MINISTRY OF EDUCATION AND SCIENCE OF THE REPUBLIC OF KAZAKHSTAN
NON-PROFIT JSC ATYRAU OIL AND GAS UNIVERSITY

APPROVED/AFFIRM
NP JSC«Atyrau oil and gas university»
By the decision of the Academic CouncilAOGU
Chairman of the Board - rector _____
20<u>21</u>y. «<u>30</u>» <u>04</u>, protocol №<u>10</u>

БІЛІМ БЕРУ БАҒДАРЛАМАСЫ
ОБРАЗОВАТЕЛЬНАЯ ПРОГРАММА
EDUCATION PROGRAMME

6B07101 «Өндірісті автоматтандыру және басқару»
Білім беру бағдарламасының атауы

6B07101 «Автоматизация и управление производством»
Название образовательной программы

6B07101 «Automation and management of production»
Name of education programme

Atyrau, 2021

Faculty of Information technologies

Name of EP Automation and management of production

Type of EP:

- [x] **Current**
- [ ] **New**
- [ ] **Innovative**

DEVELOPERS (Academic Committee):

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1. GENERAL INFORMATION

1.1 Program cycle:
First cycle: undergraduate Level 6 NQF/ SQF/ ISCED

1.2 Degree awarded: bachelor of engineering and technology in the educational program 6B07101 - «Automation and management of production»

1.3 The total amount of credits: 240 academic credits / 240 ECTS

1.4 Typical training period: 4 year

1.5 Distinctive features of EP

Modern production is impossible to imagine without automation. Automation tools help people significantly improve labor efficiency, organize production management and the equipment used with this, increase the speed of production of a product. All process chains in enterprises of various levels cannot do without competent management and automation of the entire workflow. Proper alignment of automation systems is impossible without the participation of an educated specialist.

The learning process is organized in the form of a cycle of lectures, seminars, workshops with the involvement of foreign scientists and specialists from the production.

One of the attractive aspects of the educational program is the presence of dual education in Atyrau University of Oil and Gas, where potential employers (oil and gas enterprises: Embamunaigas JSC, Continent Co LTD LLP, ZhigerMunaiService LLP) create conditions for students by combining theoretical material with practice in production, which contributes to the further employment of students.

In addition, students have the opportunity to attend conferences, seminars and various meetings to be able to participate in scientific discussions at the national and international level.

This bachelor degree program has two specializations: "Automation of production processes", "Automation of control systems»

2. PURPOSE AND JUSTIFICATION OF EP

2.1 Purpose of EP

The main goal of the educational program is the mastery of the students' knowledge, skills, practical skills, as well as the acquisition of the necessary competencies to solve the problems of his professional activity in the field of automation and control of technological processes and production.

As a result of mastering the EP, the student acquires knowledge, skills and abilities that allow achieving the following goals:

- to able to develop software for automation and control systems in various fields, including product life cycle support and quality assurance, in relation to specific production conditions, in accordance with regulatory documents and standards;
- to use software of automation systems and control of technological processes and production, allowing to produce competitive products, replacing full or partial participation of an employee in production management processes.

2.2 Justification of the EP for students

The field of application of professional knowledge obtained by a graduate of the EP, are all areas of production, which use the latest developments and modern information technology.

At enterprises of various fields of activity there is a huge shortage of highly qualified specialists with professional knowledge and skills in the field of automation and control, information-measuring systems, automatic regulators, electric drives who can apply information technologies, modern methods and means of automation of technological processes and production according to the requirements of modern of the world.

Today, there are active debates about which professions will be in demand in 5, 10, 20 years. "Automation and production management", area after field, displaces all performing professions. At present, young people will have to compete not only with themselves like graduates, but also with soulless robots.

2.3 The need for labor market

The educational program is developed on the basis of the competence-based model of training, which meets the needs of the labor market and the requirements of employers. Close contacts have been established with potential graduate users at the local level. Permanent partners are international and Kazakhstan commercial and government institutions (oil and gas companies: Embamunaigas JSC, Continent Co LTD LLP, ZhigerMunaiService LLP, Kazakhtelecom JSC). As a reasoned evidence of the need to implement the educational program with a focus on employers is the state program "Digital Kazakhstan", approved by the Government of the Republic of Kazakhstan No. 827 dated 12.12.2017.

Every year in the modern world "Automation and management of production " becomes a new popular profession. In the oil and gas industry, there will always be demanded specialists who are engaged in the design, commissioning and installation of automated systems and industries.

The value of tight integration between production levels and business automation systems as ways to improve production becomes more and more obvious. The role of the production automation system will change as business automation systems evolve towards real-time transaction processing, leading to fully synchronized actions.

Graduates of this educational program, with proper qualifications and work experience, are in great demand in the global labor market.

2.4 Areas of professional activity

The bachelor OP can perform the following professional activities:

- service-operational
- experimental-research
- engineering-design
- production and technology
- organizational and managerial

Content of professional activity:

1. Service and operational
   - operation of automatic automated and information systems of data transmission means and informational flows of diagnosing control and management of their technical informational mathematical software
   - prevention, repair, configuration of technical means of automation of informatization, testing of technologic process equipment.
2. Experimental research activities:
   - carrying out analytical and experimental work and research to diagnose and assess the state of aggregates and technological processes using the necessary methods and means of monitoring and analysis;
   - creation of mathematical and physical models of complex systems, production and technological processes and equipment;
   - experiment planning.
3. Design-construction activity:
   - formulation of the goals and objectives of the design given the criteria and constraints;

- development of generalized solutions to problems, analysis of these options, prediction of consequences, finding compromise solutions in a multi-criteria environment;
- development, design, modeling and implementation of automation projects, informatization of production and technological processes, taking into account energy, technological, design, operational, ergonomic and economic indicators.

