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Road Faculty
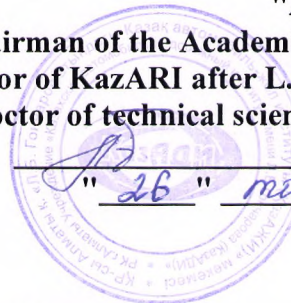
CATALOG OF ELECTIVE DISCIPLINES

for the 2024-2028 school years

Education field code and Classification: 6B06 - Information and Communication Technology

Code and classification of training areas: 6B061 – Information and Communication Technology

Educational program: 6B06106 Information systems
                              Undergraduate

Educational programs   group   B057 Information technologies

Awarded degree: Bachelor in Information and Communication Technology for the educational program 6B06106-Information Systems

Almaty 2024

List of elective specialty disciplines
6B06106 Information systems

№	Name of the discipline	Credits	Cycle of disciplines	Recom mended semester	Note
Cycle of general education disciplines GED					
	Cycle of general education disciplines GED				
	Component of choice CC				
1.	Ecology and life safety	5	GED CC	4	Appendix № 1, p. 4.
2.	Methods of scientific research in IS				Appendix № 2, p. 5.
	Cycle of Basic Disciplines (BD)				
	Component of choice CC				
3.	Theory of electrical circuits	4	BD (CC)	3	Appendix №3, p. 6.
4.	Theoretical foundations of electrical engineering				Appendix №4, p. 7.
5.	Architecture of computer systems	4	BD (CC)	3	Appendix №5, p. 8.
6.	Architecture of information systems				Appendix №6, p. 9.
7.	Operating systems	4	BD (CC)	4	Appendix №7, p.10.
8.	The basics of the Linux operating system				Appendix № 8, p.11
9.	The basics of artificial intelligence	4	BD (CC)	5	Appendix №9, p. 12.
10.	Methods and means of designing information systems				Appendix №10, p. 13.
11.	Creating startup		BD (CC)	5	Appendix №11, p. 14.
12.	Automation of business documentation**				Appendix №12, p. 15.
13.	Digital data interfaces transfer**	4			Appendix №13, p.16
14.	Metrology, standardization and quality management **				Appendix №14, p.17
15.	Methods and models in the management of the road industry	5	BD (CC)	6	Appendix №15, p. 18.
16.	Business process modeling				Appendix №16, p. 19.
17.	Digital management of road infrastructure	5	BD (CC)	6	Appendix №17, p. 20.
18.	Digital logistics				Appendix №18, p. 21.
19.	Java Programming	5	BD (CC)	6	Appendix №19, p. 22.
20.	Certification and technical documentation				Appendix № 20, p. 23.
21.	Python Web Application Development technologies	5	BD (CC)	6	Appendix №21, p. 24.
22.	Digital media technology				Appendix №22, p. 25.
23.	Basics of computer networks	5	BD (CC)	7	Appendix №23, p. 26.

24.	Multiprocessor computing systems (OLTP,DM,DW,DSS)				Appendix №24, p. 27.
25.	Information security and information protection	5	BD (CC)	7	Appendix №25, p. 28.
26.	Fundamentals of modern cryptographic systems				Appendix №26, p. 29.
27.	Programming in the 1C environment:Enterprises	5	BD (CC)	7	Appendix №27, p. 30.
28.	ERP and business opportunity management. (ERP "Galaxy")				Appendix №28, p. 31.
29.	Decision theory	5	SD(CC)	7	Appendix №29, p. 32.
30.	Theory of optimization systems				Appendix №30, p. 33.
The cycle of the specialized disciplines (SD)					
Component of choice CC					
31.	Designing of IS in the auto- road industry	5	SD(CC)	7	Appendix №31, p 34.
32.	The software design of the EIS				Appendix №32, p. 35.
33.	Programming in C#	5	SD(CC)	7	Appendix №33, p. 36.
34.	Office software tools				Appendix №34, p. 37.
35.	Telematics in the road industry	5	SD(CC)	7	Appendix №35, p. 38.
36.	BigData Technologies and Cloud Computing				Appendix №36, p. 39.

Note: A brief description of the elective specialty disciplines is given in the Appendix.

Agreed:
General Director of Honeywell-ASU LLP, S.K. Abdigaliyev
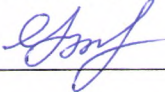Director of GIS ALI LLP Umurzakov R.D.
Tsekhovoy A.F. – First Vice President, General Director of the NGO "International Academy of Informatization"
The coordination acts are attached.

Catalog of elective disciplines in EP 6B06106 - Information Systems considered and discussed at the meeting of the Department Protocol №9 from March 15, 2024

Head Department of HK, GD and IP Ph.D., associate professor _____ K.E. Turganbay

The catalog of elective disciplines is recommended by SMC Protocol №8 of March 19, 2024.

Chairman of the SMC, Ph.D., professor _____ U.A. Murzakhmetova

**Brief description of the elective disciplines of the specialty
"Information Systems"**

Application 1

1	The name of the discipline	**Ecology and life safety**
1	Code of disciplines	E LS 21(2)01
2	Number of credits, ECTS	5
3	Department	HK, GED and IS
4	Course, semester	2,4
5	Prerequisites	Biology, Chemistry, Life Safety High School Course
6	Post requisites	Production and pre-graduate practice
7	Purpose of study	The main objective of the course is to green the consciousness of students and foster a sense of responsibility for the environment. Knowledge of the basic laws of interaction of the components of the biosphere and the consequences of the intervention of human economic activity, especially in conditions of intensified environmental management, is necessary for solving practical problems in the plane of the relationship between society and the biosphere as a whole.
8	Summary of disciplines	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 laws of the functioning of natural systems, the tasks of ecology as a science. Management in the field of environmental safety. 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. Used active teaching methods: lecture press conference; method "515"; "Case study"; the "Chain" method, etc.
9	Expected results	As a result of mastering the discipline, **the student must:** **Know**: the main natural and man-made hazards, their properties and characteristics; the nature of the impact of harmful and dangerous factors on humans and the environment, methods and methods of protection against them; theoretical foundations of life safety in emergency situations; the possible consequences of accidents, disasters, natural disasters; legal, regulatory, technical and organizational foundations for life safety; the anatomical and physiological consequences of human exposure to traumatic, harmful and damaging factors and first aid techniques; methods to protect the public in emergencies. **To be able to:** analyze the flow of environmental processes associated with anthropogenic effects on the environment; identify their causes and solutions; identify the main hazards of the human environment, assess the risk of their implementation; make decisions on appropriate actions in an emergency; recognize life disorders in emergency conditions and injuries; make decisions on appropriate actions in an emergency; choose methods of protection against harmful and dangerous factors of an emergency; to ensure the safety of life in the implementation of professional activities and environmental protection; provide first aid to victims. **Have skills**: the use of personal protective equipment in emergencies; possession of the main methods of protecting production personnel and the public in the event of an emergency; applying knowledge of the functioning of ecological systems and the biosphere as a whole **Competences**: demonstrate the basics of legal knowledge in various areas of life, formulate the basic laws of the functioning of the biosphere and the principles of environmental management to reduce the impact on human health and the environment, apply methods of protection and first aid in emergency situations, demonstrate basic knowledge of mathematics and natural Sciences, their use in professional activities, to build work in a team, tolerantly perceive social general, ethnic, confessional and cultural differences.

Application 2

2	The name of the discipline	**Methods of scientific research in IS**
1	Code of discipline	MSR 21(2)01
2	Number of credits, ECTS	5
3	Department	HK, GED and IS
4	Course, semester	2,4
5	Prerequisites	The discipline "Scientific Research Methods" involves the use of knowledge gained from studying the disciplines "Information and Communication Technologies (in English)", "Programming Technology", "Algorithms, Data Structure and Programming", "Academic Writing"
6	Post requisites	The student must carry out research work on: writing abstracts; completing coursework; writing and designing a thesis.
7	Purpose of study	The purpose of the discipline is to form in students the fundamentals of organizing and conducting scientific research that meets modern requirements for training qualified specialists.
8	Summary of disciplines	The discipline allows you to gain knowledge on the basic theoretical provisions, technologies, operations, practical methods and techniques of conducting scientific research on the basis of modern achievements of domestic and foreign scientists and to master the skills of choosing the topic of scientific research, scientific search, analysis, experimentation, data processing, obtaining sound effective solutions using. Information technology. Used active teaching methods: problem lectures; brainstorming; round tables; game exercise.
9	Expected results	Characteristics of the levels of development of competencies in a student. **Know:** global problems of our time and the need for their scientific knowledge; understand the theoretical and methodological foundations (principles, methods, etc.) of organizing and conducting scientific research; know the methodology and methods of scientific research **To be able to:** carry out experimental research and experimental work, starting from identifying problems, choosing a topic, clarifying the methodological apparatus to approbation and literary design of the work; **Competencies:** skills in organizing and conducting scientific research; independent work with scientific literature, development of one's research abilities; selection of appropriate and effective research methods for solving practical problems in the field of information systems.

MINISTRY OF SCIENCE AND HIGHER EDUCATION OF THE REPUBLIC OF KAZAKHSTAN
KAZAKH AUTOMOBILE ROAD INSTITUTE named after L.B. GONCHAROV

Application 3

3	The name of the discipline	Theory of electrical circuits
1	Code of discipline	TEC 22(2)12
2	Number of credits, ECTS	4
3	Department	HK, GED and IS
4	Course, semester	2,3
5	Prerequisites	Math 1, Physics
6	Post requisites	Robotics
7	Purpose of study	Theoretical and practical training of bachelors in research and analysis of electrical circuits, the study of electromagnetic phenomena that transmit, distribute, process and generate information, knowledge of which is necessary to solve problems of a future specialty
8	Summary of disciplines	The discipline is aimed at studying the theoretical and methodological foundations and experience in 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 an electrical circuit, analysis of complex DC electrical circuits. The discipline reveals the basic laws, properties and characteristics of electrical circuits. Introduces students to methods for analyzing electrical circuits in steady-state and transient conditions. Active teaching methods used: problem situations; learning through play; method of heuristic questions; game design, etc.
9	Expected results	As a result of mastering the discipline, **the student must:** **Know**: the fundamentals of the theory, methods and means of theoretical and experimental research of linear and non-linear (in the modes of direct current and harmonic oscillations) electrical circuits with harmonic and non-harmonic influences; fundamentals of the theory of quadrupoles and circuits with distributed parameters, the stability of electrical circuits with feedback, electrical analog filters. **To be able to:** calculate and measure the parameters and characteristics of linear and nonlinear (in the modes of direct current and harmonic oscillations) of electrical circuits; calculate and analyze the parameters of electrical circuits and filters on personal computers. **Have skills**: experimental and theoretical study of electrical circuits in the framework of physical and mathematical modeling of processes in electrical circuits. **Competences:** to understand the surrounding reality on the basis of ideological positions, to demonstrate the basics of legal knowledge in various spheres of life; demonstrate basic knowledge in the field of mathematics and natural sciences, their use in their professional activities; to realize the need to form new competencies to solve practical problems in the field of information systems and technologies.

