


Kazakh Automobile and Highway Academy named after LB Goncharova

Road Faculty

"APPROVED"
Chairman of the Academic Council
The rector of KazARI after L.B.Goncharov
doctor of technical sciences, professor
R. Kabashev
2022



CATALOG OF ELECTIVE DISCIPLINES

for the 2022-2026 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 2022

List of elective specialty disciplines
6B06106 Information systems

№	Name of the discipline	Credits	Cycle of disciplines	Recommended semester	Note
Cycle of general education disciplines GED					
Component of choice CC					
1.	Ecology and life safety	5	GED CC	4	Appendix № 1, p. 4.
2.	Ecology and sustainable development				Appendix № 2, p. 5.
Cycle of Basic Disciplines (BD)					
Component of choice CC					
3.	Electrical Circuit Theory	4	BD (CC)	3	Appendix №3, p. 6.
4.	Theoretical foundations of electrical engineering				Appendix №4, p. 7.
5.	Basics of Electronics	4	BD (CC)	3	Appendix №5, p. 8.
6.	Numerical methods				Appendix №6, p. 9.
7.	Digital road infrastructure management	4	BD (CC)	4	Appendix №7, p.10.
8.	Digital logistics				Appendix № 8,p.11
9.	IT project management	4	BD (CC)	5	Appendix №9, p. 12.
10.	Information systems in business and management*				Appendix №10, p. 13.
11.	Creating startup	4	BD (CC)	5	Appendix №11, p. 14.
12.	Automation of business documentation**				Appendix №12, p. 15.
13.	Digital data interfaces transfer**				Appendix №13,p.16
14.	Digital road infrastructure and quality management				Appendix №14,p.17
15.	Methods, models in the management of the road industry	5	BD (CC)	6	Appendix №15, p. 18.
16.	Business Process Automation				Appendix №16, p. 19.
17.	Modern operating systems	5	BD (CC)	6	Appendix №17, p. 20.
18.	Business Process Automation				Appendix №18, p. 21.
19.	Introduction the things into the internet**	5	BD (CC)	6	Appendix №19, p. 22.
20.	Certification and maintenance of documentation				Appendix № 20, p. 23.
21.	Computer games programming	5	BD (CC)	6	Appendix №21, p. 24.
22.	Digital media technology				Appendix №22, p. 25.
23.	Computer systems and networks architecture	5	BD (CC)	7	Appendix №23, p. 26.
24.	Multiprocessor computing systems (OLTP, DM, DW, DSS)				Appendix №24, p. 27.

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

25.	Information Security and Information Savety	5	BD (CC)	7	Appendix №25, p. 28.
26.	Patenting and intellectual property protection				Appendix №26, p. 29.
27.	Systems of enterprise automation activity(1C: Enterprise)	4	BD (CC)	7	Appendix №27, p. 30.
28.	ERP and business opportunity management. (ERP "Galaxy")				Appendix №28, p. 31.
29.	Digital marketing in industry	4	SD(CC)	7	Appendix №29, p. 32.
30.	Digital management in industry				Appendix №30, p. 33.
The cycle of the specialized disciplines (SD)					
Component of choice CC					
31.	IC designs for the road industry	5	SD(CC)	7	Appendix №31, p 34.
32.	EIS software design				Appendix №32, p. 35.
33.	Application Development in .NET Core platform	5	SD(CC)	7	Appendix №33, p. 36.
34.	PLC Programming				Appendix №34, p. 37.
35.	Telematics in the road industry	4	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

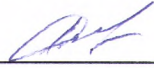
Director of the NGO "International Academy of Informatization" Tsekhova A.F.

Executive Director of the ALE "The Union of Project Managers of the Republic of Kazakhstan N. Nekrasova

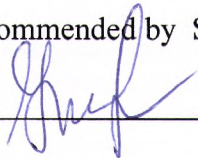
IP "Panyukova D.V." (Alternative club) Panyukova D.V.

The coordination acts are attached.

Catalog of elective disciplines in EP 6B06106 - Information Systems considered and discussed at the meeting of the Department Protocol number 9 from March 14, 2022

Head Department of HK, GD and IP Ph.D., associate professor  T.B. Nurpeisova

The catalog of elective disciplines is recommended by SMC Protocol No. 9 of March 15, 2022.

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 regularities of the functioning of natural systems, the tasks of ecology as a science. Environmental Safety Management. Legal aspects of nature protection. Ensuring the protection of the population from the consequences of accidents, catastrophes, natural disasters; carrying out rescue and other urgent work in the affected areas.
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.