4. Production and technological activities:
   - development and implementation of optimal manufacturing techniques for technical means of automation, informatization of equipment operation.
   - organization and effective conduct of input quality control of materials, production control of technological processes, the quality of finished products;
   - effective use of materials, equipment, algorithms and programs for the selection and calculation of parameters of technological processes;
   - implementation of metrological calibration of basic measuring instruments, indicators of the quality of products;
   - standardization and certification of technical automation equipment and equipment for their manufacture and repair.
5. Organizational and management activities:
   - organization of the work of the team of performers, making management decisions in the context of different opinions;
   - finding a compromise between different requirements (cost, quality, safety and deadlines) for both long-term and short-term planning and determining optimal solutions;
   - - evaluation of production and non-production costs to ensure the required product quality.

2.5 Objects of professional activity

The objects of graduates' professional activity are:

- public administration;
- oil and gas industry;
- chemical industry;
- robotics;
- instrumentation;
- energy;
- telecommunications and communications;
- transport;
- mechanical engineering;
- technological and production processes;
- technical diagnostics, research and production tests.

Graduates of EP can hold the following positions:

- technician;
- laboratory assistant;
- production process automation engineer;
- engineer of instrumentation and automation;
- design engineer;
- production management organization engineer;
- equipment commissioning and maintenance engineer;
- software engineer;
- design engineer;
- scientific and technical workers;
- leaders;
- and etc.

3. EXPECTED RESULTS OF TEACHING EP

After successful completion of this program, the learner will:

- have knowledge of the fundamentals of automation of process control systems, theoretical foundations of electrical engineering and electronics, digital information processing tools; (PO1)
- own the principles of constructing design schemes of computers, instrumentation, automation systems and robotics; the ability to apply methods and measurement tools in the design and operation of automated technological systems; (PO2)
- apply the theory of automatic control and mathematical modeling of the processes of automation in the design work on the creation and implementation of automatic systems with the wide use of modern computer equipment;(PO3)
- evaluate the functionality of SCADA-systems for building ACS, develop design and working technical documentation in the field of automation of technological processes and production, manage the life cycle of ACS, monitor the compliance of the developed systems and technical documentation with current standards, specifications and other normative documents; (PO4)
- be able to program applications, microcontrollers and create software prototypes for solving applied problems using modern programming languages and tools; (PO5)
- use the methods of modeling IT-processes of the organization and methods of analysis of the subject area and databases; administration of computer networks and protect it from unauthorized access; capable of practical development and improvement of technological process automation systems; (PO6)
- demonstrate the ability to develop executive elements of automation, operation of automated control systems and various production facilities; (PO7)
- ensure the safety of production equipment and processes, ensure uninterrupted operation of the system and take prompt measures to eliminate irregularities arising in the course of work, forecast changes in enterprise automation and develop proactive management measures;(PO8)
- create projects in the field of automation, robotics, develop client-server applications for mobile devices; (PO9)
- able to propose solutions to professional problems, conduct an experiment, interpret data and draw conclusions, defend their point of view. (PO10)

4. CURRICULUM OF EP

Module code	Disipline code	Components of the module	Cycle and component	Form of the final control	Number of academic credits	Formed competencies (codes from section 5)	Note
			1 semester				
M Math 01	MATH 1101	Mathematical analysis 1	BD,UC	examination	5		Basic faculty
M Math 01	MATH 1102	Linear algebra	BD,UC	examination	5		Faculty of information technologies
M Prog 03	CSCI 1101	Programming Principles 1	BD,UC	examination	6		Faculty of information technologies
M Lang 05	LAN 1115-8/1119	Kazakh (Russian) language	GED,CC	examination	5		Basic faculty
M Lang 05	LAN 1101	Foreign language	BD,UC	examination	5		Basic faculty
M ICT 08	INFT 1101	Information and communication technologies (in English)	GED,CC	examination	5		Faculty of information technologies
		Total per semester			**31**		
			2 semester				
M Math 01	MATH 1204	Математический анализ 2	BD,UC	examination	5		Basic faculty
M Math 01	MATH 1203	Дискретные структуры	BD,UC	examination	5		Faculty of information technologies
M Hum 02	PHYS 1201	Физика 1	BD,UC	examination	5		Basic faculty
M Prog 03	CSCI 1202	Принципы программирования II	BD,UC	examination	6		Faculty of information technologies
M Lang 05	LAN 1115-8/1119	Казахский (русский) язык	GED,CC	examination	5		Basic faculty
M Lang 05	LAN 1207	Иностранный язык	BD,UC	examination	5		Basic faculty
		Total per semester			**31**		
			3 semester				
M Math 01	MATH 2105	Differential Equations	BD,UC	examination	5		Faculty of information technologies
M Math 01	MATH 2106	Mathematical analysis of a complex variable	BD,UC	examination	5		Faculty of information technologies
M Prog 03	PHYS 2102	Physics 2	BD,UC	examination	5		Basic faculty
M SPK 06	HUM 3102	Module of socio-political knowledge (sociology, political science, cultural studies, psychology)	GED,CC	examination	5		Basic faculty
M PHE 07	PHE 101	Physical education	GED,CC	differentiate dcredit	4		Basic faculty
M BK(m) 09	CEEN 2101	Theoretical foundations of electrical engineering 1	BD,UC	examination	5		Faculty of information technologies
		Total per semester			**29**		
			4 semester				
M Math 01	STAT 2201	Statistics	BD,UC	examination	5		Faculty of information technologies
M SPK 06	HUM 3203	Module of socio-political knowledge (sociology, political science, cultural studies, psychology)	GED,CC	examination	3		Basic faculty

M PHE 07	PHE 102	Physical education	GED,CC	differentiate dcredit	4		Basic faculty
M BK(m) 09	CEEN 2202	Theoretical foundations of electrical engineering 2	BD,UC	examination	5		Faculty of information technologies
MNBIT 03	CEEN 2203	Electronics and digital design	BD,UC	examination	5		Faculty of information technologies
M ME 11		Optional discipline 1	PD,UC	examination	5		Faculty of information technologies
Total per semester					**27**		
5 semester							
M SPK 06	HUM 3204	Modern history of Kazakhstan	GED,CC	state exam	5		Basic faculty
M BK(m) 09	CEEN 3105	Elements and devices of automation	BD,UC	examination	5		Faculty of information technologies
M BK(m) 09	CEEN 3106	Introduction to signal theory	BD,UC	examination	5		Faculty of information technologies
MAZD 08	CEEN 3104	Introduction to linear and nonlinear control systems	PD,UC	examination	6		Faculty of information technologies
M ME 11		Optional discipline 2	PD,UC	examination	5		Faculty of information technologies
M FE 12		Optional discipline 1	BD,UC	examination	5		Faculty of information technologies
Total per semester					**31**		
6 semester							
M SPK 06	HUM 3206	Philosophy	GED,CC	examination	5		Basic faculty
M PK(m) 10	CEEN 3207	Automation of standard technological processes	PD,UC	examination	6		Faculty of information technologies
M PK(m) 10	CEEN 3208	Introduction to microcontrollers and microprocessor systems	PD,UC	examination	5		Faculty of information technologies
M PK(m) 10	MATH 3207	Theoretical mechanics	PD,UC	examination	5		Faculty of information technologies
M ME 11		Optional discipline 3	PD,UC	examination	5		Faculty of information technologies
M FE 12		Optional discipline 2	BD,UC	examination	5		Faculty of information technologies
Total per semester					**31**		
7 semester							
M EC 04	HUM 4107	Ethics, the art of communication and entrepreneurship - a dialogue platform	BD,UC	differentiate dcredit	4		Basic faculty
MAZD 08	HUM 2108	Fundamentals of law and anti-corruption activities / environmental science and society / Legal basis of professional activities	GED,CC	examination	5		Basic faculty
M ME 11		Optional discipline 4	PD,UC	examination	5		Faculty of information technologies
M ME 11		Optional discipline 5	PD,UC	examination	5		Faculty of information

							technologies
M FE 12		Optional discipline 3	BD,UC	examination	5		Faculty of information technologies
MIntern 13	INTS 3203	Internship	BD,UC	differentiate dcredit	6		Faculty of information technologies
Total per semester					**30**		
8 semester							
M ME 11		Optional discipline 6	PD,UC	examination	5		Faculty of information technologies
M FE 12		Optional discipline 4	BD,UC	examination	5		Faculty of information technologies
MIntern 13	INTS 3204	Undergraduate practice	PD,UC	report	8		Faculty of information technologies
M FA14	SPD2 4290	Writing and defending a thesis (project) or preparing and passing a comprehensive exam	FA	Defending a DP or comprehensiv exam	12		Faculty of information technologies
Total per semester					**30**		
Total:					**240**		

5. EDUCATIONAL MODULES MAP

A:INFORMATION FOR ADMINISTRATION			
1	**Module code**	**MMB 01**	
2	**Module name**	**MODULE "MATH BLOCK"** 1) Mathematical analysis 1 - 5 ECTS, 2) Mathematical analysis 2 - 5 ECTS, 3) Discrete structures - 5 ECTS, 4) Linear Algebra - 5 ECTS, 5) Differential Equations - 5 ECTS, 6) Mathematical analysis of a complex variable - 5 ECTS 7) Statistics-5 ECTS	
3	**Module developers**	Mardanova L.O., Diarova D.M., Hajiyev F.A.	
4	**The faculty-module owner**	Faculty of information technology, Basic faculty	
5	**Other faculties involved in the module implementation**	faculty	% participating
		Basic faculty	20
6	**Module mustering duration**	1,2,3,4 semesters	
7	**Language of teaching and assessment**	Kazakh, russian, english	
8	**Number of academic credits**	35 ECTS	
9	**Module prerequisites**	Secondary education program	

B. DETAILED INFORMATION ABOUT TRAINING AND TEACHING		
10	**Module Description**	
Introduction to analysis Metric space. Differential calculus of a function of one variable. Riemann's integral. Rows. Functional rows. Differential calculus of functions of several variables. Parameter-dependent integrals. Multiple Riemann integral. Discrete Math. Linear algebra. Vector algebra. Analytical geometry. Matrix, determinants. Differential Equations. Differential calculus of a function of several variables. Integral calculus of functions of several variables. Double and triple integrals. Differential Equations. Numerical and functional series. Elements of probability theory and mathematical statistics. The theory of functions of complex variables. Math statistics.		
11	**Module aims**	
A1	to give knowledge about the basic elements of mathematical analysis; Familiarization of students with the basics of the mathematical apparatus necessary for solving theoretical and practical problems; development of logical thinking, development of skills in mathematical research of applied issues. Familiarization of students with the basics of the mathematical apparatus necessary for solving theoretical and practical problems; development of logical thinking, development of skills in mathematical research of applied issues.	
A2	organization of computational processing of results in applied engineering problems; to imagine fundamental physical experiments and their role in the development of science;	
A3	the acquisition of the necessary knowledge and skills by students contributes to the development of logic, the ability to use mathematical, physical methods and techniques to solve specific problems.	
A4	promote the development of the student's creative thinking, skills of independent, cognitive activity	
A5	the formation of a student's complex of knowledge, abilities, skills, scientific outlook and logical thinking that are so necessary for a future engineer in conditions of technical progress	
12	**Learning results**	
Code	*EP Description*	Aim codes
CC1	The **student must be competent**: -use fundamental knowledge in the field of mathematical analysis, analytical geometry, vector and linear algebra, theory of functions of one and several variables, differential and integral calculus, theory of probability and mathematical statistics, as well as the theory of functions of a complex variable; - to use the chicken theory for solving common tasks; - use a physical and mathematical apparatus for solving analytical and analytical problems arising in the course of professional activity.	A1
CC2	**must know** the basics of linear algebra with elements of analytical geometry, the basics of	A2.1

	mathematical analysis, the basics of the theory of differential equations, their main applications in the practice of professional activity; elements of vector analysis and field theory; basic methods of mathematical statistics; **able to demonstrate** knowledge of the basic areas of mathematics; to propose possible solutions to modern problems based on the analysis and mathematical description of processes; analyze the features of mathematical devices; determine the practical potential of mathematical methods;	A2.2
CC3	**should be able to:** apply mathematical methods to solve typical professional problems; navigate mathematical reference literature; acquire new mathematical knowledge using modern educational and information technologies in solving professional problems; **use** methods of adequate physical and mathematical modeling, as well as apply methods of physical and mathematical analysis to solve specific natural science and technical problems; conduct research to identify problems in the professional field and present the results for discussion.	A 3.1 A 3.2
CC4	**must own:** - methods of constructing the simplest mathematical models of typical professional tasks; mathematical methods for solving natural science problems; methods of analysis of meaningful interpretation of the results obtained; - skills in applying the basic methods of physical and mathematical analysis to solve natural science problems; processing and interpretation of the results of the experiment; **able to explain** and interpret subject knowledge in all fields of science, to carry out research project activities in various fields; correctly express and argue your own opinion.	
13	**Teaching methods**	
	Overall learning outcomes will be achieved through the following training activities: 1) lecture classes: lectures, seminars (practical) - held in the light of innovative learning technologies, using the latest achievements of science, technology, information systems and in an interactive form; 2) extracurricular classes: independent work of the student (IWS), including under the guidance of a teacher (IWST), individual counseling;	
14	**Training methods and technologies**	
	Methods and learning technologies used in the process of implementing the module: 1) student-centered learning based on a reflexive approach to learning from the learner; 2) competence-based learning; 3) role-playing games and educational discussions of various formats; 4) case studies; 5) project method.	
15	**Evaluation methods (evaluation criteria)**	
	The final grade for the discipline includes an assessment of current performance and final control (examination grade). The share of assessment of current performance is 60% in the final assessment. Assessment of final control is 40% of the final assessment of knowledge in the discipline. The assessment of current performance is made up of the average value of the scores of the 1st and 2nd tolerance rating (TR 1 and TR 2), each of which is rated at a maximum of 100 points. The current monitoring of progress - a systematic check of the student's educational achievements on each topic of the academic discipline, conducted by the teacher conducting the training lesson. The current control is carried out in the form of checking lecture notes, fulfilling tasks of self-regulatory organizations, examinations, practical and laboratory works, etc. The final grade for the discipline as a percentage is determined by the following formula: $T\% = ((TR\ 1 + TR\ 2) / 2) \times 0.6 + E \times 0.4$ where: TR 1 - the percentage content of the assessment of the 1st admission rating; TR 2 - the percentage content of the assessment of the 2nd admission rating; E - the percentage of the examination grade. The current and two major controls (LC1 and LC2) take into account: 1. Activity of work in the audience, i.e., in the classes, which can be held in the form of case studies, role-playing games, brainstorming, disputes, round tables; 2. Timeliness of written work; 3. Examinations, surveys, reports, essays, mini-tests, research work; 3. Group project, presentation;	

	Final control - passing an exam in a discipline that can pass in the form of comprehensive testing, oral or written answer on tickets.
16	**Literature**

Main:

1. Paul, B. MATHEMATICS [Текст] = Математика: pupil's book 3A / Broadbent Paul.- London: Macmillan Publishers Limited, 2009.- 112 с.
2. Айдос, Е.Ж. Жоғарыматематика - 1 [Мәтін]. 1 кітап: оқулық / Е.Ж. Айдос.- Алматы: Бастау, 2015.- 320 б.- (ҚазақстанРеспубликасыБілімжәнеҒылыминистірлігі).
3. Айдос, Е.Ж. Жоғарыматематика - 2 [Мәтін]. 2 кітап: оқулық / Е.Ж. Айдос.- Алматы: Бастау, 2015.- 520 б.- (ҚазақстанРеспубликасыБілімжәнеҒылыминистірлігі).
4.Шипачев, В.С. Курсвысшейматематики [Текст]: Учебник / В.С. Шипачев; Подред.акад. А.Н.Тихонова.- 4-еизд.- Москва: ОНИКС, 2009.- 608 с.
5. Physics [Text] = Физика: Textbook / G.Sh. Omashova [идр.].- Almaty: Book Print, 2016.- 304 p.- (Association of higher educational institutions of Kazakhstan).

Additional :

1. Оспанов, Т. Математиканың теориялық негіздері [Мәтін]: оқулық / Т. Оспанов, Құрманалина С. Құрманалина Ш.- 2-ші басылым.- Астана: Фолиант, 2012.- 352 б.- (Кәсіптік білім).
2. Элементарлық математика. Алгебра [Мәтін]: оқу құралы / М.А. Асқарова.- Алматы: Қарасай, 2013.- 460 б.- (Қазақстан Республикасы Білім және Ғылым министірлігі). Физиктер мен инженерлерге арналған математикалық әдістер [Мәтін]. Т.2: оқулық / К. Райли, М. Ховсон, С. Бенс; Ауд. Ж.Н. Тасмамбетов және т.б.- Алматы: Дәуір, 2014.- 488 б.- (Қазақстан Республикасы жоғары оқу орындарының қауымдастығы).

A: INFORMATION FOR ADMINISTRATION			
1	**Module code**	**MEGN 02**	
2	**Module name**	**MODULE OF NATURAL SCIENCES AND HUMANITIES** 1) Physics 1- 5 ECTS 2) Physics 2- 5 ECTS	
3	**Module developers**	Karataeva K.K., Suleimenova B.K., Yerekeshova A.Kh., Urazgalieva M.K.	
4	**The faculty-module owner**	Basic faculty, Sector of "Physical, mathematical and general technical disciplines"	
5	**Other faculties involved in the module implemcntation**	Faculty	% of participating
		Basic faculty, Sector of "Physical, mathematical and general technical disciplines"	100
6	**Module mustering duration**	1,2 semesters	
7	**Language of teaching and assessment**	Kazakh, russian, english	
8	**Number of academic credits**	10 credits	
9	**Module prerequisites**	Secondary education program	
B: DETAILED INFORMATION ABOUT TRAINING AND TEACHING			
10	**Module Description**		
	The module studies the movement of bodies and their interaction with each other during movement. The course describes the movement of liquids and gases in nature; the movement of both artificially created aircraft and physical celestial objects; atmospheric and underwater currents; mechanical vibrations and waves, sound waves, the law of conservation of electric charge, Coulomb's Law, tension, electric potential, direct electric current, the movement of the medium in electromagnetic fields, etc. The disciplines of the module create a universal basis for the study of general professional and special disciplines, lay the foundation for further training in the master's degree.		
11	**Module aims**		
A1	the study of general laws of motion and balance materialnyz body and emerging verily vzaimodeyctvy mezhdu telami, teopeticheckaya and ppakticheckaya podgotovka in oblacti ppikladnoy mehaniki defopmipuemogo tvepdogo tela, a takzhe ovladenie obuchayuschihcya teopeticheckimi znaniyami o vazhneyshih of Physical faktah, ponyatiyah, zakonah, ppintsipah elektpodinamiki and duration ppimenyat these znaniya in practice, to formulate the basic concepts and general principles governing electrical and		

	magnetic phenomena, the development of engineering thinking, the acquisition of knowledge not required for the study of special disciplines.
A2	studying the basic concepts of the course and mastering the basics of Maxwell's theory for the electromagnetic field, the theory of oscillations and waves, alternating current circuits, the theory of geometric and electronic optics, wave optics, the quantum nature of radiation, methods of solving practical problems and performing laboratory work and calculations; studying applications of the basic concepts and methods of the course in engineering.
A3	development of logical and algorithmic thinking, the ability to operate with physical models, the use of mathematical and physical methods and techniques for solving applied problems.
A4	organization of computational processing of results in applied engineering problems; to imagine fundamental physical experiments and their role in the development of science; know the purpose and principles of operation of the most important physical devices.
A5	promote the development of the student's creative thinking, skills of independent, cognitive activity
12	**Learning results**

Код	*EP Description*	Aim codes
CC5	The student **must be competent**: -use fundamental physical experience in the field of mechanics of a material point, solid body, continuous media, theory of gravitational field, mechanical vibrations and waves, electrodynamics; - to use the chicken theory for solving common tasks; - to know the purpose and principles of action of the most important physical devices and equipment; - use a physical and mathematical apparatus for solving analytical and analytical problems arising in the course of professional activity.	A1
CC6	As a result of the course, the student must know the basic concepts and laws of mechanics and the methods of teaching equilibrium and motion of a material point, a solid body and a mechanical system arising from these laws; the basic laws of electromagnetic complementarities, laws of constant and alternating flow; Maxwell equalization; the properties of electricians and magnetic techniques; mechanisms of electrical conductivity of biological tissues and liquids; the physical basis of the activity of electromagnetic poles on a person, as well as the ability to adjust the acquired knowledge to solve specific problems of technology, separately build and investigate mathematical and mechanical models of technical systems, while expertly applying the basic algorithms of higher mathematics and the use of modern computers and information technology systems. The student must be able to: formalize problems of dynamics, kinematics of points and solids, dynamics of points, mechanical system and solid body; subtract kinematic and dynamic characteristics of wheels and solid body, the location of the center of mass of the mechanical system, axial moments of inertia of the simplest bodies; make equalization balancing, differential equations of motion of a point, mechanical system and solid body, laws of constant and alternating flow; Maxwell equalization; the work of electricians and magnetics; mechanisms of electrical conductivity of biological tissues and liquids; the physical basis of the action of electromagnetic poles on a person. The student must apply physical methods to solve typical professional tasks; acquire independent new knowledge, use modern educational and information technologies in solving professional tasks. The student should be able to conduct an independent analysis of the physical processes occurring in various electrical devices. The student should be able to process the results of measured laboratory work, use methods of analyzing the meaningful interpretation of the results obtained in solving engineering problems. The student **must have** the following skills: to identify the physical essence of phenomena and processes in devices of various physical nature and perform simple technical calculations in relation to them, work with instruments and equipment of a modern physical laboratory; use various methods of physical measurements and experimental data processing; use methods of physical and mathematical modeling, as well as apply methods of physical and mathematical analysis to solving specific scientific and technical problems; master the skills of searching for necessary information in reference literature and in information networks.	A1

CC7	**Must know**:basic concepts of Maxwell's theory for the electromagnetic field, Maxwell's differential and integral equations, differential equations of free and forced electromagnetic oscillations and their solutions, wave theory, wave equation, wave interference, experimental generation of electromagnetic waves, differential equation of electromagnetic wave, basic laws of optics, interference, diffraction, dispersion, polarization of light, thermal radiation, types and laws of the photoelectric effect, Compton effect and its elementary theory, solve practical problems, using course theory.	A1 A5
CC8	**Must be able to**: investigate the equations of vibrations and waves, find solutions to differential equations, be able to apply the method of vector diagrams to solve practical problems. The student should be able to apply physical methods to solve typical professional tasks; acquire new knowledge independently, using modern educational and information technologies in solving professional tasks. The student should be able to conduct an independent analysis of the physical processes occurring in various electrical devices, based on the theory of electromagnetic fields, alternating current. The student should be able to process the results of measurements of laboratory work, use methods of analysis of meaningful interpretation of the results obtained in solving engineering problems.	A2 A5
CC9	**Must have the skills to**: identify the physical essence of phenomena and processes in devices of various physical nature and perform simple technical calculations with respect to them, work with instruments and equipment of a modern physical laboratory; use various methods of physical measurements and experimental data processing; use methods of physical and mathematical modeling, as well as apply methods of physical and mathematical analysis to solve specific scientific and technical problems. The student must have the skills to search for the necessary information in the reference literature, in local and global information networks.	A3
CC10	**Must be competent**: to use fundamental physical experiments in the field of electromagnetic field theory, vibrations and waves, wave optics, quantum radiation theory; - apply the theory of the course to solve applied problems; - to use a physical and mathematical apparatus for solving computational and analytical problems arising in the course of professional activity.	A4.1 A4.2 A4.3 A5

13	**Teaching methods**
	General Learning results will be achieved through the following training activities: 1) Classroom lessons: lectures, seminars (practical) - are conducted taking into account innovative teaching technologies, using the latest achievements of science, technology, information systems and in an interactive form; 2) Out-of-class lessons: student independent work (SRO), including under the guidance of a teacher (SRO), individual consultations.
14	**Training methods and technologies**
	Methods and learning technologies used in the process of implementing the module: 1) student-centered learning based on a reflexive approach to learning from the learner; 2) competence-based learning; 3) role-playing games and educational discussions of various formats; 4) case studies; 5) project method.
15	**Evaluation methods (evaluation criteria)**
	The final grade for the discipline includes an assessment of current performance and final control (examination grade). The share of assessment of current performance is 60% in the final assessment. Assessment of final control is 40% of the final assessment of knowledge in the discipline. The assessment of current performance is made up of the average value of the scores of the 1st and 2nd tolerance rating (TR 1 and TR 2), each of which is rated at a maximum of 100 points. The current monitoring of progress - a systematic check of the student's educational achievements on each topic of the academic discipline, conducted by the teacher conducting the training lesson. The current control is carried out in the form of checking lecture notes, fulfilling tasks of self-regulatory organizations, examinations, practical and laboratory works, etc. The final grade for the discipline as a percentage is determined by the following formula: $T\% = ((TR\ 1 + TR\ 2) / 2) \times 0.6 + E \times 0.4$

	where: TR 1 - the percentage content of the assessment of the 1st admission rating; TR 2 - the percentage content of the assessment of the 2nd admission rating; E - the percentage of the examination grade. The current and two major controls (LC1 and LC2) take into account: 1. Activity of work in the audience, i.e., in the classes, which can be held in the form of case studies, role-playing games, brainstorming, disputes, round tables; 2. Timeliness of written work; 3. Examinations, surveys, reports, essays, mini-tests, research work; 3. Group project, presentation; Final control - passing an exam in a discipline that can pass in the form of comprehensive testing, oral or written answer on tickets.
16	**Literature**

Main:

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A:	INFORMATION FOR ADMINISTRATION	
1	**Module code**	**MPP 03**
2	**Module name**	**PROGRAMMING MODULE** 1) Programming Principles 1-6 ECTS 2) Programming Principles 2- 6 ECTS
3	**Module developers**	Hajiyev F.A., Shabdirov D.N.
4	**The faculty-module owner**	Faculty of information technology

5	**Other faculties involved in the module implementation**	Faculty	% of participating
		Information technologies	100
6	**Module mustering duration**	1,2 semester	
7	**Language of teaching and assessment**	Kazakh, russian, english	
8	**Number of academic credits**	12 credits	
9	**Module prerequisites**	Mathematics 1, Mathematics 2, Information and communication technologies	

B. DETAILED INFORMATION ABOUT TRAINING AND TEACHING

10	**Module description**

The module is designed to familiarize students with the concepts of procedural-oriented programming, provided that they are not familiar with programming. Its main goal is to teach the principles of programming using C++, C#.

The module provides the student with the fundamental knowledge to become an experienced C++, C# programmer.

11	**Module aims**	
A1	Teach students to use basic programming principles to create console and desktop applications. This module uses C++ and C# as the main programming languages.	
A2	study and practical mastering of general principles and modern methods of programming technology in the chosen language	
12	**Learning results**	
Code	*EP Description*	Aim codes
CC11	The student **must be competent to:** - use fundamental knowledge in the field of algorithmization and programming; - apply course theory to solve suitable problems;	A1
CC12	**can:** develop block diagrams of various algorithms, organize the necessary data structures depending on the requirements of the task; **choose** the right methods for solving problems and develop programs using language tools; use application programming systems, develop basic program documents. knowledge of the features, basic algorithms and their implementation in the chosen programming language	A2
13	**Teaching methods**	
	The overall Learning results will be achieved through the following training activities: 1) classroom classes: lectures, seminars (practical) - are conducted taking into account innovative teaching technologies, using the latest achievements of science, technology, information systems and in an interactive form; 2) extracurricular activities: independent work of the student (IWS), including under the guidance of a teacher (IWST), individual consultations;	
14	**Training methods and technologies**	
	Methods and learning technologies used in the process of implementing the module: 1) student-centered learning based on a reflexive approach to learning from the learner; 2) competence-based learning; 3) role-playing games and educational discussions of various formats; 4) case studies; 5) project method.	
15	**Evaluation methods (evaluation criteria)**	
	The final grade for the discipline includes an assessment of current performance and final control (examination grade). The share of assessment of current performance is 60% in the final assessment. Assessment of final control is 40% of the final assessment of knowledge in the discipline. The assessment of current performance is made up of the average value of the scores of the 1st and 2nd tolerance rating (TR 1 and TR 2), each of which is rated at a maximum of 100 points. The current monitoring of progress - a systematic check of the student's educational achievements on each topic of the academic discipline, conducted by the teacher conducting the training lesson. The current control is carried out in the form of checking lecture notes, fulfilling tasks of self-regulatory	

	organizations, examinations, practical and laboratory works, etc. The final grade for the discipline as a percentage is determined by the following formula: T% = ((TR 1+ TR 2) / 2) x 0.6 + E x 0.4 where: TR 1 - the percentage content of the assessment of the 1st admission rating; TR 2 - the percentage content of the assessment of the 2nd admission rating; E - the percentage of the examination grade. The current and two major controls (LC1 and LC2) take into account: 1. Activity of work in the audience, i.e., in the classes, which can be held in the form of case studies, role-playing games, brainstorming, disputes, round tables; 2. Timeliness of written work; 3. Examinations, surveys, reports, essays, mini-tests, research work; 3. Group project, presentation; Final control - passing an exam in a discipline that can pass in the form of comprehensive testing, oral or written answer on tickets.
16	**Literature**

Main:

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A: INFORMATION FOR ADMINISTRATION			
1	**Module code**	**M04**	
2	**Module name**	**MODULE** Ethics, art of communication and entrepreneurship - dialogue platform - 4 ECTS	
3	**Module developers**	F.A. Hajiyev	
4	**The faculty-module owner**	Faculty of information technology	
5	**Other faculties involved in the module implementation**	Faculty	% of participating
		Information technologies	
6	**Module mustering duration**	7 semester	
7	**Language of teaching and assessment**	Kazakh, russian, english	
8	**Number of academic credits**	4 credits	
9	**Module prerequisites**	Module of socio-political knowledge, Philosophy	
B. DETAILED INFORMATION ABOUT TRAINING AND TEACHING			
10	**Module description**		

The module envisages weekly meetings with well-known representatives of the business world, statesmen, representatives of culture and science.		
11	**Module aims**	
A1	To broaden the horizons of the graduate, to provide him with the opportunity to link together the ideas of modern economics and social relations.	
12	**Learning results**	
Code	*EP Description*	Aim codes
CC13	**analyze** various situations in different spheres of communication from the standpoint of correlation with the system of values, social, business, cultural, legal and ethical norms of Kazakhstan society; **assess** the specific situation of relations in society from the standpoint of one or another science of the social and humanitarian type, project the prospects for its development, taking into account possible risks; **develop** programs for resolving conflict situations in society, including in a professional society; **carry out** research project activities in various spheres of communication, generate socially valuable knowledge, present it; correctly express and argue their own opinion on issues of social significance.	A1
13	**Teaching methods**	
	The overall Learning results will be achieved through the following training activities: 1) classroom classes: lectures, seminars (practical) - are conducted taking into account innovative teaching technologies, using the latest achievements of science, technology, information systems and in an interactive form; 2) extracurricular activities: independent work of the student (IWS), including under the guidance of a teacher (IWST), individual consultations;	
14	**Training methods and technologies**	
	Methods and learning technologies used in the process of implementing the module: 1) student-centered learning based on a reflexive approach to learning from the learner; 2) competence-based learning; 3) role-playing games and educational discussions of various formats; 4) case studies; 5) project method.	
15	**Evaluation methods (evaluation criteria)**	
	The final grade for the discipline includes an assessment of current performance and final control (examination grade). The share of assessment of current performance is 60% in the final assessment. Assessment of final control is 40% of the final assessment of knowledge in the discipline. The assessment of current performance is made up of the average value of the scores of the 1st and 2nd tolerance rating (TR 1 and TR 2), each of which is rated at a maximum of 100 points. The current monitoring of progress - a systematic check of the student's educational achievements on each topic of the academic discipline, conducted by the teacher conducting the training lesson. The current control is carried out in the form of checking lecture notes, fulfilling tasks of self-regulatory organizations, examinations, practical and laboratory works, etc. The final grade for the discipline as a percentage is determined by the following formula: $T\% = ((TR\ 1 + TR\ 2) / 2) \times 0.6 + E \times 0.4$ where: TR 1 - the percentage content of the assessment of the 1st admission rating; TR 2 - the percentage content of the assessment of the 2nd admission rating; E - the percentage of the examination grade. The current and two major controls (LC1 and LC2) take into account: 1. Activity of work in the audience, i.e., in the classes, which can be held in the form of case studies, role-playing games, brainstorming, disputes, round tables; 2. Timeliness of written work; 3. Examinations, surveys, reports, essays, mini-tests, research work; 3. Group project, presentation; Final control - passing an exam in a discipline that can pass in the form of comprehensive testing, oral or written answer on tickets.	
16	**Literature**	
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A: INFORMATION FOR ADMINISTRATION			
1	**Module code**	**MYa 05**	
2	**Module name**	**LANGUAGE MODULE** 1) Kazakh language / Russian language - 10 ECTS 2) Foreign language - 10 ECTS	
3	**Module developers**	Kulzhanova N., Bayzhigitova G.	
4	**The faculty-module owner**	Basic faculty	
5	**Other faculty involved in the module implementation**	Faculty	% of participating
		Basic faculty	100
6	**Module mustering duration**	1,2 semester	
7	**Language of teaching and assessment**	Kazakh, russian, english	
8	**Number of academic credits**	20 credits	
9	**Module prerequisites**	Secondary education programs	
B. DETAILED INFORMATION ABOUT TRAINING AND TEACHING			
10	**Module description**		

The Language training module is **aimed** at a new format of language learning and at the formation of a social and humanitarian worldview of students within the framework of the national idea of spiritual modernization, is designed to develop the language personality of a student who is able to carry out cognitive and communicative activities in three languages (kazakh, russian, english) in the spheres of interpersonal , social, professional, intercultural communication in the context of the implementation of state programs of trilingualism. The module aims the student at a tolerant attitude towards world cultures and languages as translators of world-class knowledge, advanced modern technologies, the use and transfer of which can ensure the modernization of the country and the personal career growth of a future specialist. In addition, the program of the module aims the student at the successful mastering of the types of speech activity in accordance with the level training, the formation and improvement of language skills in various situations of everyday, socio-cultural and professional communication, the formation of skills in the production of oral and written speech in accordance with the communicative goal and professional communication.		
11	**Module aims**	
A1	Formation of intercultural and communicative competence of students in the process of foreign language education at a sufficient level (A2, common European competence) and the level of basic sufficiency (B1, common European competence). Depending on the level of training, the student at the time of completion of the course reaches the B2 level of the common European competence if the student's language level at the start is higher than the B1 level of the common European competence.	
A2	Ensuring high-quality assimilation of the kazakh (russian) language as a means of social, intercultural, professional communication through the formation of communicative competencies at all levels of language use. Depending on the level of training, the student at the time of completion of the course must achieve learning outcomes in accordance with the intended requirements of the module program.	
12	**Learning results**	
Code	*EP Description*	Aim codes
CC14	**systematizes** the conceptual foundations of understanding the communicative intentions of the partner, the authors of texts at this level, compares and selects the forms and types of speech / communication corresponding to the communicative intention with a logical structure adequate to the type of speech, adequately expresses his own communicative intentions with the correct selection and appropriate use of the appropriate language means, taking into account them compliance with the socio-cultural norms of the target language.	A1
CC15	**classifies** the levels of use of real facts, references to authoritative opinion; verbal behavior is communicatively and cognitively justified, reveals the patterns of development of a foreign language, paying attention to the study of stylistic originality, owns the techniques of linguistic description and analysis of the causes and consequences of events in texts of a scientific and social nature; expresses in a foreign language possible solutions to modern problems based on the use of reasoned information.	A1
CC16	**demonstratively uses** language material with reasoned language means sufficient for a given level, timely and independently corrects errors made with 75% of error-free statements, **owns** the strategy and tactics of building a communicative act, correctly intonationally forms speech, relying on lexical sufficiency within the framework of speech topics and grammatical correctness.	A1
CC17	**able to**: correctly **select** and **use** linguistic and speech means based on a complete understanding of vocabulary, grammatical system of knowledge and pragmatic content of intentions, convey the exact content of the text, be able to formulate conclusions, characterize the final part of the entire text and its individual structural parts, explain text information, reveal style and genre features of social, social, cultural, socio-political, educational and professional texts.	A2
CC18	**Is able to**: request and report information in accordance with the communication situation, evaluate the actions of participants in verbal communication, use information to influence a familiar or unfamiliar interlocutor, in accordance with the peculiarities of linguistic and culturological communication, demonstrate personal, social and professional competence, discuss ethical, culturological and socially significant problems, **be able to** express their point of view, substantiate it, critically assess the	A2

	opinions of participants, fulfill personal needs (household, educational, social, cultural, professional), **be able to** participate in various communication situations in order to express ethically correct, from a meaningful point full view, at the proper lexico-grammatical and pragmatic level of their position.	
CC19	**Able to**: make the right choice and use of linguistic and speech means for solving certain problems of communication and cognition based on knowledge of a sufficient volume of vocabulary, a system of grammatical knowledge, pragmatic means of expressing intentions, convey the factual content of texts, formulate their conceptual information, describe inferential knowledge (pragmatic focus) of both the entire text and its individual structural elements, interpret the information of the text, explain in the scope of certification requirements the style and genre specificity of texts in the socio-cultural, socio-political, official-business and professional spheres of communication.	A1, A2
CC20	**Able to: request** and **report** information in accordance with the communication situation, evaluate the actions and actions of participants, use information as a tool to influence the interlocutor in situations of cognition and communication in accordance with certification requirements, build speech behavior programs in situations of personal, social and professional communication in accordance with with the norms of language, culture, the specifics of the sphere of communication, certification requirements, discuss ethical, cultural, socially significant problems in discussions, express your point of view, defend it reasonably, critically evaluate the opinion of the interlocutors.	A1, A2
13	**Teaching methods**	
	The overall learning results will be achieved through the following training activities: 1) classroom classes: lectures, seminars (practical) - are conducted taking into account innovative teaching technologies, using the latest achievements of science, technology, information systems and in an interactive form; 2) extracurricular activities: independent work of the student (IWS), including under the guidance of a teacher (IWST), individual consultations;	
14	**Training methods and technologies**	
	Methods and learning technologies used in the process of implementing the module: 1) student-centered learning based on a reflexive approach to learning from the learner; 2) competence-based learning; 3) role-playing games and educational discussions of various formats; 4) case studies; 5) project method.	
15	**Evaluation methods (evaluation criteria)**	
	The final grade for the discipline includes an assessment of current performance and final control (examination grade). The share of assessment of current performance is 60% in the final assessment. Assessment of final control is 40% of the final assessment of knowledge in the discipline. The assessment of current performance is made up of the average value of the scores of the 1st and 2nd tolerance rating (TR 1 and TR 2), each of which is rated at a maximum of 100 points. The current monitoring of progress - a systematic check of the student's educational achievements on each topic of the academic discipline, conducted by the teacher conducting the training lesson. The current control is carried out in the form of checking lecture notes, fulfilling tasks of self-regulatory organizations, examinations, practical and laboratory works, etc. The final grade for the discipline as a percentage is determined by the following formula: $T\% = ((TR\ 1 + TR\ 2) / 2) \times 0.6 + E \times 0.4$ where: TR 1 - the percentage content of the assessment of the 1st admission rating; TR 2 - the percentage content of the assessment of the 2nd admission rating; E - the percentage of the examination grade. The current and two major controls (LC1 and LC2) take into account: 1. