current state of theories of transport systems, various tools and simulation packages for modeling traffic flows; practical skills in the use of specialized software for transport modeling, research and creation of predictive transport models. Used active teaching methods: individual projects (computer simulation, presentation and discussion).	5	ON 5, ON 10, ON 12
14	Business process modeling	The discipline forms knowledge of methods of analysis and modeling of business processes, principles of construction and architecture of computing systems, types of content of information resources of an enterprise, digital content management processes, processes of creating and using information services; practical skills in modeling, analyzing and improving business processes, planning an IT project, choosing rational ISs for managing business and enterprise content. Used active teaching methods: individual projects (computer simulation, presentation and discussion).		ON 6, ON 9, ON 11
15	Modern operating systems	The discipline forms a complex of knowledge, skills and abilities in the field of operating systems, considers: memory management, file systems, information input and output, deadlocks, virtualization and the cloud, multiprocessor systems, security, operating system architecture and application programming interfaces; design of parallel interacting computational processes, the problem of dead ends and methods of dealing with them, installation and configuration of modern programs for various virtual machines. Used active teaching methods: solving practical problem problems; presentations; discussions.	5	ON 7, ON 9, ON 10, ON 12
16	Business process automation	The discipline is aimed at studying and building models of business processes using modern		ON 5, ON 11

		automated systems using tools, modeling methods, drafting technical specifications, life cycle of process management, modern languages and modeling environments for enterprise architecture, corporate information management systems (CIMS), virtualization of business processes based on the creation of virtual enterprises, standards in the field of business process modeling - the IDEF family. Used active teaching methods: solving practical problem problems; presentations; discussions.		
17	Introduction to the Internet of Things **	The discipline forms knowledge about the basic principles of organization and functioning, the history of origin and development, the main factors of the development of the Internet of Things, existing technologies, trends and prospects in the field of the Internet of Things; practical skills of working with Arduino microcontrollers, connecting and programming end devices, creating a software solution for creating and storing data using cloud technologies. In practical classes, team projects are carried out (brainstorming, presentation and discussion). Used active teaching methods: lecture-discussion; intellectual warm-up; solving practical problematic tasks; business games.		ON 5, ON 6, ON 7 ON8, ON9, ON10, ON12
18	Certification and technical documentation	The discipline forms students' knowledge in the field of certification of software and systems, as well as in technical documentation, the application of the requirements of regulatory documents to the main types of services and processes, national and international systems of standardization and certification, standards for document preparation, regulations, protocols and organization of their own activities, choice standard methods and ways of performing professional tasks, assessing their effectiveness and quality. Used active teaching methods: lecture-conversation; solving practical problematic tasks; situation-problem; presentation.	5	ON5,ON10

ROAD FACULTY

19	Computer game programming	The discipline forms a complex of knowledge, skills and abilities in the field of computer game development, implemented in the Python programming language using the PyGame framework and the tkinter library. Considered: the stages of developing applications with a GUI; handling tkinter events; creating classes in Python; game template; graphics in PyGame; event handling in PyGame; PyGame classes animation and sprites, collision detection; sound design of the game; organization of work in a project for the development of computer games. <i>Used active teaching methods:</i> group mini-projects; brainstorm.	5	ON 5, ON 9, ON 11
20	Digital media technology	The discipline forms a complex of knowledge in the field of using digital media technologies, analyzing and visualizing information on specific examples developed in the Python programming language. Considered: stages of developing applications with a GUI; widgets, tkinter event handling; creating classes and objects in Python; processing NumPy arrays; Matplotlib basics, the structure of a drawing in Matplotlib, plotting in Matplotlib, special drawing elements in Matplotlib; Pygal library, design of Pygal chart elements. <i>Used active teaching methods:</i> group mini-projects; brainstorm.		ON 5, ON 8, ON 9
21	Architecture of computer systems and networks	The discipline forms knowledge in the field of architectural features of modern computers and computer systems, the composition and purpose of elements of computer systems, computer classification, main computer devices and their purpose, network classification, network architecture, their standards and network equipment. He studies the basics of the theory of logical design of digital devices, elements and functional units of computers, as well as the arithmetic foundations of computers. <i>Used active teaching methods:</i> analysis of a specific situation; discussion; method of projects.	5	ON 5, ON 7

22	Multiprocessor computing systems (OLTP, DM, DW, DSS)	<p>The discipline forms knowledge on the use of computing systems based on applied technologies when working with information resources that are used in the business processes of an organization. The directions of using IT for specific applications in solving professional problems are determined. The use of multiprocessor computing systems presupposes the practical mastering of the following sections of parallel processing in computers: the architectural principles of implementing parallel processing in a VM, as well as in the section on parallel computing methods.</p> <p><i>Used active teaching methods:</i> analysis of a specific situation; discussion; method of projects.</p>		ON 5, ON 7, ON8
23	Information security and information protection	<p>The discipline is aimed at studying the theoretical and methodological foundations and experience of using information security, levels and models of information security, building and assessing a security system based on the ISO / IEC 15408 standard, fundamentals of cryptography, information security administration, using basic software and hardware measures to ensure high the degree of protection of access to information, insider attacks, the use of software code defects, malware, electronic signature of binary programs. <i>Used active teaching methods:</i> analysis of a specific situation; discussion; method of projects.</p>	5	ON 5, ON 9, ON10
24	Patenting and protection of intellectual property	<p>The discipline forms knowledge of normative legal acts on the regulation of civil circulation of intangible goods; legislation on intellectual property, the essence and purpose of the patent system, methods for analyzing information, the procedure for obtaining patent rights; practical skills in the interpretation of legal terms in the field of intellectual property law, identification of the objects of invention, literary and patent search, registration of individual application materials.</p> <p><i>Used active teaching methods:</i></p>		ON 6, ON10

ROAD FACULTY

		case-study; brainstorm; individual projects.		
25	Enterprise automation systems (1C: Enterprise)	The discipline is focused on the study and application in professional activity of modern means of automation of the organization's activities, the fundamental concepts and methods of automation of managerial work are considered, the analysis of ITU means is carried out. The principles of building information systems and the criteria for their choice for an enterprise based on the 1C: enterprise platform are analyzed. <i>Used active teaching methods:</i> classes with elements of conversation and the use of multimedia; case-study; work in small groups; discussion.	4	ON 7, ON 11
26	ERP and Business Opportunity Management (ERP "Galaxy")	The discipline forms a complex of knowledge, skills and abilities in the use of ERP systems, which are based on the principle of creating a single data warehouse containing all corporate business information and taking into account information, material, financial, economic and production processes in the company. Will give an overview of ERP business solutions, lay down basic knowledge of ERP systems. <i>Used active teaching methods:</i> classes with elements of conversation and the use of multimedia; case-study; work in small groups; discussion.		ON 7, ON 11
27	Digital marketing by industry	The course forms complex of theoretical knowledge and practical skills for usage of digital technologies in marketing and addresses tasks of marketing and promotion of a project, a company or a personal brand in social media (SMM-marketing) and rumor mill (basic principles of contagiousness); design and management of web-site according to SEO and SMO; usage of email-marketing.	4	ON 1, ON 3, ON 4, ON 6, ON 11
28	Digital management by industry	The course forms complex of knowledge and skills for usage of digital instruments and data in company management for both corporations and small business: digital data accounting, key features of programs for financial		ON 1, ON 3, ON 4, ON 6, ON 11

		accounting and planning, production management, human resources management, client relationship management, business analytics and enterprise management on a real business cases.		
	<i>* Major</i>			
	<i>**Minor</i>			
Cycle of profiling disciplines - 60 credits				
University component - 46 credits				
1	Programming technology	The discipline is aimed at studying the theoretical and methodological foundations and programming techniques that are used at all major stages of the program life cycle. Studied: C ++ data types, program structure, instructions, C ++ control structures, library, user-defined, recursive functions in C ++, classes, data abstraction and OOP in C ++; as well as issues related to the design of algorithms, the use of methods of structured and modular programming in C ++. <i>Used active teaching methods:</i> solving practical problem problems; case-study; work in small groups; discussion.	6	ON 7, ON 9
2	Databases in IS	The discipline forms a complex of knowledge, skills and abilities in the field of database theory, research and use of various models of data representation, language tools for the presentation and processing of data in databases, as well as the development of information applications based on databases in a DBMS environment using various programming languages. Promotes the formation of knowledge and skills in the field of database theory, research and use of various data presentation models. <i>Used active teaching methods:</i> lecture-discussion; solving practical problematic tasks; method projects; presentation.	5	ON 5, ON 8, ON 9, ON 12
3	Robotics	The course is focused on theoretical basics of functioning and designing of industrial and residential robotic systems; practical methods of designing robotic systems and their programming in specialized IDE; types of indicators, actuators and	5	ON 1, ON 3, ON 5, ON 6, ON 11

ROAD FACULTY

		other elements necessary for robotic systems; features of robots and robotic systems. All knowledge and skills are reinforced by practice on a team projects.		
4	Client server applications	The course focuses on fundamentals of client server applications: architectures, interaction types, IP-addresses, sockets and ports. The course forms knowledge about client server applications' design: starting with business analysis of requirements, continuing with usage of modern approaches for teamwork and implementation of version control system, ending with testing and quality check of the application (including DevOps methods).	4	ON 1, ON 3, ON 5, ON 6, ON 7, ON 9, ON 12
5	Web technologies	The discipline is focused on the study and application in professional activities of the concepts and practical methods of organizing and functioning of the Internet, teaching methods of designing applications for use in the Internet environment. Learns the basics of web design, graphic programs; common web browsers, HTML, CSS, JavaScript, technologies for creating and editing Internet advertising objects (banners, buttons, flash objects); basics of web design; technology for creating hypertext documents. <i>Used active teaching methods:</i> lecture-discussion; solving practical problematic tasks; method projects; presentation.	5	ON 8, ON 9
6	Intelligent information systems and knowledge bases	The course is focused on two types of intellectual systems: biological and semiotic. Artificial neural networks, genetic algorithms and other bio-inspired systems are considered as intellectual systems of first type. Expert systems are considered as intellectual systems of second type. Main practical task of the course is formation and adjustment of data and/or knowledge base for such systems.	4	ON 5, ON 6, ON 9
7	Industrial practice 3k	The industrial practice of students is the most important part of the training of highly qualified specialists. It is aimed at	5	ON 3, ON 6, ON 8

ROAD FACULTY

		consolidating and expanding theoretical knowledge and practical skills in the design, operation and maintenance of software and hardware for data processing; in the use of innovative technologies in the IT field; in the development of methods and means of researching the subject area of production, economic and other purposes. <i>Used active teaching methods:</i> solving practical problem problems; group work.		
8	Undergraduate practice 4k	Undergraduate practice is aimed at consolidating the theoretical and practical knowledge obtained at the university in the field of application: modern methods of system analysis of information processes; the use of information technology in the development of CIS; use of IS modeling tools; ensuring information security; software development, the use of network technologies, tools for managing databases and knowledge, computer graphics; gaining experience in researching a scientific problem. <i>Used active teaching methods:</i> solving practical problem problems; group work.	12	ON 3, ON 5, ON 6, ON 7, ON 8, ON 9, ON10, ON 12
Optional Component - 14 Credits				
1	Designing of IS in the auto- road industry	The course forms complex of theoretical knowledge and practical skills for designing IS in the auto-road industry based on UML language and “Clean architecture” principle, including analytics of business requirements for IS designing, usage of agile methods (as well as DevOps methods) and teamwork, selection of software and hardware, testing, implementation and technical support of the IS.	5	ON3, ON5, ON7, ON8, ON9, ON12
2	The software design of the EIS	The course forms complex of theoretical knowledge and practical skills for designing IS for economic and business tasks based on UML language and “Clean architecture” principle, including analytics of business requirements for IS designing, usage of agile methods (as well as DevOps methods) and teamwork, selection of software and hardware, testing, implementation		ON3, ON5, ON7, ON8, ON9, ON12

		and technical support of the IS.		
3	NET Core application development.	The discipline is aimed at acquaintance with the technologies of the .NET platform, studying the modern instrumental environment designed for developing programs using the object-oriented programming language C #; implementations of mechanisms of encapsulation, inheritance and polymorphism in C #. Considered: the model of code execution in the CLR; packaging, packaging, deployment and administration of applications; assemblies; basics of types; constants and fields; methods and parameters; properties; events; interfaces; delegates, etc. <i>Used active teaching methods:</i> solving practical problem problems; case-study; work in small groups; discussion.	5	ON5, ON 8, ON 9
4	PLC programming	The discipline forms knowledge of the theoretical principles of operation and characteristics of programmable logic controllers (PLC), principles of hardware configuration and programming in the main programming languages; practical skills in choosing the type and configuration of a PLC depending on the technological process, programming in all major PLC programming languages, solving design problems and supporting a control system on a PLC. <i>Used active teaching methods:</i> case-study, brainstorming, individual projects.		ON 5, ON 9
5	Telematics in the road industry	The discipline forms knowledge about the principles of operation and technical and operational characteristics of the main devices of telematic systems, methods and technologies for automated regulation of traffic flow, telematic intelligent systems; practical skills in the analysis of the technical condition and technological processes of transport, the choice of telematic equipment, the use of software, information technologies. <i>Used active teaching methods:</i> situational tasks simulating transport telematics; discussions;	4	ON8, ON9, ON10, ON12

		presentation.		
6	BigDate technologies and cloud computing	The discipline forms theoretical knowledge of the main characteristics of "cloud" technologies, the main differences from solutions based on server technologies, on the architecture of "cloud" technologies, design methods and prerequisites for the use of "cloud" services, best practices to reduce risks, licensing and certification of "cloud" services ; practical skills in application development for the main existing "cloud" platforms. Practical lessons <i>Used active teaching methods:</i> situational tasks; solving practical problematic tasks; discussions; presentation.		ON 7, ON 9
Final state certification				
7	Final certification	Writing and defending a thesis (project) or preparing and passing a comprehensive exam The main tasks of completing and defending a thesis are: collection, processing and generalization of practical material on the topic of the thesis, analysis of data and practical material in the field of implementation and use of information systems and technologies in within the topic of pre-graduate research, the formulation of conclusions, patterns, recommendations and proposals on the topic of the thesis	12	ON 5, ON 8, ON 9, ON10,ON 11, ON 12
TOTAL			240	
Additional types of education (ATE) - 7				
1	Eternal country. Spiritual renewal	The discipline gives future specialists a holistic view of the origins of folk traditions and interests of the Fatherland, reveals the essence of Kazakh life in the socio-cultural space, reproduces the social and internal life of a person, based on an open system of equal relationships and the unity of the community of people in a certain place of residence - Atameken. The value of discipline lies in the systemic understanding of the path traveled by the Kazakh people in the context of the formation of a nationality and nation. When conducting the discipline, active teaching methods are used. <i>Used active</i>	2	ON 1, ON 2

		<i>teaching methods:</i> lecture-discussion; solving practical problematic tasks; round table.		
2	Fundamentals of Anti-Corruption Culture	The discipline forms knowledge in the field of anti-corruption culture and contains concepts related to the criminal offense of corruption and all corruption phenomena encountered in the practice of public relations, which contributes to the understanding of the relevance of the fight against corruption by each member of society, the assimilation of general legal knowledge about the stages of development of anti-corruption policy in the Republic of Kazakhstan from the moment of acquiring independence. <i>Used active teaching methods:</i> lecture-discussion; solving practical problematic tasks; round table; webinars; game design.	2	ON 1, ON 3
3	Legal framework for entrepreneurship	The discipline forms students' knowledge about the set of norms that regulate entrepreneurial relations in the Republic of Kazakhstan, as well as theoretical and practical issues of legal regulation of entrepreneurial activity in the Republic of Kazakhstan. Studying the business law of the Republic of Kazakhstan contributes to the professional development of specialists, develops their ability to think in entrepreneurial and legal categories. <i>Used active teaching methods:</i> lecture-discussion; solving practical problematic tasks; round table; webinars; presentations; game design.	3	ON 1, ON 3