2	The name of the discipline	Ecology and sustainable development
1	Code of discipline	E SD 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	To form a holistic view of the basic laws of sustainable development of nature and society. The main task of the discipline: to study the basic laws of the functioning of living organisms, ecosystems of different levels of organization, the biosphere as a whole and their sustainability; to generate knowledge about the basic laws of interaction of the components of the biosphere and the environmental consequences of human activities, especially in the context of intensified environmental management; to form modern ideas about the concepts, strategies and practical tasks of sustainable development in various countries and the Republic of Kazakhstan; to form a comprehensive, objective and creative approach for students to discuss the most acute and complex problems of ecology, environmental protection and sustainable development.
8	Summary of disciplines	The discipline forms knowledge in the field of ecology and sustainable development. Studies the features and principles of interaction between human society and nature, the conditions for the development of an industrial society and the dehumanization of the planet's biosphere as a consequence of the demographic explosion and technogenic development. A number of global environmental problems have arisen: soil depletion, deforestation, the greenhouse effect, ozone depletion, pollution of the world's oceans, a decrease in fresh water supplies, desertification, and others.
9	Expected results	As a result of mastering the discipline, the student must: Know: the patterns of distribution of living organisms in space and in time; general patterns of interaction of living organisms with environmental factors; distribution and dynamics of the number of organisms, community structure and their dynamics; patterns of energy flow through living systems and the circulation of substances, the functioning of ecological systems and the biosphere as a whole and their sustainability. To be able to: critically comprehend the development trends of ecological and economic systems associated with the use of natural resources and characterize their environmental consequences; use the knowledge gained about the patterns of interaction between living organisms and the environment in practice to preserve sustainable development Have skills: analysis of environmental processes, setting specific objectives and priorities for the sustainable development of nature and society, and using the knowledge gained to solve environmental problems; possession of the concept of sustainable development and practical approaches to its solution at the global, regional and local levels. Competences: to understand the surrounding reality on the basis of ideological positions, demonstrate the basics of legal knowledge in various spheres of life, formulate the basic laws of the biosphere and principles of rational nature management to reduce the impact on human health and the environment, apply methods of protection and first aid in emergency situations, to realize the need for self-organization and self-education, to critically rethink the accumulated experience, and change, if necessary, the type and nature of their professional activities.

3	The name of the discipline	Electrical Circuit Theory
1	Code of discipline	ECTh 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 of using the laws of electrical and magnetic circuits, the physical foundations of the theory of electrical and magnetic circuits, elements of linear electrical circuits, nonlinear elements of electrical circuits, basic concepts of the structure of an electrical circuit, analysis of complex electrical circuits of direct current. The discipline reveals the basic laws, properties and characteristics of electrical circuits. Introduces students to the methods of analyzing electrical circuits in steady-state and transient modes.
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.

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, principles of operation of the simplest generator of sinusoidal electromotive force, Ohm's and Kirchhoff's laws for sinusoidal current circuits, three-phase electrical circuits, principles of operation of a three-phase generator. with, devices and principles of operation of DC machines, electromechanical analog devices, physical foundations of semiconductor devices.
9	Expected results	<p>As a result of mastering the discipline, the student must:</p> <p>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.</p> <p>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.</p> <p>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.</p> <p>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.</p>

5	The name of the discipline	Basics of Electronics
1	Code of Discipline	BE 22(2)13
2	Number of credits, ECTS	4
3	Department	HK, GED and IS
4	Course, semester	2,3
5	Prerequisites	Mathematics 1, Physics
6	Post requisites	Robotics
7	Purpose of study	Provide basic training in electronics required for the operation of electrical and electronic systems, automation devices, transmission technology, information reproduction.
8	Summary of disciplines	The discipline forms knowledge about the purpose and areas of application, the physical principles of work, the main technical parameters of semiconductor devices and microelectronic technology; practical skills in analysis, calculation and experimental research, reading and understanding ready-made circuitry solutions, the choice of semiconductor devices, blocks, components and integrated circuits in the development of simple electronic devices.
9	Expected results	<p>As a result of mastering the discipline, the student must:</p> <p>Know: basic information about vacuum and semiconductor devices, rectifiers, oscillatory systems, antennas; amplifiers, generators of electrical signals; general information about the propagation of radio waves; the principle of signal propagation in communication lines; information about fiber-optic lines; digital methods of information transmission; general information about the element base of circuitry; logical elements and logical design in the basis of microcircuits; functional units; digital-to-analog and analog-to-digital converters; foundations of the theory of four-poles; device, physical processes, characteristics and parameters, mathematical and electrical models of electronic devices, elements and components of integrated circuits, construction principles, basic circuit solutions of analog electronics devices, their main parameters and characteristics, bases of analysis and mathematical description, implementation features, areas of application;</p> <p>Be able to: calculate by various methods linear passive and active circuits, give a physical interpretation of the results obtained; reasonably choose semiconductor devices and integrated circuits in the development of simple electronics devices, taking into account the requirements for systems and complexes, choose the necessary blocks and components on the electronic services market, read and comprehend ready-made circuitry solutions, perform calculations of operating modes, characteristics and parameters of simple electronic devices;</p> <p>Have skills: analysis of DC and AC circuits in the time and frequency domains; calculation and experimental research, carrying out an automated experiment in the laboratory;</p> <p>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); 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.</p>

6	The name of the discipline	Numerical methods
1	Code of Discipline	NM 22(2)13
2	Number of credits, ECTS	4
3	Department	HK, GED and IS
4	Course, semester	2,3
5	Prerequisites	Mathematics I
6	Post requisites	Methods, models in management in the road industry.
7	Purpose of study	Familiarization with the basic definitions and concepts of computational mathematics, the structure of computational mathematics, the main tasks, methods and algorithms of computational mathematics. Students should learn how to approximately solve linear algebra problems; nonlinear equations and systems; interpolate functions; perform numerical integration and differentiation; solve differential equations; use approximation and approximation of functions
8	Summary of disciplines	The discipline forms knowledge in the field of theory and methods of using basic problems and algorithms of computational mathematics, solving problems of linear algebra; solutions of nonlinear equations and systems; function interpolation; numerical integration and differentiation; solving differential equations; methods of approximation and approximation of functions. The discipline is aimed at applying mathematical methods in professional activities, solving simple professional problems related to the road industry.
9	Expected results	<p>As a result of mastering the discipline, the student must:</p> <p>Know: terminology, basic concepts and definitions of computational mathematics; error theory; theory of approximation of functions; the theory of numerical differentiation and numerical integration, as well as methods for solving linear and nonlinear equations, numerical methods for solving ordinary differential equations and partial differential equations.</p> <p>To be able to: Choose the right numerical method for solving a specific problem; to calculate and analyze the errors of the numerical method; to understand and put into practice computer technologies for the numerical solution of practical problems.</p> <p>Have skills: solving practical problems using numerical methods.</p> <p>Competences: apply information and communication technologies for searching and processing information; demonstrate basic knowledge in the field of mathematics and natural sciences, their use in their professional activities; develop and / or use software, hardware, information, mathematical, functional and organizational support of information systems, including algorithms and information security methods.</p>