Application 4

4	The name of the discipline	Theoretical foundations of electrical engineering
1	Code of Discipline	TFEE 22(2)12
2	Number of credits, ECTS	4
3	Department	HK, GED and IS
4	Course, semester	2,3
5	Prerequisites	Math 1, Physics
6	Post requisites	Robotics.
7	Purpose of study	Theoretical and practical training of bachelors in research and analysis of electrical circuits, the study of electromagnetic phenomena that transmit, distribute, process and form information, the knowledge of which is necessary to solve the problems of the future specialty
8	Summary of disciplines	The discipline is aimed at studying the theoretical and methodological foundations and experience of using linear electrical circuits, sinusoidal current, the principles of operation of the simplest sinusoidal emf generator, Ohm's and Kirchhoff's laws for sinusoidal current circuits, three-phase electrical circuits, principles of operation of a three-phase emf generator. d.s., devices and principles of operation of DC machines, electromechanical analog devices, physical foundations of semiconductor devices. Active teaching methods used: problem situations; learning through play; method of heuristic questions; game design, etc.
9	Expected results	As a result of mastering the discipline, **the student must:** **Know**: the basics of the theory of electrical circuits of constant, alternating and three-phase currents; device and principle of operation of the transformer and electric machines; principle of operation, device, metrological and operational characteristics of electrical measuring instruments, basic methods of electrical measurements; elementary base of modern electronic devices, characteristics and parameters of semiconductor devices, general rules for the operation of semiconductor devices. **To be able to:** apply the basic laws and ratios of electrical circuits of constant, alternating and three-phase currents for their analysis and calculation; read electrical circuits and understand the purpose of the basic units of electrical equipment; measure basic electrical quantities; evaluate measurement errors and test electrical measuring instruments. **Have skills**: handling of modern technology, use of information technology in the field of professional activity; acquiring new knowledge necessary for daily professional activities and continuing education in the magistracy. **Competences**: apply methods of protection and first aid in emergency situations, be aware of the need to form new competencies to solve practical problems; demonstrate basic knowledge in the field of mathematics and natural sciences, their use in their professional activities; to realize the need to form new competencies to solve practical problems in the field of information systems and technologies.

Application 5

5	The name of the discipline	Architecture of computer systems
1	Code of Discipline	AKS 22(2)13
2	Number of credits, ECTS	4
3	Department	HK, GED and IS
4	Course, semester	2,3
5	Prerequisites	School Computer Science course
6	Post requisites	The material of this discipline is used during the performance by students of various computational and design works, diploma theses and projects.
7	Purpose of study	Familiarization with the basics of the architecture of personal computers and the principles of their functioning, the basics of the theory of logical design of digital devices, elements and functional nodes of a computer.
8	Summary of disciplines	The discipline forms knowledge in the field of architectural features of modern computers and computer systems, the composition and purpose of computer system elements, computer classification, main computer devices and their purpose, classification of networks, network architecture, their standards and network equipment. He studies the basics of the theory of logical design of digital devices, computer elements and functional units, as well as the arithmetic basics of computers. The active teaching methods used are: analysis of a specific situation; discussion; project method.
9	Expected results	As a result of mastering the discipline, the student must: **Know:** models of information system components, including database models and models of human-electronic computer interfaces, software, hardware, information, mathematical, functional and organizational support of information systems, including algorithms and methods of information security, technical and software documentation of various types based on domestic and foreign documentation standards. **Be able to:** install, configure, test and maintain system and application software for highly loaded computer systems and networks, support the processes of creating, managing, modernizing and promoting information resources (IR) of an organization (web content, text, graphic and multimedia content of websites, information support for business processes of organizations), formulate requirements for the structure and services of the IR of the organization, to model business processes, to test the IR of the organization. **Have skills:** to apply modern programming languages, system engineering methodologies, design automation systems, modern information technology standards, including methods and tools for building information security systems of modern ICT, manifestations of the ability to integrate into innovative structures of interaction in the field of professional activity, developing critical, problem-oriented thinking and striving for physical self-improvement. **Competencies:** to use various types of ICT in personal activities: Internet resources, cloud and mobile services for searching, storing, processing, protecting and distributing information, to realize the need to form new competencies to solve practical problems in the field of information systems and technologies, to use various types of ICT in professional and personal activities (Internet resources, cloud and mobile services for the search, storage, processing, protection and dissemination of information), demonstrate mastery of techniques and methods of operation of modern computer technology and equipment, apply methods and means of protecting information infrastructure, information resources and technologies, determine requirements for the design of network architecture, software and hardware of a computer network, develop, adapt and implement high-load applications, develop information system infrastructure, including databases, operating systems, application software software, etc., apply software solutions that combine text, graphic, multimedia materials, as well as other interactive tools.

Application 6

6	The name of the discipline	Architecture of information systems
1	Code of Discipline	AIS 22(2)13
2	Number of credits, ECTS	4
3	Department	HK, GED and IS
4	Course, semester	2,3
5	Prerequisites	School Computer Science course
6	Post requisites	The material of this discipline is used during the performance by students of various computational and design works, diploma theses and projects.
7	Purpose of study	Mastering the theoretical, methodological and technological foundations of designing modern information systems, mastering the general principles of operation and obtaining practical skills in designing information systems to solve applied problems
8	Summary of disciplines	The use of systematic approaches in information management and information technology in the course. Management of information systems resources. Design and implementation. Management of information systems resources. Management of information systems resources. Architectural approach to the implementation of information systems (approach): concepts and definitions. The connection of the architecture of information systems with the strategy of the organization. Formation of information system application architecture development skills
9	Expected results	As a result of mastering the discipline, the student must: **Know:** models of components of information systems, the methodology of functioning of the 1st, 2nd and 3rd-level IP architecture, features of building a file-server architecture; features of building a client-server architecture; features of building distributed systems; to have an idea about the architecture of open systems, the reference model of interaction of open systems; about distributed information processing, network software and hardware of information networks; about the applied architecture and organization of information system management; the main methods of testing the reliability of the IC and the architecture of the construction. **Be able to:** develop the structure of an information system; code in programming languages; verify the structure of the program code. **Have skills:** develop the structure of the IP databases in accordance with the architectural specification; develop the structure of the IP program code; verify the structure of the IP program code with respect to the IP architecture and the customer's requirements for the IP; eliminate detected inconsistencies. **Competencies:** to apply information and communication technologies to search and process information; to use various types of ICT in professional and personal activities (Internet resources, cloud and mobile services for searching, storing, processing, protecting and distributing information), to demonstrate mastery of techniques and methods of operation of modern computing equipment and equipment.

Application 7

7	The name of the discipline	Operating systems
1	Code of Discipline	OS 22(2)14
2	Number of credits, ECTS	4
3	Department	HK, GED and IS
4	Course, semester	2,4
5	Prerequisites	Information and communication technologies, Architecture of computer systems
6	Post requisites	Fundamentals of computer networks, Information security and information protection
7	Purpose of study	Familiarization with the fundamental principles of modern operating systems, the possibilities of applying fundamental concepts from the achieved technological level and specific requirements for a specific implementation, their relationship with various innovations in this field, as well as with modern trends in the development of operating systems.
8	Summary of disciplines	The discipline forms a complex of knowledge, skills and abilities in the field of operating systems application, considers: memory management, file systems, dispatching disciplines, input and output of information, deadlocks, virtualization and cloud, multiprocessor systems, security, operating system architecture and application programming interfaces; design of parallel interacting computing processes, the problem of deadlocks and methods of dealing with them, installation and configuration of modern programs for various virtual machines, classification of modern operating systems. Active teaching methods used: solving practical problem problems; presentations; discussions.
9	Expected results	As a result of mastering the discipline, the student must: *To know:* the composition and principles of operating systems and environments; the concept, main functions, types of operating systems; machine-dependent OS properties: interrupt handling, process planning, I/O maintenance, virtual memory management; machine-independent OS properties: working with files; job planning, resource allocation; principles of operating systems construction systems; ways of organizing device support, hardware drivers; the concept, functions and ways of using the software interface of the operating system, types of user interface. *Be able to:* use the tools of operating systems and environments to ensure the operation of computer technology; work in a specific OS; install and maintain operating systems; support applications of various operating systems. *Have skills:* work with various operating systems and their administration; use software tools to solve practical problems; develop components of software complexes and databases; use modern tools and programming technology (justify design decisions, carry out formulation and perform experiments to verify their correctness and effectiveness). *Competencies:* to be aware of the need to form new competencies to solve practical problems in the field of information systems and technologies; to use various types of ICT in professional and personal activities (Internet resources, cloud and mobile services for searching, storing, processing, protecting and distributing information); to demonstrate mastery of techniques and methods of operation of modern computing equipment and equipment; prepare technical documentation for the design of information systems and software development.

Application 8

8	The name of the discipline	The basics of the Linux operating system
1	Code of Discipline	TBLinuxOS 22(2)14
2	Number of credits, ECTS	4
3	Department	HK, GED and IS
4	Course, semester	2,4
5	Prerequisites	Information and communication technologies, Architecture of information systems.
6	Post requisites	Multiprocessor computing systems (OLTP,DM,DW,DSS), The basics of modern cryptographic systems.
7	Purpose of study	Gaining knowledge in the field of fundamental concepts and general principles of the organization of the Linux operating system, including the study of aspects such as process management, memory and device mechanisms of interprocessor interaction, security issues in the context of Linux OS, as well as the study of the main features of the most popular modern operating systems.
8	Summary of disciplines	The discipline defines the Linux operating system, scope and purpose, discusses: processes and threads, OS functions for process management; provides mechanisms for interprocessor interaction; memory management functions; memory allocation methods; OS tasks for managing files and devices; file systems; fault tolerance of file and disk systems; architecture of the operating system and application programming interfaces; design of parallel interacting computing processes, installation and configuration of modern programs for various virtual machines. Active teaching methods used: solving practical problem problems; presentations; discussions.
9	Expected results	As a result of mastering the discipline, the student must: *To know:* the basic principles and concepts of the Linux OS, including the management of processes, memory, devices and the file system; the main platforms and tools available for the development of information systems; the technological requirements necessary to work on selected platforms. *Be able to:* analyze user requirements and configure the Linux OS, taking into account these requirements; carry out parametric configuration of the Linux OS in accordance with the requirements and the project; analyze the requirements of the project and determine the most appropriate platform and tools for the implementation of information systems; evaluate and select software and hardware components, taking into account the requirements of the project; *Have skills:* in performing the installation and configuration of Linux OS, as well as diagnosing and troubleshooting problems related to installation and configuration; in integrating various platforms and tools to create effective information systems; the ability to analyze possible risks and problems associated with the choice of platform and tools, and propose appropriate solutions. *Competencies:* to perform parametric configuration and installation of information and automated systems; to configure, set up, test software and hardware complexes; to work in various modern operating systems; to use software configuration tools in Linux; to use the Linux operating system to solve typical tasks.

Application 9

9	The name of the discipline	The basics of artificial intelligence
1	Code of Discipline	TBAI 22(2)15
2	Number of credits, ECTS	4
3	Department	HK, GED and IS
4	Course, semester	3,5
5	Prerequisites	Mathematics II
6	Post requisites	Basics of computer networks
7	Purpose of study	Mastering by students the technologies of software development of practical systems of intelligent and expert systems, training students in the basic theoretical and practical position of the theory of artificial intelligence, training in the skills of using methods and models of expert systems
8	Summary of disciplines	The course focuses on the architecture of artificial intelligence systems, pattern recognition systems, adaptation of artificial intelligence systems, learning and self-learning problems, perceptron's, methods of analysis and algorithmic models of multidimensional data structures, methods of human speech synthesis, the use of modern integrated instrumental development environments (in particular, the Anaconda 3 development environment - Jupyter Notebook), high-and middle-level Python programming and machine learning, Data Science, Deep Neural Networks and artificial intelligence
9	Expected results	As a result of mastering the discipline, the student must: *To know:* concepts of modern models of biological and artificial neural networks, ways of their application for information processing and pattern recognition *Be able to:* describe models of artificial neural networks; solve problems and develop algorithms for solving them for the implementation of software implementation of neural networks in order to process static and video images; *Have skills*: organizes modern models of biological and artificial neural networks, ways to use them for information processing and pattern recognition *Competencies*: applies various neural network models in solving information processing problems

MINISTRY OF SCIENCE AND HIGHER EDUCATION OF THE REPUBLIC OF KAZAKHSTAN
KAZAKH AUTOMOBILE ROAD INSTITUTE named after L.B. GONCHAROV

Application 10

10	The name of the discipline	Methods and means of designing information systems
1	Code of Discipline	MMODIS 32(2)15
2	Number of credits, ECTS	4
3	Department	HK, GED and IS
4	Course, semester	3,5
5	Prerequisites	Operating systems
6	Post requisites	Designing of IS in the auto- road industry
7	Purpose of study	Knowledge of design principles based on the application of modern economic and mathematical methods and computer technology, the concept and methodology of analysis and synthesis of complex systems.
8	Summary of disciplines	The course provides: the composition and structure of various subjects as design objects; modern design technologies and methods of substantiating the effectiveness of their application; the content of IP stages and design stages in the application of various design technologies and their features; goals and objectives of pre-design research of informatization tools; methods of modeling information processes in the subject area; classification and general characteristics of existing CASE studiestools. Active teaching methods used: lectures, project work, group discussions, problem solving, technology use, presentations
9	Expected results	As a result of mastering the discipline, the student must: **To know:** the introduction of information technologies into professional activities, types of computer graphics, areas of their application, ways of storing graphic information, the study of information models of colors; **Be able to:** use modern models for computer design, Web technologies, object-oriented programming, database design, as well as search, storage, processing, protection and dissemination of information in managed organizations and business structures; **Have skills:** working with data and analyzing data tools, understanding infrastructure, working with interface and design; **Competencies:** application of methods of decomposition of systems in order to effectively design information systems at all stages of design

MINISTRY OF SCIENCE AND HIGHER EDUCATION OF THE REPUBLIC OF KAZAKHSTAN
KAZAKH AUTOMOBILE ROAD INSTITUTE named after L.B. GONCHAROV

Application 11

13	The name of the discipline	Creating a startup
1	Code of Discipline	C S 32(2)16
2	Number of credits, ECTS	4
3	Department	HK, GED and IS
4	Course, semester	3,5
5	Prerequisites	ICT, Robotics
6	Post requisites	Digital media technologies, Digital marketing by industries
7	Purpose of study	Formation of a scientific understanding of start-up projects, goals and results, features and differences between start-up projects and business plans.
8	Summary of disciplines	The discipline is aimed at studying modern approaches to the development of new ideas in the form of a startup, starting with the formation of a business plan, further step-by-step verification of each of the hypotheses of the initial business plan and reversal, if necessary (identification of consumers), ending with the verification of consumers for a startup. During the course, all knowledge and skills are given in the form of theory, with consolidation in practice in team projects. Used active teaching methods: problem lecture; case-study; basket method; discussion, presentations.
9	Expected results	As a result of mastering the discipline, **the student must:** **Know**: the essence of the automated control system as a tool to optimize management in transport processes; organization methods and ways to improve the accounting and workflow system. **To be able to:** use scientific methods and techniques for studying a specific science; summarize research results; synthesize new knowledge and present it in the form of humanitarian socially significant products; make a choice of methodology and analysis; realize the need for self-organization and self-education, critically rethink the accumulated experience, change, if necessary, the type and nature of their professional activities; to understand the nature of entrepreneurship and how to manage it as a process, to determine the areas in which entrepreneurship is manifested, including a startup in professional activity; evaluate a business idea, market, competitors; present a business idea and startup strategy in writing, substantiate its feasibility, develop an action plan; draw up a marketing plan, incl. using methods of project advancement at the initial stage in conditions of limited financial and human resources; estimate the financial costs of a startup. **Have skills:** using a methodology for describing the economy of a startup, calculating indicators of its effectiveness and implementation; develop, adapt and implement high-load applications; apply software solutions that combine text, graphic, multimedia materials, as well as other interactive tools; prepare technical documentation for the design of information systems and software development. **Competencies:** to show the ability to be included in the innovative structure of interaction in the field of professional activity, developing critical, problem-oriented thinking and the desire for physical self-improvement; support the processes of creation, management, modernization and promotion of information resources (IR) of the 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 the organization's IR, model business processes, test the organization's IR; apply the skills of entrepreneurship, innovation, creativity, reengineering of business processes, management of possible risks in business processes.

Application 12

12	The name of the discipline	Automation of business documentation
1	Code of Discipline	ABDS 32(2)16
2	Number of credits, ECTS	4
3	Department	HK, GED and IS
4	Course, semester	3,5
5	Prerequisites	ICT, Basics of Information Systems, Basic data in IS.
6	Post requisites	The material of this discipline is used during the performance by students of various computational and design works, diploma theses and projects.
7	Purpose of study	Formation in students of a system of knowledge and skills in working with electronic documents, which are necessary for the effective management of the business process of an enterprise.
8	Summary of disciplines	The discipline helps to understand the need to implement electronic document management systems in the business processes of any organization, gain experience in assessing the capabilities and complexity of the selected system. Introduces the principles of automated document management systems. The theoretical foundations of electronic document management technologies and the practice of their application in the IP of enterprises for the purpose of documentation management are considered. The use of technologies for the collection, management, storage, protection and delivery of information related to organizational processes. Used active teaching methods: problem lectures, round table, discussion, presentations.
9	Expected results	As a result of mastering the discipline, the student must: Know: the laws and terminology of document management, the patterns of document formation in the business process of the company; organization of document circulation, control of execution of documents and information and reference work using modern computer information technologies. Be able to: develop clear and structured abstractions and algorithms for management processes related to electronic document management and interaction between employees of the organization, as well as for external relations with clients of organizations. Apply in practice the provisions of the legislative and regulatory-methodological acts of the Republic of Kazakhstan on the issues of office work. Have skills: execute scripts that implement typical actions related to document management (docflow) and business processes of document management and interaction between employees within the organization and employees of the organization with its customers (workflow). Competencies: organize, plan and control the work of the office work (management documentation support); implement unified documentation systems in the organization's business process; draw up documents in accordance with the requirements of state standards; determine the historical and practical value of documents.

MINISTRY OF SCIENCE AND HIGHER EDUCATION OF THE REPUBLIC OF KAZAKHSTAN
KAZAKH AUTOMOBILE ROAD INSTITUTE named after L.B. GONCHAROV

Application 13

11	The name of the discipline	Digital interfaces of data transmission
1	Code of Discipline	DIDT 32(2)16
2	Number of credits, ECTS	4
3	Department	HK, GED and IS
4	Course, semester	3,5
5	Prerequisites	**ICT.OIS**
6	Post requisites	Digital Media Technologies, .NET Core Application Development, Telematics in the Road Industry.
7	Purpose of study	Training the specialists capable of competently and efficiently designing ergonomic digital user interfaces of automated information processing and control systems.
8	Summary of disciplines	The discipline forms a complex of knowledge, skills and abilities in the field of using digital data transfer interfaces, discusses the main functions of digital input/output interfaces, structures, exchange channels, technical and operational characteristics of the main, most common digital interfaces of information and computing systems Used active teaching methods: problem situations; "Brainstorming"; discussion, method projects.
9	Expected results	As a result of mastering the discipline, **the student must:** **Know:** scientific methods and techniques for studying a specific science; summarize research results; methods of ergonomic design of digital interfaces; methods of system-wide design of interfaces of human-computing environment; exchange protocols, technical and operational characteristics of interfaces. **To be able to:** use various types of ICT in personal activities: Internet resources, cloud and mobile services for the search, storage, processing, protection and dissemination of information; apply software solutions that combine text, graphic, multimedia materials, as well as other interactive tools; to formulate requirements for hardware and software that provide interaction with the computing environment; make a selection and justification of design solutions for the organization of interfaces of computer systems. **Have skills:** Demonstrate proficiency in the techniques and methods of operation of modern computers and equipment; apply methods and means of protecting information infrastructure, information resources and technologies; prepare technical documentation for the design of information systems and software development; connecting peripheral devices to the appropriate interfaces, building information and computing systems at the interface level. **Competences:** apply in professional activity modern programming languages, system engineering methodology, design automation systems, modern information technology standards, including methods and tools for building information security systems of modern ICT; develop models of components of information systems, including models of databases and models of interfaces "human - electronic computer".

MINISTRY OF SCIENCE AND HIGHER EDUCATION OF THE REPUBLIC OF KAZAKHSTAN
KAZAKH AUTOMOBILE ROAD INSTITUTE named after L.B. GONCHAROV

Application 14

14	The name of the discipline	Metrology, standardization and quality management **
1	Code of Discipline	M S QM 32(2)19
2	Number of credits, ECTS	4
3	Department	HK, GED and IS
4	Course, semester	3,5
5	Prerequisites	Math, physics
6	Post requisites	IS projecting for road industry. Material of this disciplin is used during the students' performing different calculation and design, diploma works and projects.
7	Purpose of study	Study of scientific principles and methods of metrological support of production, standardization, certification and determination of their role in improving quality in the development of information systems. In the process of studying this discipline, the student will be able to independently prepare documentation on quality management, use standard methods of quality control of technological processes in the design, development and implementation of information systems, organize workplaces, their technical equipment (use of computer technology and computer networks), carry out control of compliance with technological discipline and environmental safety.
8	Summary of disciplines	The discipline forms students' complex of knowledge related to measurements, methods and means of ensuring their unity and ways to achieve the required accuracy, the essence of technical standardization, 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 compliance and quality standards based on knowledge of international and national systems of relevant regulatory documents. Used active teaching methods: problem lecture; case-study; discussion, presentations, etc.
9	Expected results	As a result of mastering the discipline, **the student must:** **Know:** the general principles and basic scientific provisions of standardization, the theory of interchangeability and technical measurements, the current standards in the field of IT, the principles of their construction and the method of application; - basic concepts, terms and definitions related to standardization, certification and metrology; basic concepts of qualimetry; technical measurements, methods, methods and means of control in the development of IS; indicators of the level of IP quality and the basis of quality management. **To be able to:** use modern methods of control of IS, technological processes of their design; assign appropriate control methods when developing information processes; use the applicable standards when setting quality parameters; technically competently draw up technical documentation; learn to work with educational, methodological and reference literature. **Have skills**: be proficient in the methods of monitoring compliance with the technological process and environmental safety; methods of organizing metrological support of technological processes, using standard methods of quality control of IS and ICT; measurement methods and methods of processing measurement results; methods and techniques used in metrology, standardization and certification of information products. **Competencies:** apply information and communication technologies to search and process information; be aware of the need for the formation of new competencies for solving practical problems in the field of information systems and technologies; use various types of ICT in professional and personal activities; demonstrate mastery of techniques and methods of operation of modern computers and equipment; determine the requirements for the design of the network architecture, software and hardware of the computer network.

Application 15

15	The name of the discipline	Methods, models in the management of the road industry
1	Code of Discipline	MMMRI 32(2)17
2	Number of credits, ECTS	5
3	Department	HK, GED and IS
4	Course, semester	3,6
5	Prerequisites	Mathematics, Information and Communication Technologies
6	Post requisites	The material of this discipline is used during the performance by students of various computational and design works, diploma theses and projects.
7	Purpose of study	Formation of solid theoretical knowledge and practical skills in future specialists, allowing them to successfully work in the construction and numerical analysis of mathematical models of various technical objects and systems and, based on the results of this analysis, formulate recommendations for the improvement and modernization of such systems and objects
8	Summary of disciplines	The discipline forms knowledge about modern methods of constructing mathematical models of technical systems, about transport modeling, the current state of transport system theories, various tools and simulation packages for modeling traffic flows; practical skills in using specialized software for transport modeling, research and creation of predictive transport models. Used active teaching methods: individual projects (computer modeling, presentation and discussion).
9	Expected results	As a result of mastering the discipline, the student must: know: - classification of models of systems and processes, their types and types of modeling; - principles and methodology of functional, simulation and mathematical modeling of systems and processes, - methods for constructing modeling algorithms; - methods of constructing mathematical models, their simplification, - hardware and software simulation tools; - experiment planning technology; - methods of statistical modeling on a personal computer; be able to: - use the basic methods of constructing mathematical models of processes, systems, their elements and control systems; - implement simple simulation algorithms; - work with any of the main types of software systems designed for mathematical and simulation modeling; - to plan a model experiment and process its results on a personal computer; - evaluate the accuracy and reliability of the simulation results; master the skills: - working with a software system for mathematical and simulation modeling; gain experience in building a mathematical model; model research; application of hardware and software for modeling. Competences: independently apply modern computer technologies to solve research and production-technological problems of professional activity; demonstrate basic knowledge in the field of mathematics and natural sciences, their use in professional activities; to be aware of the need for the formation of new competencies for solving practical problems in the field of information systems and technologies; use various types of ICT in professional and personal activities (Internet resources, cloud and mobile services for searching, storing, processing, protecting and distributing information); develop the infrastructure of information systems, including databases, operating systems, application software, etc.; apply software solutions that combine text, graphics, multimedia materials, as well as other interactive tools.

MINISTRY OF SCIENCE AND HIGHER EDUCATION OF THE REPUBLIC OF KAZAKHSTAN
KAZAKH AUTOMOBILE ROAD INSTITUTE named after L.B. GONCHAROV

Application 16

16	The name of the discipline	Business process modeling
1	Code of Discipline	BPM 32(2)17
2	Number of credits, ECTS	5
3	Department	HK, GED and IS
4	Course, semester	3,6
5	Prerequisites	Algorithms, data structure and programming
6	Post requisites	ERP and business opportunity management. Reengineering of business processes based on corporate EIS
7	Purpose of study	Mastering the theoretical foundations of process management, modeling, analysis and optimization of business processes of an organization (enterprise), the formation of practical skills in using the process approach in the work of an organization (enterprise).
8	Summary of disciplines	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 the enterprise, processes of digital content management, processes of creation and use of information services; practical skills of modeling, analysis and improvement of business processes, IT project planning, selection of rational IS for business and content management enterprises. Used active teaching methods: individual projects (computer modeling, presentation and discussion).
9	Expected results	As a result of mastering the discipline, the student must: **Know:** conceptual foundations of enterprise architecture; basic principles and methods for describing and developing enterprise architecture; methods of analysis and modeling of business processes; basic programming technologies; principles of construction and architecture of computing systems; types of content of information resources of an enterprise and Internet resources, processes for managing the life cycle of digital content, processes for creating and using information services (content services). **Be able to**: develop and analyze enterprise architecture; to model, analyze and improve business processes; planning an IT project at all phases of its life cycle; choose smart IP and ICT for business management; manage the processes of the life cycle of enterprise content and Internet resources, manage the processes of creating and using information services (content services); systematize and summarize information, organize and conduct research in the field of economics, management and ICT, develop specific proposals based on research results, prepare reference and analytical materials for making management decisions **Have skills:** business communications in the professional field, teamwork; formalization, development of diagrams, analysis and modeling of business processes; the use of software tools for modeling business processes; formulating management decisions for reengineering business processes **Competences:** independently apply modern computer technologies to solve research and production-technological problems of professional activity; to be aware of the need for the formation of new competencies for solving practical problems in the field of information systems and technologies; to understand the nature of entrepreneurship and how to manage it as a process, to determine the areas in which entrepreneurship is manifested, including a startup in professional activity; use various types of ICT in professional and personal activities (Internet resources, cloud and mobile services for searching, storing, processing, protecting and distributing information); apply software solutions that combine text, graphics, multimedia materials, as well as other interactive tools.

MINISTRY OF SCIENCE AND HIGHER EDUCATION OF THE REPUBLIC OF KAZAKHSTAN
KAZAKH AUTOMOBILE ROAD INSTITUTE named after L.B. GONCHAROV

Application 17

17	The name of the discipline	**Digital management of road infrastructure**
1	Code of Discipline	DMRI 32(2)18
2	Number of credits, ECTS	5
3	Department	HK, GED and IS
4	Course, semester	2,4
5	Prerequisites	Information and communication technologies
6	Post requisites	Digital interfaces for data transmission. Methods, models in the management of the road industry. Telematics in the road industry.
7	Purpose of study	Students gain knowledge in the field of digital transport systems management. In the course of studying the discipline, students will master a new ideology of interaction between vehicles and infrastructure, which consists in a comprehensive information exchange between them with a simultaneous decrease in the role of a person in management. All this will help to reduce transportation costs and increase the growth of throughput due to the transition to optimal modes of infrastructure functioning.
8	Summary of disciplines	The discipline forms 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; forms practical skills in the development and use of hardware and software for the implementation of digital management of road infrastructure. Used active teaching methods: team projects (brainstorming, presentation and discussion).
9	Expected results	As a result of mastering the discipline, the student must: **Know:** the importance and place of digital technologies in the management of the infrastructure of the road industry; the essence of management processes, automation of information systems; methods and areas of their application; methodology for the implementation of digital technologies, the main industry standards. **Be able to:** highlight the main objects of automation; to characterize the essence and evolution of digital management technologies in the road industry; use basic approaches to the choice of digital information systems. **Have skills:** independently apply modern computer technologies to solve research and production-technological problems of professional activity; own the methodology for the implementation of information systems; approaches to project management in terms of automation in the road industry; the main methods of calculating the indicator of the total cost of projects. **Competencies:** to use scientific methods and research techniques of a specific science; summarize research results; synthesize new knowledge and present it in the form of humanitarian socially significant products; make a choice of methodology and analysis; analyze specific and general problems of the functioning of the biosphere and rational use of natural resources to reduce the impact on human health and the environment; independently apply modern computer technologies to solve research and production and technological problems of professional activity; build work in a team, tolerantly perceive social, ethnic, confessional and cultural differences; use various types of ICT in professional and personal activities (Internet resources, cloud and mobile services for searching, storing, processing, protecting and distributing information); demonstrate mastery of techniques and methods of operation of modern computers and equipment. determine the requirements for the design of the network architecture, software and hardware of the computer network; prepare technical documentation for the design of information systems and software development.

MINISTRY OF SCIENCE AND HIGHER EDUCATION OF THE REPUBLIC OF KAZAKHSTAN
KAZAKH AUTOMOBILE ROAD INSTITUTE named after L.B. GONCHAROV

Application 18

18	The name of the discipline	Digital logistics
1	Код дисциплины	DLog 32(2)18
2	Number of credits, ECTS	5
3	Department	HK, GED and IS
4	Course, semester	2,4
5	Prerequisites	Information and Communication Technology
6	Post requisites	Digital management by industry.
7	Purpose of study	Students acquire knowledge and skills in the use of digital logistics for various purposes, as well as familiarization with information and legal issues related to the implementation of projects of modern digital logistics systems.
8	Summary of disciplines	The discipline forms knowledge about the specifics 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, robots and cobots in logistics; forms practical skills in the application and development of solutions for the use of hardware and software for the implementation of digital logistics. Used active teaching methods: team projects (brainstorming, presentation and discussion).
9	Expected results	As a result of mastering the discipline, the student must: Know: the main provisions of the concept of the digital economy, the direction of making effective management decisions in the functional areas of logistics To be able to: apply in practice methods of choosing tools and information technologies for information processing when making managerial decisions in the functional areas of logistics; develop, adapt and implement high-load applications; prepare technical documentation for the design of information systems and software development. Skills: independently apply modern computer technologies to solve research and production-technological problems of professional activity; own the methods and tools of the digital economy for making effective management decisions in the functional areas of logistics Competences: independently apply modern computer technologies to solve research and production-technological problems of professional activity; build work in a team, tolerantly perceive social, ethnic, confessional and cultural differences; to understand the nature of entrepreneurship and how to manage it as a process, to determine the areas in which entrepreneurship is manifested, including a startup in professional activity; use various types of ICT in professional and personal activities (Internet resources, cloud and mobile services for searching, storing, processing, protecting and distributing information); demonstrate mastery of techniques and methods of operation of modern computers and equipment; apply software solutions that combine text, graphic, multimedia materials, as well as other interactive tools; prepare technical documentation for the design of information systems and software development.

MINISTRY OF SCIENCE AND HIGHER EDUCATION OF THE REPUBLIC OF KAZAKHSTAN
KAZAKH AUTOMOBILE ROAD INSTITUTE named after L.B. GONCHAROV

Application 19

19	The name of the discipline	**Java Programming**
1	Code of Discipline	Java P 32(2)19
2	Number of credits, ECTS	5
3	Department	HK, GED and IS
4	Course, semester	3,6
5	Prerequisites	Algorithms, data structure and programming, C/C++ programming technology
6	Post requisites	The material of this discipline is used during the performance by students of various computational and design works, diploma theses and projects.
7	Purpose of study	Mastering students' knowledge about the principles of designing and developing computer programs in the Java language; forming students' holistic understanding of the principles of building and functioning of the modern Java platform.
8	Summary of disciplines	The course provides an overview of the Java technologies and platform. The following issues are studied: creating and maintaining a project, project files; introduction to object-oriented Java programming; data types, variables, I/O operations; program progress control operators; creating and using objects; Java API classes and objects; constructors, methods and class fields; encapsulation, inheritance and polymorphism, interfaces; exception handling mechanism; graphical user interface (GUI) development; containers and components. Active teaching methods used: solving practical problem problems; brainstorming; working in small groups; discussion.
9	Expected results	As a result of mastering the discipline, the student must: **To know:** the history of the emergence and development of Java technology, the main goals and areas of application, the basic concepts and components of Java technology, the composition of the JDK development kit, editions and versions of Java, the life cycle of a Java program; the main interface elements and features of the development environment; basic concepts of the Java language: class, object, attribute, operation, composition, inheritance, interface, package; Java language syntax: identifiers, data types, arrays of primitive types, variables, arithmetic and logical operators and expressions; basic features of Java API classes, arrays of objects. **Be able to:** design and develop applications in Java; compile and run programs in Java; use GUI elements; manipulate resources in the development environment; design classes and apply inheritance and polymorphism mechanisms; express relationships between classes using UML notation; use the exception mechanism for I/O operations. **Have the skills to:** design, develop and debug Java code; test Java applications; develop programs using OOP; create a graphical user interface; use template technology; UML language. **Competencies:** to be aware of the need to form new competencies to solve practical problems in the field of information systems and technologies; to use various types of ICT in professional and personal activities; to demonstrate mastery of techniques and methods of operation of modern computer technology and equipment; to develop information system infrastructure, including databases, operating systems, application software, etc.; to prepare technical documentation for the design of information systems and software development

MINISTRY OF SCIENCE AND HIGHER EDUCATION OF THE REPUBLIC OF KAZAKHSTAN
KAZAKH AUTOMOBILE ROAD INSTITUTE named after L.B. GONCHAROV

Application 20

20	The name of the discipline	Certification and technical documentation
1	Code of Discipline	C TD 32(2)19
2	Number of credits, ECTS	5
3	Department	HK, GED and IS
4	Course, semester	3,6
5	Prerequisites	ICT
6	Post requisites	Information security and information protection. IC design for the road industry. The material of this discipline is used during the performance by students of various computational and design works, diploma theses and projects.
7	Purpose of study	The purpose of studying the discipline is the acquisition by students of knowledge on the application of the certification system in the formation of technical documentation in accordance with the current regulatory framework; use the quality system documentation in professional activities; bring non-system measurement values in accordance with applicable standards and the international system of SI units
8	Summary of disciplines	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 standardization and certification systems, standards for paperwork, regulations, protocols and the organization of their own activities, the choice of standard methods and methods of performing professional tasks, evaluation their effectiveness and quality. Used active teaching methods: lecture-conversation; solving practical problem problems; situation-problem; presentation.
9	Expected results	As a result of mastering the discipline, **the student must:** **Know:** national and international standardization and certification system and product quality assurance system; basic concepts and definitions of standardization and certification; provisions of systems (complexes) of general technical and organizational and methodological standards; certification, systems and certification schemes; main types of technical and technological documentation, standards for the preparation of documents, regulations, protocols. **To be able to:** apply the requirements of regulatory documents to the main types of products (services) and processes; apply quality systems documentation; Apply the basic rules and documents of the certification system of the Republic of Kazakhstan. **Have skills**: use of up-to-date legal and regulatory documentation in the specialty; apply modern scientific and professional terminology. **Competencies:** apply information and communication technologies to search and process information; own a competent oral and written presentation of their thoughts on professional topics; apply in professional activity the normative documents of the International Organization for Standardization (ISO). International Electrotechnical Commission (IEC). International organizations participating in the work of ISO. Conduct metrological expertise and metrological control of design and technological documentation. Search, analyze and interpret the information necessary to fulfill the tasks of professional activity. Prepare technical documentation for the design of information systems and software development.

MINISTRY OF SCIENCE AND HIGHER EDUCATION OF THE REPUBLIC OF KAZAKHSTAN
KAZAKH AUTOMOBILE ROAD INSTITUTE named after L.B. GONCHAROV

Application 21

21	The name of the discipline	Python Web Application Development technologies
1	Code of Discipline	P Web ADT 32(2)20
2	Number of credits, ECTS	5
3	Department	HK, GED and IS
4	Course, semester	3,6
5	Prerequisites	Algorithms, data structure and programming, WEB technology
6	Post requisites	The material of this discipline is used during the performance by students of various computational and design works, diploma theses and projects.
7	Purpose of study	Students gain basic skills in designing and developing Web applications on the Django platform, as well as skills in testing and debugging applications on this platform.
8	Summary of disciplines	The course focuses on the development of web applications using Python, the Django framework and the interactive PyCharm development environment. The basic features of Django, its features, the structure of web applications created in it, and ways to integrate with other web libraries are being studied. The approaches of using modern architecture for building web frameworks are revealed. It describes how to use third-party packages when designing applications on Django. Special attention is paid to practical issues of using the basic features of the framework. Active teaching methods used: solving practical problem problems; brainstorming; group mini-projects; discussion.
9	Expected results	As a result of mastering the discipline, the student must: **To know:** the principles of programming using the main advantages of the Python language, the Django framework and the PyCharm development environment; features of building Django applications, standards for writing code, debugging tools and IDE for writing it; methods and technologies in the field of software development, websites and web applications; technologies for developing and testing programs for the web websites, programming languages and standards for the presentation of the results of analysis and design in the field of web programming and website creation. **Be able to:** develop and deploy applications on Django. work with the PyCharm IDE, test and debug written code; create web page templates and user forms; organize user interaction with various types of databases through models; apply technologies for developing and testing programs for websites, programming languages to solve professional tasks. **Have skills:** create a website from creating a template to its administration and deployment on the Internet; develop and debug code written using Django, test Django applications; use the basic libraries of the Django framework. the capabilities of the PyCharm IDE for code validation; the choice of tools, design and implementation of the system; the use of libraries and special software for the development and testing of programs for websites and web applications. **Competencies:** to use various types of ICT in professional and personal activities; to demonstrate mastery of techniques and methods of operation of modern computer technology and equipment; to develop information system infrastructure, including databases, operating systems, application software, etc.; to apply software solutions combining text, graphics, multimedia materials, as well as other interactive tools; prepare technical documentation for the design of information systems and software development

MINISTRY OF SCIENCE AND HIGHER EDUCATION OF THE REPUBLIC OF KAZAKHSTAN
KAZAKH AUTOMOBILE ROAD INSTITUTE named after L.B. GONCHAROV

Application 22

22	The name of the discipline	Digital media technologies
1	Code of Discipline	DMT 32(2)20
2	Number of credits, ECTS	5
3	Department	HK, GED and IS
4	Course, semester	3,6
5	Prerequisites	Information and communication technologies, Algorithms, data structures and programming, Programming technology.
6	Post requisites	The material of this discipline is used during the performance by students of various computational and design works, diploma theses and projects.
7	Purpose of study	Training in the field of information technology, which makes it possible to effectively apply methods of mathematical modeling, computer graphics technology, human-computer interaction in the field of computer graphics creation, data processing, analysis and visualization.
8	Summary of disciplines	The discipline forms a complex of knowledge in the field of the use of digital media technologies, analysis and visualization of information on specific examples developed in the Python programming language. The following are considered: application development stages with GUI; widgets, tkinter event processing; creation of classes and objects in Python; NumPy array processing; Matplotlib basics, drawing structure in Matplotlib, plotting in Matplotlib, special drawing elements in Matplotlib; Pygal library, design of Pygal graph elements. Used active teaching methods: group mini-projects; brainstorming.
9	Expected results	As a result of mastering the discipline, **the student must:** **Know:** programming languages and application software used to develop applications that implement digital media technologies; the capabilities of the Python programming language when developing applications with a graphical interface; the structure of the Python tkinter matplotlib and Pygal libraries; principles of data processing, analysis, visualization, mathematical processing methods and models of information presentation. **To be able to:** develop algorithms and software for solving problems of data processing, analysis and visualization; develop user interface design and information presentation; document the application development process; work in a team, create an interesting and high-quality intellectual product. **Have skills:** engineering development (design, coding, debugging, testing) and implementation of high-tech software solutions in the field of application development that implement digital media technologies; organizational and managerial activities, including the management of projects or phases of projects for the development and implementation of science-intensive software solutions, including collection of product requirements, planning of production processes and resources; development of a graphical user interface, programming of interactive graphical applications. **Competences:** to be aware of the need for the formation of new competencies to solve practical problems in the field of information systems and technologies; use in professional and personal activities various types of ICT (Internet resources, cloud and mobile services for searching, storing, processing, protecting and distributing information; demonstrate mastery of techniques and methods of operating modern computers and equipment; use software solutions that combine text, graphic , multimedia materials, as well as other interactive tools; prepare technical documentation for the design of information systems and software development.

Application 23

23	The name of the discipline	Basics of computer networks
1	Code of Discipline	BCN 42(2)21
2	Number of credits, ECTS	5
3	Department	HK, GED and IS
4	Course, semester	4,7
5	Prerequisites	Computer graphics and design
6	Post requisites	The material of this discipline is used during the performance by students of various computational and design works, diploma theses and projects.
7	Purpose of study	Classification of computer networks, features of modern network technologies, as well as the formation of computer network software and information support skills. The active teaching methods used are: lecture discussion; contextual learning; educational discussion, mobile learning, e-learning.
8	Summary of disciplines	Standardization and unification of hardware and software components of local and composite computer networks, formation of conceptual aspects of organizational and structural characteristics. Mastering the functional properties of network technologies and the possibilities of their maintenance. Get an idea of the communication systems of Network users. Mastering the skills of managing and managing networks with a limited number of users.
9	Expected results	As a result of mastering the discipline, **the student must:** **To know:** classification of computer networks, features of modern network technologies, hardware and software of computer networks; protocols and principles of operation of the Internet; modern computer technology, communications and communications; fundamentals of network administration; distinctive properties of various families of Internet browsers; common web browsers, HTML language; features of using the technology "Client - Server" in automated information systems; characteristics and features of operation of computer networks of various types. **Be able to:** perform installation, configuration and administration of network services of computer networks; design the architecture of computer network components; use the Internet and its capabilities to organize operational information exchange; receive information in local and global computer networks; install and configure network hardware in modern operating systems; to ensure the assignment of access rights, password protection and copying of the contents of file system folders, to share network hardware and software resources for sharing. **Have skills:** knowledge of methods for conducting a detailed and comprehensive assessment of the reliability and quality of a computer network; knowledge of the scientific base of standardization in order to determine the optimal level of unification and standardization of computer networks; professional search for necessary information on the Internet, scientific and periodical literature; choice of architecture and integration of computer network hardware. **Competencies:** have skills in handling modern technology, be able to use information technology in the field of professional activity; possess the tools for data processing and analysis in order to justify the design decisions made; determine the initial assessment of the degree of difficulty, risks, costs; apply modern architectures of distributed systems; use operating systems, network technologies, software development tools and software interfaces, the use of languages and methods of formal specifications, database management systems

MINISTRY OF SCIENCE AND HIGHER EDUCATION OF THE REPUBLIC OF KAZAKHSTAN
KAZAKH AUTOMOBILE ROAD INSTITUTE named after L.B. GONCHAROV

Application 24

24	The name of the discipline	Multiprocessor computing systems (OLTP, DM, DW, DSS)
1	Code of Discipline	MCS42(2)21
2	Number of credits, ECTS	5
3	Department	HK, GED and IS
4	Course, semester	4,7
5	Prerequisites	Information systems in business and management. IT project management. Business process automation.
6	Post requisites	The material of this discipline is used during the performance by students of various computational and design works, diploma theses and projects.
7	Purpose of study	Acquaintance with mathematical models and methods of parallel programming for multiprocessor computing systems necessary for solving complex applied problems with a large amount of computation.
8	Summary of disciplines	The discipline forms knowledge on the use of computer systems based on applied technologies when working with information resources that are used in the business processes of the organization. The directions of using OT for specific applications in solving professional tasks are determined. The use of multiprocessor computing systems involves the practical development of the following sections of parallel processing in computing machines: architectural principles of parallel processing implementation in a VM, as well as in the section of parallel computing methods. Used active teaching methods: analysis of a specific situation; discussion; project method.
9	Expected results	As a result of mastering the discipline, **the student must:** **Know:** the organization of common parallel computing systems, their most important architectural features and areas of effective use of specific types of parallel computing systems; architectural principles for the implementation of parallel processing in computers; methods and language mechanisms for constructing parallel programs. **To be able to:** use theoretical knowledge and practical skills to develop parallel computing systems with different architectures, present the main problems of parallel programming and possible ways to solve them. **Have skills:** using multiprocessor computing systems; application of parallel algorithms for solving professional problems; application of applied programs for multiprocessor computing systems. **Competencies:** apply information and communication technologies to search and process information; be aware of the need for the formation of new competencies for solving practical problems in the field of information systems and technologies; demonstrate mastery of techniques and methods of operation of modern computers and equipment; apply methods and means of protecting information infrastructure, information resources and technologies; develop infrastructure of information systems, including databases, operating systems, application software, etc.

MINISTRY OF SCIENCE AND HIGHER EDUCATION OF THE REPUBLIC OF KAZAKHSTAN
KAZAKH AUTOMOBILE ROAD INSTITUTE named after L.B. GONCHAROV

Application 25

25	The name of the discipline	Information security and information protection
1	Code of Discipline	ISIS 42(2)22
2	Number of credits, ECTS	5
3	Department	HK, GED and IS
4	Course, semester	4,7
5	Prerequisites	Discrete mathematics, Information and communication technologies, Operating systems.
6	Post requisites	The material of this discipline is used during the performance by students of various computational and design works, diploma theses and projects.
7	Purpose of study	Mastering the theoretical foundations of the construction and practice of using information security systems in information systems, teaching students systematic ideas about the principles, methods and means of implementing data protection, acquiring practical skills in information protection in information systems necessary for their design and operation
8	Summary of disciplines	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 evaluating a security system based on ISO/IEC 15408, the basics of cryptography, information security administration, the use of basic software and technical measures to ensure a high degree of protection of access to information, insider attacks, the use of software code defects, malware, electronic signature of binary programs. The active teaching methods used are: analysis of a specific situation; discussion; project method.
9	Expected results	As a result of mastering the discipline, the student must: *To know:* the relevance and importance of the problem of information security; goals, objectives, principles and main directions of ensuring information security; the main provisions of legislation in the field of modern copyright and information protection; evolution, trend and prospects for the development of methods and means of protecting computer information; basic methods of protecting confidential computer information; basic concepts used in the field of protection information security threats and classification of channels of unauthorized access to information; modern approaches to the construction of information security systems. *Be able to:* analyze the information structure; make adequate decisions when choosing information security tools based on threat analysis; select and analyze the quality indicators of the system and individual methods and means of information protection; identify and analyze the threat to information security depending on the operating environment of information technology products; develop models of information security system components; use modern software for encryption and concealment of information; choose the best methods to protect confidential information; to develop and create new standard information protection schemes based on modern information security tools. *Have skills:* create a secure environment using hardware and software protection tools; develop secure applications; independently design information security systems; master techniques to combat information security threats. *Competencies:* independently apply modern computer technologies to solve research and production and technological tasks of professional activity; realize the need to form new competencies to solve practical problems in the field of information systems and technologies; use various types of ICT in professional and personal activities (Internet resources, cloud and mobile services for search, storage, processing, protection and dissemination of information); apply methods and means of protecting information infrastructure, information resources and technologies; prepare technical documentation for the design of information systems and software development.

MINISTRY OF SCIENCE AND HIGHER EDUCATION OF THE REPUBLIC OF KAZAKHSTAN
KAZAKH AUTOMOBILE ROAD INSTITUTE named after L.B. GONCHAROV

Application 26

26	The name of the discipline	Fundamentals of modern cryptographic systems
1	Code of Discipline	FMCS 42(2)22
2	Number of credits, ECTS	5
3	Department	HK, GED and IS
4	Course, semester	4,7
5	Prerequisites	Discrete mathematics, Information and Communication technologies, Fundamentals of the Linux operating system.
6	Post requisites	The material of this discipline is used during the performance by students of various computational and design works, diploma theses and projects.
7	Purpose of study	Formation and understanding of the importance of information security issues at every stage of society's development, familiarization with the history of encoding and encrypting information since ancient times, formation of ideas about the possible practical application of data encryption in the modern world.
8	Summary of disciplines	The content of the discipline course is aimed at familiarizing students with the mathematical foundations of encryption theory, the history of cryptography, including current trends, basic encryption algorithms, stream ciphers and pseudorandom number generators, European standards for data encryption, hashing and electronic digital signature (EDS), the use of software code defects, malware, cryptographic information exchange protocols, methods cryptanalysis, steganographic methods of hiding transmitted information, modern developing trends in cryptography. The active teaching methods used are: analysis of a specific situation; discussion; project method.
9	Expected results	As a result of mastering the discipline, the student must: To know: the main tasks and concepts of cryptography; requirements for ciphers and the main characteristics of ciphers; methods of building block and stream cryptosystems, hashing functions, public key cryptosystems, electronic digital signature systems, steganographic systems; principles of using modern software for cryptographic protection of information. Be able to: apply the acquired knowledge to create secure systems and documentation; use encryption systems and stegosystems for the secure transmission of binary and textual information; conduct the simplest analysis of the durability of algorithms; apply hash functions and electronic digital signature in the exchange of commercial activities; be able to use standards and application software in the field of cryptography. Have the skills to: cryptographically protect your own and corporate information; navigate issues of security standards and legislation in the field of information protection. Competencies: to master system and comparative analysis; independently apply modern computer technologies to solve research and production and technological tasks of professional activity; design, develop and test software of various types; develop technical documentation for software; work with scientific and technical information using modern information technologies; analyze the results of installed software and develop suggestions for improving its work; interact with specialists of related profiles; apply methods and means of protecting information infrastructure, information resources and technologies; prepare technical documentation for the design of information systems and software development.

MINISTRY OF SCIENCE AND HIGHER EDUCATION OF THE REPUBLIC OF KAZAKHSTAN
KAZAKH AUTOMOBILE ROAD INSTITUTE named after L.B. GONCHAROV

Application 27

27	The name of the discipline	Programming in the 1C environment: Enterprises
1	Code of Discipline	P1CE:E 42(2)23
2	Number of credits, ECTS	5
3	Course, semester	HK, GED and IS
4	Курс, семестр	4,7
5	Prerequisites	Databases in information systems, ICT.
6	Post requisites	The material of this discipline is used during the performance by students of various computational and design works, diploma theses and projects.
7	Purpose of study	Formation of students' knowledge and skills necessary to manage the organization's information systems. These systems manage the financial and economic activities of the enterprise, ensure the adoption of informed management decisions based on high-quality and reliable information obtained using modern management and information technologies.
9	Summary of disciplines	The discipline is focused on the study and application of modern means of automation of the organization's activities in professional activity, the fundamental concepts and methods of automation of managerial work are considered, the analysis of IT tools is carried out. The principles of building information systems and the criteria for their selection for an enterprise based on the 1C:enterprise platform are analyzed. Used active teaching methods: classes with elements of conversation and the use of multimedia tools; case-study; work in small groups; discussion.
10	Expected results	As a result of mastering the discipline, **the student must:** **Know:** The structure and composition of functional tasks of management systems of organizations; capabilities of typical information systems for managing organizations; methods of development, implementation and adaptation of applied software based on the 1C: Enterprise 8. * platform; principles and methods for solving applied problems based on the 1C: Enterprise 8. * platform; standards for the development of technical documentation based on the 1C: Enterprise 8. * platform. **To be able to:** use various types of ICT in personal activities: Internet resources, cloud and mobile services for the search, storage, processing, protection and dissemination of information; apply methods and means of protecting information infrastructure, information resources and technologies; generate reports in 1C: Enterprise mode (in user mode); administer the 1C: Enterprise version 8. * system; perform elementary settings of typical configurations in the configuration mode. **Have skills:** develop information systems infrastructure, including databases, operating systems, application software, etc .; formation of requirements for an information system developed on the basis of 1C Enterprise 8. *; prepare technical documentation for the design of information systems and software development. **Competencies:** to carry out installation, configuration, testing and maintenance of system and application software for high-load computer systems and networks; apply information and communication technologies to search and process information; apply skills of entrepreneurship, innovation, creativity, reengineering of business processes, management of possible risks in business processes; prepare technical documentation for the design of information systems and software development.

MINISTRY OF SCIENCE AND HIGHER EDUCATION OF THE REPUBLIC OF KAZAKHSTAN
KAZAKH AUTOMOBILE ROAD INSTITUTE named after L.B. GONCHAROV

Application 28

28	The name of the discipline	ERP and business opportunity management. (ERP "Galaxy")
1	Code of Discipline	ERP BOM. 42(2)23
2	Number of credits, ECTS	5
3	Department	HK, GED and IS
4	Course, semester	4,7
5	Prerequisites	Information systems in business and management. Business processes automation.
6	Post requisites	The material of this discipline is used during the performance by students of various computational and design works, diploma theses and projects.
7	Purpose of study	Formation of knowledge that allows you to create a holistic view of modern corporate information ERP-systems and the underlying methodologies of enterprise management. The discipline allows you to study the practical aspects of using these software products in the process of managing a company in the production sector.
8	Summary of disciplines	The discipline forms a complex of knowledge, skills and abilities in the field of using 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 the basic knowledge of ERP systems. Used active teaching methods: classes with elements of conversation and the use of multimedia tools; case-study; work in small groups; discussion.
9	Expected results	As a result of mastering the discipline, **the student must:** **Know:** information technology used in ERP systems; classification, structure and functionality of ERP systems. **To be able to:** develop a concept for an ERP system capable of supporting all key business processes of an enterprise, such as planning, accounting, control and analysis in all areas of main and auxiliary activities. **Have skills:** Demonstrate proficiency in the techniques and methods of operation of modern computers and equipment; develop the infrastructure of information systems, including databases, operating systems, application software, etc. selection of methods and technologies for the implementation of an ERP system in the enterprise. **Competencies:** to carry out installation, configuration, testing and maintenance of system and application software for high-load computer systems and networks; support the processes of creation, management, modernization and promotion of information resources (IR) of the 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 the organization's IR, model business processes, test the organization's IR; apply skills of entrepreneurship, innovation, creativity, reengineering of business processes, management of possible risks in business processes; prepare technical documentation for the design of information systems and software development.

MINISTRY OF SCIENCE AND HIGHER EDUCATION OF THE REPUBLIC OF KAZAKHSTAN
KAZAKH AUTOMOBILE ROAD INSTITUTE named after L.B. GONCHAROV

Application 29

29	The name of the discipline	Decision theory
1	Code of Discipline	DT 42(2)24
2	Number of credits, ECTS	5
3	Department	HK, GED and IS
4	Course, semester	4,7
5	Prerequisites	Discrete Mathematics, Mathematics I, Mathematics II, Fundamentals of Information Systems
6	Post requisites	The material of this discipline is used during the performance by students of various computational and design works, diploma theses and projects.
7	Purpose of study	The accelerated development of information and communication technologies currently makes it possible to constantly increase the volume and complexity of applied engineering research. In these conditions, the study of the discipline "Decision Theory" is necessary as a basis for forming a general idea of methods for solving a wide class of technical and managerial tasks.
8	Summary of disciplines	The discipline is aimed at studying the basic provisions of the theory of operations research, considering various methods of operations research: mathematical programming, including linear and dynamic, network planning and management methods, queuing systems, matrix games, the development and application of methods for finding optimal solutions and various heuristic approaches in various fields of human activity, metaheuristic approaches and methods artificial intelligence, such as constraint satisfaction theory and neural networks. The active teaching methods used are: analysis of a specific situation; discussion; project method, presentations.
9	Expected results	As a result of mastering the discipline, the student must: *To know:* methods of collecting and processing information; current Kazakhstani and foreign sources of information in the field of professional activity; methods of operations research; programming; classification of software tools and the possibility of their application to solve practical problems. *Be able to:* apply methods of searching, collecting and processing information; carry out critical analysis and synthesis of information obtained from various sources; solve standard professional tasks using natural science and general engineering knowledge, methods of mathematical analysis and modeling; find and analyze technical documentation on the use of software, select and use the necessary functions of software for solving a specific problem. *Have skills:* methods of searching, collecting and processing, critical analysis and synthesis of information; methods of a systematic approach to solving tasks; theoretical and experimental research of objects of professional activity; methods of describing the methodology of using software to solve specific tasks in the form of a document, presentation or video *Competencies:* independently apply modern computer technologies to solve research and production and technological tasks of professional activity; realize the need to form new competencies to solve practical problems in the field of information systems and technologies; use various types of ICT in professional and personal activities (Internet resources, cloud and mobile services for search, storage, processing, protection and dissemination of information); demonstrate mastery of techniques and methods of operation of modern computer technology and equipment; prepare technical documentation for the design of information systems and software development.

MINISTRY OF SCIENCE AND HIGHER EDUCATION OF THE REPUBLIC OF KAZAKHSTAN
KAZAKH AUTOMOBILE ROAD INSTITUTE named after L.B. GONCHAROV

Application 30

30	The name of the discipline	Theory of optimization systems
1	Code of Discipline	TOS 42(2)24
2	Number of credits, ECTS	5
3	Department	HK, GED and IS
4	Course, semester	4,7
5	Prerequisites	Discrete Mathematics, Mathematics I, Mathematics II, Fundamentals of Information Systems
6	Post requisites	The material of this discipline is used during the performance by students of various computational and design works, diploma theses and projects.
7	Purpose of study	The study of the theoretical provisions of the general theory of optimization, the basics of the theory of calculus of variations and optimal control, consideration of options for their practical application to solve optimization problems taking into account optimization criteria, as well as the formation of students' skills in analyzing real and resulting processes.
8	Summary of disciplines	The discipline is aimed at studying the methods of formalization of optimization problems, their classification according to the type of mathematical model; problems, models and methods of linear programming, linear programming problems interpreted on graphs and methods of their solution, transport problems of linear programming and methods of their solution, the concept of dynamic optimization, models and methods of dynamic programming, problems and models of nonlinear static optimization and their solution by methods of classical mathematical analysis, numerical methods for finding the extremum of the objective function the main approaches to solving vector (multicriteria) optimization problems and approaches to solving stochastic optimization problems. The active teaching methods used are: analysis of a specific situation; discussion; project method, presentations.
9	Expected results	As a result of mastering the discipline, the student must: To know: the general formulation of the optimization problem, the classification of optimization problems, typical models of these problems and methods of their solution; methods of system analysis and mathematical modeling; basic methods for estimating costs and risks arising from the creation of an IP. Be able to: formulate a meaningful statement of the problem and implement its formalization, determine the type of the resulting model, choose the appropriate solution method, apply it to the task, using computer technology with appropriate software; evaluate the accuracy and reliability of the results of optimization of applied tasks, justify the choice of cost and risk optimization methods. Have skills in: computer modeling of applied processes in mathematical packages, the use of software tools for optimal solution of applied problems, methods of classical mathematical analysis, methods of linear and nonlinear programming, network planning and dynamic programming, universal and special software. Competencies: independently apply modern computer technologies to solve research and production and technological tasks of professional activity; realize the need to form new competencies to solve practical problems in the field of information systems and technologies; use various types of ICT in professional and personal activities (Internet resources, cloud and mobile services for search, storage, processing, protection and dissemination of information); demonstrate mastery of techniques and methods of operation of modern computer technology and equipment; prepare technical documentation for the design of information systems and software development.

MINISTRY OF SCIENCE AND HIGHER EDUCATION OF THE REPUBLIC OF KAZAKHSTAN
KAZAKH AUTOMOBILE ROAD INSTITUTE named after L.B. GONCHAROV

Application 31

31	The name of the discipline	Designing of IS in the auto- road industry
1	Code of Discipline	DISRI 43(2)07
2	Number of credits, ECTS	5
3	Department	HK, GED and IS
4	Course, semester	4,7
5	Prerequisites	Databases in IC, Object-oriented programming, Methods, models in the management of the road industry.
6	Post requisites	The material of this discipline is used during the performance by students of various computational and design works, diploma theses and projects.
7	Purpose of study	Systematization and deepening of the acquired knowledge, as well as the study of various methods of software development and acquisition of professional IP design skills in the road industry.
8	Summary of disciplines	The discipline forms a complex of knowledge, skills and abilities in the field of information system design for the road industry, the development of technical specifications according to GOST 34.602-2020, the use of software development processes, project management and software quality, creation of a software product interface, analysis of requirements for the projected information system, risks and analysis, detailed design information system testing, verification and validation of the information system, integration of software modules and maintenance of the software product. The active teaching methods used are: role-playing of the team process; group work; discussion; presentation.
9	Expected results	As a result of mastering the discipline, the student must: *To know:* scientific methods and techniques of research of a specific science; to summarize the results of research; to synthesize new knowledge and present it in the form of humanitarian socially significant products; to select methodology and analysis; software development process; language for defining and analyzing tasks in the design of IP; methods of testing software modules of IP. *Be able to:* be aware of the need to form new competencies to solve practical problems in the field of information systems and technologies to develop a user interface for IP software; conduct a professional analysis of requirements (C-customer requirements, D-developer requirements); apply methods and means of protecting information infrastructure, information resources and technologies; determine requirements when designing a network architecture, software and hardware of a computer network; to develop the infrastructure of information systems, including databases, operating systems, application software, etc. *Have skills:* independently apply modern computer technologies to solve research and production and technological tasks of professional activity; maintain documentation for the integration and testing of a software product; use software application development tools; detailed design, implementation of modules and maintenance of a software system. *Competencies:* possess in-depth knowledge of modern methods and means of designing information systems, create technical documentation of the designed system, organize its information protection; possess skills in using application software packages for calculations, modeling and automation of information processes and systems design; apply software solutions combining text, graphics, multimedia materials, as well as other interactive tools; prepare technical documentation for the design of information systems and software development.

MINISTRY OF SCIENCE AND HIGHER EDUCATION OF THE REPUBLIC OF KAZAKHSTAN
KAZAKH AUTOMOBILE ROAD INSTITUTE named after L.B. GONCHAROV

Application 32

32	The name of the discipline	The software design of the EIS
1	Code of Discipline	SDEIS 43(2)07
2	Number of credits, ECTS	5
3	Department	HK, GED and IS
4	Course, semester	4,7
5	Prerequisites	Programming technology, Databases in IS, Business process modeling.
6	Post requisites	The material of this discipline is used during the performance by students of various computational and design works, diploma theses and projects.
7	Purpose of study	To get acquainted with the processes, models and stages of the software life cycle of economic information systems, as well as with structural and object-oriented approaches to software design.
8	Summary of disciplines	The discipline forms a set of knowledge, skills and abilities in the field of IP design for economic and business tasks based on the UML language and the principle of "Clean Architecture", including the analysis of business requirements for the designed IP, the use of flexible software development management methods (including DevOps techniques) and teamwork, the selection of software tools and hardware, testing, implementation and maintenance of IP. Active teaching methods used: solving practical problem problems; case-study; working in small groups; discussion.
9	Expected results	As a result of mastering the discipline, the student must: To know: basic knowledge in the field of mathematics and natural sciences, their use in professional activities; scientific methods and techniques of research of a specific science; to summarize the results of research; goals of engineering programming, software life cycle standards, economic justification of software models. Be able to: develop, adapt and implement high-load applications; develop information system infrastructure, including databases, operating systems, application software, etc.; apply object-oriented analysis methods in software development, evaluate the complexity of creating software. Skills: demonstrate mastery of techniques and methods of operation of modern computer technology and equipment; apply software solutions combining text, graphics, multimedia materials, as well as other interactive tools; prepare technical documentation for the design of information systems and software development; develop design and software documentation, develop software applications. Competencies: to apply modern programming languages, system engineering methodology, design automation systems, modern information technology standards, including methods and means of building information security systems of modern ICT in professional activities; to carry out installation, configuration, testing and maintenance of system and application software of highly loaded computer systems and networks; to develop and/or use software, hardware, information, mathematical, functional and organizational support for information systems, including algorithms and methods of information security.

MINISTRY OF SCIENCE AND HIGHER EDUCATION OF THE REPUBLIC OF KAZAKHSTAN
KAZAKH AUTOMOBILE ROAD INSTITUTE named after L.B. GONCHAROV

Application 33

33	The name of the discipline	Programming in C#
1	Code of Discipline	PC# 43(2)08
2	Number of credits, ECTS	5
3	Department	HK, GED and IS
4	Course, semester	4,7
5	Prerequisites	Algorithms, data structure and programming, C/C++ programming technology
6	Post requisites	The material of this discipline is used during the performance by students of various computational and design works, diploma theses and projects.
7	Purpose of study	Mastering the principles and tools for developing console and Windows applications using the C# programming language. Acquisition of practical skills in creating applications at all stages of development from design to software testing.
8	Summary of disciplines	The discipline provides for the study of: the basics of the C# high-level programming language (syntax, data types, data structures, simple and structural operators, etc.); a modern tool environment designed for developing programs using the C# programming language; the principles of object-oriented application development in C#. An overview of the platform is being done .Introduction to: the encapsulation mechanism and scope in C#; inheritance in C#; implementation of the polymorphism principle in C#; exception handling in C#. Application development is carried out in the Microsoft Visual Studio environment based on specific examples of solving practical problems. Active teaching methods used: solving practical problem problems; brainstorming; group mini-projects; discussion.
9	Expected results	As a result of mastering the discipline, the student must: **To know:** the main technologies of application development in the Microsoft environment.NET Framework; C# programming language; methods and tools for developing algorithms and programs for creating software applications for information systems; tools for describing data and sequencing their processing; object-oriented programming techniques; principles of building and functioning Windows applications; fundamentals of forming a user graphical interface. **Be able to:** create software tools using the capabilities of the C# programming language; use C# libraries and environments.NET Framework for building the Windows interface of software applications; develop algorithms for solving professional tasks; use methods and tools for testing and debugging programs; document the software development process. **Have the skills to:** formalize the subject area and develop the structure of programs; develop applications of varying complexity in C# in Ms Visual Studio; develop applications using database access technologies; test and debug programs with a modular structure. **Competencies:** to be aware of the need to form new competencies to solve practical problems in the field of information systems and technologies; to use various types of ICT in professional and personal activities; to demonstrate mastery of techniques and methods of operation of modern computer technology and equipment; to develop information system infrastructure, including databases, operating systems, application software, etc.; to prepare technical documentation for the design of information systems and software development

MINISTRY OF SCIENCE AND HIGHER EDUCATION OF THE REPUBLIC OF KAZAKHSTAN
KAZAKH AUTOMOBILE ROAD INSTITUTE named after L.B. GONCHAROV

Application 34

34	The name of the discipline	Office software tools
1	Code of Discipline	OST 43(2)08
2	Number of credits, ECTS	5
3	Department	HK, GED and IS
4	Course, semester	4,7
5	Prerequisites	Information-communication technologies, Algorithms, data structure and programming
6	Post requisites	The material of this discipline is used during the performance by students of various computational and design works, diploma theses and projects.
7	Purpose of study	Mastering the techniques of professional work with applications that are part of an office suite; forming a holistic view of the information processing automation process; providing a deep understanding of the goals and trends in the development of automation technologies in application software packages.
8	Summary of disciplines	The discipline is aimed at mastering the automation language of office applications Visual Basic for Applications (VBA). The following are studied: the basics of the VBA programming language; objects, their methods, properties and events; the software development environment; the creation of projects, forms, macros and modules; methods for developing and creating library functions; object models of the Ms Word text editor and the Ms Excel table processor; software tools for processing text information; software tools for processing tabular information; technologies for the development and use of software for processing and analyzing data from parent applications. Active teaching methods used: solving practical problem problems; brainstorming; group mini-projects; discussion.
9	Expected results	As a result of mastering the discipline, the student must: To know: the features of office applications, their structures; the possibilities of office programming as a means of expanding the functionality of applications; methods and tools for designing software, software interfaces; syntax of the VBA programming language; hierarchy of objects in the object models of the main Ms Office applications; properties, methods and events of the main objects of the Ms Word and Ms Excel models; composition, properties and events of controls for user interaction with the application; error handling methods in VBA applications; principles of organization of inter-program interaction of applications. Be able to: apply methods and tools for designing software, data structures, software interfaces; develop and debug effective algorithms and programs using modern programming technologies; use VBA tools for processing information from the parent application and automated document generation; develop a graphical interface for user interaction with the application; organize and use navigation and search methods in Ms documents Office. Have the skills to: automate office applications in VBA; develop applications with a graphical interface; create and use new library functions; analyze the possibilities of implementing software requirements; develop programs to solve application problems; use application integration methods, error handling and debugging programs in VBA. Competencies: to use various types of ICT in professional and personal activities; to demonstrate proficiency in the techniques and methods of operation of modern computer technology and equipment; to develop the infrastructure of information systems, including databases, application software, etc.; to prepare technical documentation for the design of information systems and software development

MINISTRY OF SCIENCE AND HIGHER EDUCATION OF THE REPUBLIC OF KAZAKHSTAN
KAZAKH AUTOMOBILE ROAD INSTITUTE named after L.B. GONCHAROV

Application 35

35	The name of the discipline	Telematics in the road industry
1	Code of Discipline	TRI 43(2)09
2	Number of credits, ECTS	5
3	Department	HK, GED and IS
4	Course, semester	4,7
5	Prerequisites	Information and Communication Technology, Digital Management of Road Infrastructure
6	Post requisites	The material of this discipline is used during the performance by students of various computational and design works, diploma theses and projects.
7	Purpose of study	Formation of knowledge in the field of using the capabilities of telecommunication technologies and informatics in solving technological problems in transport, their competent application in practice to improve the efficiency of road transport
8	Summary of disciplines	The discipline forms knowledge about the principles of operation and technical and operational characteristics of the main devices of telematics systems, methods and technologies for automated regulation of traffic flow, telematics intelligent systems; practical skills in analyzing the technical condition and technological processes of transport, choosing telematics equipment, using software, information technology. Active teaching methods used: situational tasks modeling telematics in transport; discussions; presentations.
9	Expected results	As a result of mastering the discipline, the student must: Know: the main directions of the functioning of information systems in road transport; methods, methods, means, sequence and content of stages of operation of telematic systems in vehicles; types of satellite communication systems, especially the choice and their use in vehicles; basic measures to protect information of telematic systems. Be able to: work with packages of applied software; to form information systems of a motor transport enterprise, a car service enterprise and an information system of car telematic systems; to investigate the effectiveness of the telematics systems being created in vehicles, to conduct a marketing analysis of their use. Have skills: application in practice of the current laws and regulations; analysis of the operation of the main units and devices of modern telematic systems of a motor transport enterprise and a car; maintaining the operability, detecting and eliminating malfunctions in the operation of the electronic hardware of the vehicle telematics systems; the use of software and hardware for ensuring information security of telematic systems of a motor vehicle and a car. Competences: independently apply modern computer technologies to solve research and production-technological problems of professional activity; use various types of ICT in professional and personal activities (Internet resources, cloud and mobile services for searching, storing, processing, protecting and distributing information); demonstrate mastery of techniques and methods of operation of modern computers and equipment; apply methods and means of protecting information infrastructure, information resources and technologies; determine the requirements for the design of the network architecture, software and hardware of the computer network; develop the infrastructure of information systems, including databases, operating systems, application software, etc.; apply software solutions that combine text, graphic, multimedia materials, as well as other interactive tools; prepare technical documentation for the design of information systems and software development.

MINISTRY OF SCIENCE AND HIGHER EDUCATION OF THE REPUBLIC OF KAZAKHSTAN
KAZAKH AUTOMOBILE ROAD INSTITUTE named after L.B. GONCHAROV

Application 36

36	The name of the discipline	BigData technologies and cloud computing
1	Code of Discipline	BDT CC 43(2)09
2	Number of credits, ECTS	5
3	Department	HK, GED and IS
4	Course, semester	4,7
5	Prerequisites	Information and communication technologies, OIS, IT infrastructure, Client-server applications.
6	Post requisites	The material of this discipline is used during the performance by students of various computational and design works, diploma theses and projects.
7	Purpose of study	mastering the principles, methods, technologies and tools for using BigData and cloud computing, the features and prospects of their use in IS..
8	Summary of disciplines	The discipline forms theoretical knowledge of the main characteristics of "cloud" technologies. During the training, students get acquainted with the method of studying large arrays of data containing disparate information, Gain the skills to extract the necessary information from various sources. Students should know the methodology of research, data collection, data processing and transformation, model building, and ways to organize data storage. During the course of studying the discipline, students will gain skills in working with tools for organizing data storage, skills in software implementation in programming languages; application development for existing "cloud platforms", etc. Used active teaching methods: situational tasks; solving practical problem problems; discussions; presentations.
9	Expected results	As a result of mastering the discipline, the student must: Know: the peculiarities of working with large unstructured and semi-structured data; principles of NoSQL technology; big data processing tools; methods and tools for data analysis; goals and objectives of cloud technologies; prerequisites for migration to the "clouds"; basic concepts, functions and development trends of cloud technologies; types of cloud architectures; the main benefits and risks associated with cloud computing. Be able to: configure and organize NoSQL databases; choose a NoSql DBMS for solving an applied problem; use NoSQL databases in IS projects; identify automated business processes that are more efficient to move to the "clouds"; assess the possible risks of using cloud technologies; choose the best strategy for the transition to cloud technologies. Have skills: Demonstrate proficiency in data manipulation technologies and languages; big data analysis tools using distributed systems and modern query languages; methods for assessing the cost of software systems in the "clouds"; methods of developing a company's exit strategy for using cloud technologies. Competences: independently apply modern computer technologies to solve research and production-technological problems of professional activity; demonstrate basic knowledge in the field of mathematics and natural sciences, their use in professional activities; demonstrate mastery of techniques and methods of operation of modern computers and equipment; apply methods and means of protecting information infrastructure, information resources and technologies; determine the requirements for the design of the network architecture, software and hardware of the computer network; develop, adapt and implement high-load applications; develop the infrastructure of information systems, including databases, operating systems, application software, etc.; prepare technical documentation for the design of information systems and software development.