7	The name of the discipline	Road infrastructure digital management
1	Code of Discipline	RIDM 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
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; develops practical skills in the development and use of hardware and software for the implementation of digital management of road infrastructure.
9	Expected results	<p>As a result of mastering the discipline, the student must:</p> <p>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.</p> <p>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.</p> <p>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.</p> <p>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.</p> <p>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.</p>

8	The name of the discipline	Digital logistics
1	Code of Discipline	DL 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 Technology
6	Post requisites	Digital interfaces for data transmission. Digital management by industry. Telematics in the road 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 peculiarities of the transition to digital logistics, new approaches and tools for digital transformation in the field of transport and logistics; introduces examples of the development and implementation of modern solutions for Logistics 4.0 and Smart Supply Chains, the Industrial Internet of Things, approaches to solving the problems of hybrid supply chains, the use of robots and cobots in logistics; practical skills in the application and development of practical solutions for the use of hardware and software for the implementation of digital logistics.
9	Expected results	<p>As a result of mastering the discipline, the student must:</p> <p>Know: the main provisions of the concept of the digital economy, the direction of making effective management decisions in the functional areas of logistics</p> <p>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.</p> <p>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</p> <p>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.</p>

9	The name of the discipline	IT – projects management
1	Code of Discipline	ITPM 22(2)15
2	Number of credits, ECTS	4
3	Department	HK, GED and IS
4	Course, semester	3,5
5	Prerequisites	Information and communications technology. Algorithms, data structures, and programming
6	Post requisites	The material of this discipline is used during students' coursework and diploma works and projects.
7	Purpose of study	Formation of a system of theoretical knowledge and practical skills necessary for project managers and members of the project team in the planning, management and execution of IT projects
8	Summary of disciplines	The discipline forms a complex of knowledge, skills and abilities for project management in accordance with international standards and PMI PMBOK leadership; modern practices in project management, including several types of flexible management methodologies (AGILE, KANBAN, SCRUM, LEAN, etc.); the specifics of project management in the field of information technology, the use of various software products in project management.
9	Expected results	<p>As a result of mastering the discipline, the student must:</p> <p>Know: the conceptual apparatus of project management; the best world practices, composition and content of international and national guidelines and project management standards (PMI PMBOK, ST RK ISO 21500: 2012); principles and methodologies of Agile approaches to IT project management; structure and typical content of an IT project; architecture and functionality of project management information systems;</p> <p>To be able to: draw up, analyze and optimize an IT project work plan; plan resources for the implementation of an IT project; apply information systems to solve practical project management problems.</p> <p>Have skills: building a network schedule for the project and calculating the critical path; resource allocation and planning; analysis of project risks and determination of response measures to them; preparation and presentation of the project.</p> <p>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; to build work in a team, to tolerate social, ethnic, confessional and cultural differences; 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. use in professional and personal activities various types of ICT (Internet resources, cloud and mobile services for searching, storing, processing, protecting and distributing information). 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.</p>

10	The name of the discipline	Information systems in business and management
1	Code of Discipline	ISBM 32(2)15
2	Number of credits, ECTS	4
3	Department	HK, GED and IS
4	Course, semester	3,5
5	Prerequisites	Information and communication technology. OIC. DB in IS
6	Post requisites	Multiprocessor computing systems (OLTP, DM, DW, DSS). 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 by students of general principles, concepts and modern methods in the field of information resource management at all stages of the life cycle of information systems. Formation of skills of rational regulation of information flows, ensuring the consistency of internal and external variables of the organization.
8	Summary of disciplines	The discipline forms knowledge about the practical application of information systems in the enterprise. Influence of information technologies on competition, market; main trends in the application of information systems, the impact of IT on the economic potential of the enterprise. An understanding of how to support the processes of creation, management, modernization and promotion of information resources (IR) of the organization is formed, how to develop the structure and services of the organization's IR.
9	Expected results	As a result of mastering the discipline, the student must: Know: methods of managing professionally oriented information systems; creation and implementation of information systems in the activities of organizations; bases of standardization and certification in the field of professional activity; legal basis for standardization and certification, main objectives and objects of certification, terms and definitions in the field of certification. To be able to: o form new competencies for solving 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); develop information systems infrastructure, including databases, operating systems, application software, etc .; demonstrate proficiency in techniques and methods of operation of modern computers and equipment. Have skills: application of 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; 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. 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; 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

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 developing 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 (consumer identification), ending with consumer verification for a startup. During the course, all knowledge and skills are given in the form of theory, with consolidation in practice in team projects.
9	Expected results	<p>As a result of mastering the discipline, the student must:</p> <p>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.</p> <p>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.</p> <p>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.</p> <p>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.</p>

12	The name of the discipline	Automation of business documentation support
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 contributes to the understanding of the need to implement electronic document management systems in the business processes of any organization, to gain experience in assessing the capabilities and complexity of the selected system. Introduces the principles of work of automated document management systems. The theoretical foundations of electronic document management technologies and the practice of their application in enterprise IS for the purpose of document management are considered. Using technology to collect, manage, store, protect and deliver information related to organizational processes.
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.

11	The name of the discipline	Digital interfaces for data transmissions:
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 interfaces for data transmission, examines the main functions of digital input / output interfaces, structures, exchange protocols, technical and operational characteristics of the main, most common digital interfaces of information and computing systems. Systematizes knowledge, skills and competencies in the field of organizing interaction between electronic nodes, blocks and subsystems of computerized measuring and control systems.
9	Expected results	<p>As a result of mastering the discipline, the student must:</p> <p>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.</p> <p>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.</p> <p>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.</p> <p>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".</p>

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 for students a complex of knowledge related to measurements, methods and means of ensuring their unity and ways to achieve the required accuracy, the essence of technical regulation, conformity assessment, standardization and certification. Improves practical skills in the use of various measuring instruments and high-precision instruments, the ability to assess the compliance of technical products with the requirements of conformity and quality standards based on the knowledge of international and national systems of relevant regulatory documents.
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.

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 theories of transport systems, various tools and simulation packages for modeling traffic flows; practical skills of using specialized software for transport modeling, research and creation of predictive transport models.
9	Expected results	<p>As a result of mastering the discipline, the student must:</p> <p>know: - classification of models of systems and processes, their types and types of modeling;</p> <ul style="list-style-type: none"> - 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; <p>be able to: - use the basic methods of constructing mathematical models of processes, systems, their elements and control systems;</p> <ul style="list-style-type: none"> - 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; <p>master the skills: - working with a software system for mathematical and simulation modeling;</p> <p>gain experience in building a mathematical model; model research; application of hardware and software for modeling.</p> <p>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.</p>

16	The name of the discipline	Modeling of business processes
1	Code of Discipline	MBP 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 an enterprise, digital content management processes, processes of creating and using information services; practical skills in modeling, analyzing and improving business processes, planning an IT project, choosing rational ISs for managing business and enterprise content.
9	Expected results	<p>As a result of mastering the discipline, the student must:</p> <p>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).</p> <p>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</p> <p>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</p> <p>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.</p>

17	The name of the discipline	Modern operating System
1	Code of Discipline	MOS 32(2)18
2	Number of credits, ECTS	5
3	Department	HK, GED and IS
4	Course, semester	3,6
5	Prerequisites	Information and communication technologies, Programming technology
6	Post requisites	Architecture of computer systems and networks, Information security and information protection, Design of IS for the road industry.
7	Purpose of study	Acquaintance with the fundamental principles of the device 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 area, 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 using operating systems, it considers: memory management, file systems, information input and output, deadlocks, virtualization and the cloud, multiprocessor systems, security, operating system architecture and application programming interfaces; design of parallel interacting computational processes, the problem of dead ends and methods of dealing with them, installation and configuration of modern programs for various virtual machines.
9	Expected results	<p>As a result of mastering the discipline, the student must:</p> <p>Know: features of the IOS platform, IOS software stack; methodology for creating applications with a user interface using touch screens for the road industry; basic tools for developing and debugging mobile applications for the automotive industry.</p> <p>To be able to: develop and test mobile applications for the road industry; distribute created products; analyze the wishes of users who use the application; make corrections; create updates, instructions.</p> <p>Have skills: development of user interface and programming functionality, providing telephony support, sending / receiving SMS, managing connections via Wi-Fi, Bluetooth, Programming background services, notification mechanisms and alarms.</p> <p>Competences: the ability to use the basics of legal knowledge for use in various areas of life, use information and communication technologies to search and process information, create startups, use various types of ICT in professional and personal activities: Internet resources, cloud and mobile services for searching, storing processing, protection and dissemination of information, the ability to understand the principles of operation and methods of operation of modern computers and equipment, own methods and means of protecting information infrastructure, information resources and technologies, the ability to develop, implement and adapt application software, the ability to prepare technical documentation for software development and design information systems.</p>

18	The name of the discipline	Business Process Automation
1	Код дисциплины	БПА 32(2)18
2	Number of credits, ECTS	5
3	Department	HK, GED and IS
4	Course, semester	3,6
5	Prerequisites	Information and communication technologies, Information systems in business and management
6	Post requisites	Multiprocessor computing systems (OLTP, DM, DW, DSS), ERP and business opportunity management. (ERP "Gala
7	Purpose of study	Formation of theoretical and practical skills, general skills, knowledge and ideas necessary and sufficient for the successful management of the company's business processes, regardless of its industry affiliation.
8	Summary of disciplines	The discipline is aimed at studying and building models of business processes using modern automated systems using tools, modeling methods, drawing up technical specifications, life cycle of process management, modern languages and modeling environments for enterprise architecture, corporate information management systems (KIUS), virtualization of business processes based on the creation of virtual enterprises, standards in the field of business process modeling - the IDEF family.
9	Expected results	<p>As a result of mastering the discipline, the student must:</p> <p>Know: characteristics of models of business processes and methods of reorganizing business processes using modern automated systems in the practice of organizations; modern concept of business process management; foundations of the organizational structure; basic mathematical methods and models used in business process management; the consequences of organizational and managerial decisions.</p> <p>To be able 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 model business processes and use methods of reorganizing business processes in the practical activities of organizations; set goals and formulate tasks related to the implementation of professional functions for the automated management of business processes; substantiate the need to use analytical and computer tools to solve problems of managing business processes;</p> <p>Have skills: analysis of the results of modeling business processes and reorganization of business processes in the practical activities of organizations; orientation in a modern dynamic environment; assessing and predicting the risks of decisions made regarding the modeling and reorganization of business processes.</p> <p>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; 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.</p>

19	The name of the discipline	Introduction the things in the Internet
1	Code of Discipline	ITh I 32(2)19
2	Number of credits, ECTS	5
3	Department	HK, GED and IS
4	Course, semester	3,6
5	Prerequisites	ICT, BIS
6	Post requisites	The material of this discipline is used during students' coursework and diploma works and projects.
7	Purpose of study	To familiarize students with the basic principles of connections. new technological concept of the Internet of Things (IoT). The program explores the concept of bringing people, processes, data and things together to improve the efficiency and value of network connections. In addition to the theoretical part, the practice-oriented educational program of the course is based on the study of real cases for the implementation of Internet of Things technologies and the creation of prototypes of IoT devices.
8	Summary of disciplines	The discipline forms knowledge about the basic principles of organization and functioning, the history of origin and development, the main factors of the development of the Internet of Things, existing technologies, trends and prospects in the field of the Internet of Things; practical skills in working with Arduino microcontrollers, connecting and programming end devices, creating a software solution for creating and storing data using cloud technologies.
9	Expected results	<p>As a result of mastering the discipline, the student must:</p> <p>Know: the principles of organization and functioning of the Internet of Things; the main factors in the development of the Internet of Things; existing technologies in the field of the Internet of things; main trends and directions in the field of the Internet of Things, the main provisions of the concept of the industrial Internet of Things IIoT; main types and principle of operation of IoT equipment on the market; technologies and protocols used to create IoT solutions.</p> <p>Be able to: work with microcontrollers and main debug boards (Arduino); understand existing IoT technologies and apply them to specific scenarios; analyze the structure of the structure, highlight parts, their shape, determine the relative position (symmetry, asymmetry), types of connection of parts; read and execute technological documentation.</p> <p>Have skills: programming end devices; on connecting end devices to the network; to create a software solution for data processing and storage using cloud technologies.</p> <p>Competences: independently apply modern computer technologies to solve research and production-technological problems of professional activity; demonstrate personal and professional competitiveness: build a personal educational trajectory for self-development and career growth; 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); 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; 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.</p>

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 systems of standardization and certification, standards for document preparation, regulations, protocols and organization of their own activities, selection of standard methods and ways of performing professional tasks, assessing their effectiveness and quality.
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.

21	The name of the discipline	Computer games programming
1	Code of Discipline	PCG 32(2)20
2	Number of credits, ECTS	5
3	Department	HK, GED and IS
4	Course, semester	3,6
5	Prerequisites	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	Effectively apply the methods of mathematical modeling, computer graphics technology, human-computer interaction, as well as sound technologies to the problems of developing computer games with high aesthetic indicators, information and artistic expressiveness and compositional integrity.
8	Summary of disciplines	The discipline forms a complex of knowledge, skills and abilities in the field of computer game development, implemented in the Python programming language using the PyGame framework and the tkinter library. Considered: the stages of developing applications with a GUI; handling tkinter events; creating classes in Python; game template; graphics in PyGame; event handling in PyGame; PyGame classes animation and sprites, collision detection; sound design of the game; organization of work in a project for the development of computer games.
9	Expected results	<p>As a result of mastering the discipline, the student must:</p> <p>Know: programming languages and application software used for the development of computer games; the capabilities of the Python programming language when developing applications with a graphical interface; the structure of the Python tkinter and PyGame libraries; principles of game design, roles of participants in the development of computer games, responsibilities of members of the development team (game designer, artist, programmer, sound engineer, tester).</p> <p>To be able to: develop algorithms and software for solving problems of developing computer games; to develop the idea of the game and the game process of interaction between the game and the player, the design of the design of computer games; document the process of developing computer games; work in a team, create an interesting and high-quality intellectual product.</p> <p>Have skills: engineering development (design, coding, debugging, testing) and implementation of science-intensive software solutions in the field of computer games development; organizational and managerial activities, including project management or phases of projects for the development and implementation of science-intensive software solutions, including collecting product requirements, planning production processes and resources; development of a graphical user interface, programming of interactive graphical applications.</p> <p>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; 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 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 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.</p>

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, skills and abilities in the use of digital media technologies, analysis and visualization of information on specific examples developed in the Python programming language using additional libraries. Considered: the stages of developing applications with a GUI; widgets, tkinter event handling; creating classes and objects in Python; processing NumPy arrays; Matplotlib basics, the structure of a drawing in Matplotlib, plotting in Matplotlib, special drawing elements in Matplotlib; Pygal library, design of Pygal chart elements.
9	Expected results	<p>As a result of mastering the discipline, the student must:</p> <p>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.</p> <p>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.</p> <p>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.</p> <p>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.</p>

23	The name of the discipline	Architecture of computer systems and networks
1	Code of Discipline	ACS NW 42(2)21
2	Number of credits, ECTS	5
3	Department	HK, GED and IS
4	Course, semester	4,7
5	Prerequisites	Information and communication technologies, Modern operating systems. GIS
6	Post requisites	Материал данной дисциплины используется во время выполнения студентами различных расчетно-конструкторских работ, дипломных работ и проектов.
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 in the field of architectural features of modern computers and computer systems, the composition and purpose of elements of computer systems, computer classification, main computer devices and their purpose, network classification, network architecture, their standards and network equipment. He studies the basics of the theory of logical design of digital devices, elements and functional units of computers, as well as the arithmetic foundations of computers.
9	Expected results	<p>As a result of mastering the discipline, the student must:</p> <p>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.</p> <p>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.</p> <p>Have skills: using multiprocessor computing systems; application of parallel algorithms for solving professional problems; application of applied programs for multiprocessor computing systems.</p> <p>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.</p>

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 computing systems based on applied technologies when working with information resources that are used in the business processes of an organization. The directions of using IT for specific applications in solving professional problems are determined. The use of multiprocessor computing systems presupposes the practical mastering of the following sections of parallel processing in computers: the architectural principles of implementing parallel processing in a VM, as well as in the section on parallel computing methods.
9	Expected results	<p>As a result of mastering the discipline, the student must:</p> <p>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.</p> <p>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.</p> <p>Have skills: using multiprocessor computing systems; application of parallel algorithms for solving professional problems; application of applied programs for multiprocessor computing systems.</p> <p>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.</p>

25	The name of the discipline	Information security and information safety
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	Information and communication systems. Modern 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	Mastering the theoretical foundations of the construction and practice of using information security systems in information systems, teaching students a systematic understanding of the principles, methods and means of implementing data security, acquiring practical skills in information security 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 assessing a security system based on the ISO / IEC 15408 standard, the basics of cryptography, information security administration, the use of basic software and hardware measures to ensure high the degree of protection of access to information, insider attacks, the use of software code defects, malware, electronic signature of binary programs.
9	Expected results	<p>As a result of mastering the discipline, the student must:</p> <p>Know: the relevance and importance of the information security problem; goals, objectives, principles and main directions of 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 information security; information security threats and classification of channels of unauthorized access to information; modern approaches to building information security systems.</p> <p>To be able to: analyze the information structure; make adequate decisions when choosing information protection tools based on threat analysis; select and analyze 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 components of information security systems; use modern software to encrypt and hide information; choose the best methods for protecting confidential information; develop and create new standard information protection schemes based on modern information security tools.</p> <p>Have skills: create a secure environment using hardware and software protection; development of secure applications; independent design of information security systems; know how to deal with information security threats.</p> <p>Competencies: independently apply modern computer technologies to solve research and production-technological tasks of professional activity; use in professional and personal activities various types of ICT (Internet resources, cloud and mobile services for searching, storing, processing, protecting and distributing information); apply methods and means of protecting information infrastructure, information resources and technologies</p>

26	The name of the discipline	Patenting and protection of intellectual property
1	Code of Discipline	PIIP 42(2)22
2	Number of credits, ECTS	5
3	Department	HK, GED and IS
4	Course, semester	4,7
5	Prerequisites	Sociology, Legal foundations of entrepreneurship.
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 systemic ideas about the goals, strategies and mechanisms of legal protection, commercialization and protection of intellectual property, the foundations of Kazakhstani and international legislation, approaches and mechanisms for managing conflicts of interest in the field of intellectual property.
8	Summary of disciplines	The discipline forms knowledge of normative legal acts on the regulation of civil circulation of intangible goods; legislation on intellectual property, the essence and purpose of the patent system, methods for analyzing information, the procedure for obtaining patent rights; practical skills in the interpretation of legal terms in the field of intellectual property law, identification of the objects of invention, literary and patent search, registration of individual application materials.
9	Expected results	<p>As a result of mastering the discipline, the student must:</p> <p>Know: regulations governing the rules of civil circulation of intangible goods; basic concepts and categories of state legislation on intellectual property; essence and purpose of the patent system; legal basis for contractual work in the field of intellectual rights; classification of objects of intellectual property; key participants in legal relations arising from the existence of intellectual property rights; peculiarities of legal liability for violation of the exclusive right to an object of intellectual property; peculiarities of patent information, structure and content of patent documentation; information analysis methods;</p> <p>Be able to: interpret legal terms in the field of intellectual property law; identify objects of intellectual property rights according to various criteria; give a detailed description of the fundamental rights and obligations of the copyright holder; to identify the objects of inventions; carry out a literary and patent search for analogs and prototypes on the professional problem posed by the sources of the library fund and through the websites of patent offices and institutes of different states;</p> <p>Have skills: analysis and use of laws and regulations in practice; work with various sources of patent information; registration of individual application materials.</p> <p>Competences: to develop their own moral and civic position: to operate with social, business, cultural, legal and ethical norms of the Kazakh society; independently apply modern computer technologies to solve research and production and technological problems of professional activity; 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; 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.</p>

27	The name of the discipline	Automation systems for enterprise activities (1S: Enterprise)
1	Code of Discipline	AS for EA IS 42(2)23
2	Number of credits, ECTS	4
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 in professional activity of modern means of automation of the organization's activities, the fundamental concepts and methods of automation of managerial work are considered, the analysis of ITU means is carried out. The principles of building information systems and the criteria for their choice for an enterprise based on the 1C: enterprise platform are analyzed.
10	Expected results	<p>As a result of mastering the discipline, the student must:</p> <p>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.</p> <p>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.</p> <p>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.</p> <p>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.</p>

28	The name of the discipline	ERP and Business Opportunity Management (ERP Galaktika)
1	Code of Discipline	ERP BOM. 42(2)23
2	Number of credits, ECTS	4
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 use of ERP systems, which are based on the principle of creating a single data warehouse containing all corporate business information and taking into account information, material, financial, economic and production processes in the company. Will give an overview of ERP business solutions, lay down basic knowledge of ERP systems.
9	Expected results	<p>As a result of mastering the discipline, the student must:</p> <p>Know: information technology used in ERP systems; classification, structure and functionality of ERP systems.</p> <p>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.</p> <p>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.</p> <p>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.</p>

29	The name of the discipline	Digital Marketing by industries
1	Code of Discipline	DMI 42(2)24
2	Number of credits, ECTS	4
3	Department	HK, GED and IS
4	Course, semester	4,7
5	Prerequisites	OIS, IT-infrastructure, Automation of business documentation.
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	Studying the conceptual foundations of applying digital marketing methods and techniques for their implementation in the system of marketing activities at the organizational level, acquiring knowledge and competencies in the field of promoting the organization and effectively using the channels for promoting goods.
8	Summary of disciplines	The discipline forms a complex of theoretical knowledge and practical skills in the use of digital technologies in marketing, considers the marketing and promotion of your project, company or personal brand in social networks (SMM marketing) and the basic principles of content contagion (promotion through word of mouth); website design and management, taking into account the principles of SEO and SMO optimization, the use of email marketing for promotion.
9	Expected results	<p>As a result of mastering the discipline, the student must:</p> <p>Know: the peculiarities of using IT in solving marketing problems and making organizational and managerial decisions; how to independently and correctly choose marketing tools for conducting an effective advertising campaign for enterprises on the Internet.</p> <p>To be able to: summarize research results; synthesize new knowledge and present it in the form of humanitarian socially significant products; make a choice of methodology and analysis; use various types of ICT in personal activities: Internet resources, cloud and mobile services for the search, storage, processing, protection and dissemination of information; to be aware of the need for the formation of new competencies to solve practical problems in the field of information systems and technologies. plan the processes of marketing communications on the Internet.</p> <p>Have skills: Demonstrate proficiency in the techniques and methods of operation of modern computers and equipment; application of technology for building marketing web communications to solve the problems of promoting goods and services, analysis and selection of general-purpose services for solving marketing problems; apply software solutions that combine text, graphic, multimedia materials, as well as other interactive tools.</p> <p>Competencies: to show communication skills and psychological readiness for work, including when working in a team and make managerial and technical decisions; apply in professional activities 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; apply the skills of entrepreneurship, innovation, creativity, reengineering of business processes, management of possible risks in business processes. 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.</p>

30	The name of the discipline	Digital management by industries
1	Code of Discipline	DMI42(2)24
2	Number of credits, ECTS	4
3	Department	HK, GED and IS
4	Course, semester	4,7
5	Prerequisites	IT infrastructure, Information systems in business and management.
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 the foundations of theoretical and practical knowledge about the principles of management in the context of the transformation and digitalization of the world economy and business, as well as the acquisition of skills for the independent use of the knowledge gained in current professional activities.
8	Summary of disciplines	The discipline forms a complex of knowledge, skills and abilities in the use of digital tools and data in the management of a company from corporations to medium and small businesses: digital data accounting, software features for financial accounting and planning, production management, personnel management, relationship management. clients, business intelligence and integrated management based on examples of real business cases.
9	Expected results	<p>As a result of mastering the discipline, the student must:</p> <p>Know: business models and the content of business processes of the enterprise; basic concepts of digital management for making management decisions; the digital environment in the organization; elements of the information support system for digital management; methods and modern information technologies of search, systematization and processing of data necessary for carrying out economic calculations; the process of developing and implementing digital management, methods for assessing the company's strategy.</p> <p>To be able to: summarize research results; synthesize new knowledge and present it in the form of humanitarian socially significant products; make a choice of methodology and analysis; evaluate management decisions based on digital management indicators; use various types of ICT in personal activities: Internet resources, cloud and mobile services for the search, storage, processing, protection and dissemination of information; use sources of economic, regulatory and legal information and search for information on the received assignment, collect, analyze data necessary for conducting economic calculations for business management purposes; apply information technology to solve management problems.</p> <p>Have skills: possession of software for working with business information and Internet technologies; be aware of the need for the formation of new competencies for solving practical problems in the field of information systems and technologies; using business models and communication methods; develop, adapt and implement high-load applications; develop infrastructure of information systems, including databases, operating systems, application software, etc.</p> <p>Competencies: to show communication skills and psychological readiness for work, including when working in a team and make managerial and technical decisions; 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; apply skills of entrepreneurship, innovation, creativity, reengineering of business processes, management of possible risks in business processes; use various types of ICT in professional and personal activities; develop and use technical and software documentation of various types based on domestic and foreign documentation standards.</p>

31	The name of the discipline	Designing IS for the 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	Fundamentals of Information Systems, Databases in IS, IT Project Management
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 the acquisition of professional skills in the design of information systems in the road industry.
8	Summary of disciplines	The discipline forms a complex of knowledge, skills and abilities in the field of designing IP for the road industry based on the UML language and the principle of "Clean architecture", including the analysis of business requirements for the designed IS, the use of flexible methods of software development management (including DevOps methods) and teamwork, selection of software tools and hardware, testing, implementation and maintenance of IS.
9	Expected results	<p>As a result of mastering the discipline, the student must:</p> <p>Know: 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; software development process; language for defining and analyzing tasks in the design of IS; methods of testing software modules of the IS.</p> <p>To be able to: realize the need for the formation of new competencies for solving practical problems in the field of information systems and technologies; 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 the requirements for the design of the network architecture, software and hardware of the computer network; develop infrastructure of information systems, including databases, operating systems, application software, etc.</p> <p>Have skills: to independently apply modern computer technologies to solve research and production-technological tasks of professional activity; to maintain documentation for the integration and testing of a software product; using tools for developing software applications; detailed design, implementation of modules and maintenance of the software system.</p> <p>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; 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; develop and / or use software, hardware, information, mathematical, functional and organizational support of information systems, including algorithms and methods of information security; develop and use technical and software documentation of various types based on domestic and foreign documentation standards.</p>

32	The name of the discipline	Design of EIS software
1	Code of Discipline	DEISS 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, Object-oriented 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	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 complex of knowledge, skills and abilities in the field of designing IP for economic and business problems 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 methods of software development management (including and DevOps methodologies) and teamwork, selection of software tools and hardware, testing, implementation and maintenance of IS.
9	Expected results	<p>Expected results As a result of mastering the discipline, the student must:</p> <p>Know: basic knowledge in the field of mathematics and natural sciences, their use in professional activities; scientific methods and techniques for studying a specific science; summarize research results; engineering programming goals, software life cycle standards, economic justification of software models.</p> <p>To be able to: develop, adapt and implement high-load applications; develop information systems infrastructure, including databases, operating systems, application software, etc .; apply object-oriented methods of analysis in software development, estimate the complexity of software development.</p> <p>Have skills: 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; development of design and software documentation, development of software applications.</p> <p>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; to install, configure, test and maintain system and application software for high-load computer systems and networks; develop and / or use software, hardware, information, mathematical, functional and organizational support of information systems, including algorithms and methods of information security.</p>

33	The name of the discipline	Development of applications in the.NET Core
1	Code of Discipline	DA NETC 43(2)08
2	Number of credits, ECTS	5
3	Department	HK, GED and IS
4	Course, semester	4,7
5	Prerequisites	Algorithms, Data Structures and Programming, Programming Technology, Object-Oriented 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 principles and tools of application development using the Ms Visual C # programming language. Acquisition of practical skills in creating applications at all stages of development from design to testing a software tool.
8	Summary of disciplines	The discipline is aimed at acquaintance with the technologies of the .NET platform, studying the modern instrumental environment designed for developing programs using the object-oriented programming language C #; implementations of mechanisms of encapsulation, inheritance and polymorphism in C #. Considered: the model of code execution in the CLR; packaging, packaging, deployment and administration of applications; assemblies; basics of types; constants and fields; methods and parameters; properties; events; interfaces; delegates, etc.
9	Expected results	<p>As a result of mastering the discipline, the student must:</p> <p>Know: the basic concepts of the .NET platform; common language runtime CLR and base class library; C # programming language; methods and tools for the development of algorithms and programs for the development of software applications for information systems; means for describing data and the sequence of their processing; object-oriented programming techniques; principles of building and functioning of applications; the basics of the formation of a user graphical interface.</p> <p>Be able to: create software using the capabilities of the C # programming language; use libraries of the C # language and the .NET environment to build the GUI interface of software applications; develop algorithms for solving professional problems related to the automotive, road and other industries; use methods and tools for testing and debugging programs.</p> <p>Have the skills to: formalize the subject area and design the structure of programs; development of applications of varying complexity in the C # language in the Ms Visual Studio environment; developing applications using ADO.NET technology for accessing databases; testing and debugging programs with a modular structure.</p> <p>Competencies: 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); 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.</p>

34	The name of the discipline	PLC Programming
1	Code of Discipline	PLC P43(2)08
2	Number of credits, ECTS	5
3	Department	HK, GED and IS
4	Course, semester	4,7
5	Prerequisites	Physics, ICT, Theory of electrical circuits
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 and practical foundations of the functioning of the PLC and the formation of skills in the selection and programming of the PLC.
8	Summary of disciplines	The discipline forms knowledge of the theoretical principles of operation and characteristics of programmable logic controllers (PLC), principles of hardware configuration and programming in the main programming languages; practical skills in choosing the type and configuration of a PLC depending on the technological process, programming in all major PLC programming languages, solving design problems and supporting a control system on a PLC.
9	Expected results	As a result of mastering the discipline, the student must: Know: basic concepts and theoretical foundations of PLC functioning; principles of configuring the PLC hardware; principles of programming in the main PLC programming languages; Be able to: analyze and select the type of PLC; configure the hardware of the PLC; write small programs in all major PLC programming languages; Have skills: practical choice of the type of PLC, depending on the technological process; selection of the PLC configuration depending on the technological process; programming in all major PLC programming languages; 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; determine the requirements for the design of the network architecture, software and hardware of the computer network; 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.

35	The name of the discipline	Telematics in the road industry
1	Code of Discipline	TRI 43(2)09
2	Number of credits, ECTS	4
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 telematic systems, methods and technologies for automated regulation of traffic flow, telematic intelligent systems; practical skills in the analysis of the technical condition and technological processes of transport, the choice of telematic equipment, the use of software, information technologies.
9	Expected results	<p>As a result of mastering the discipline, the student must:</p> <p>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.</p> <p>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.</p> <p>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.</p> <p>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.</p>

36	The name of the discipline	Big Data Technologies and Cloud Computing
1	Code of Discipline	BDT CC 43(2)09
2	Number of credits, ECTS	4
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, the main differences from solutions based on server technologies, on the architecture of "cloud" technologies, design methods and prerequisites for the use of "cloud" services, best practices to reduce risks, licensing and certification of "cloud" services ; practical skills in application development for the main existing "cloud" platforms.
9	Expected results	<p>As a result of mastering the discipline, the student must:</p> <p>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.</p> <p>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.</p> <p>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.</p> <p>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.</p>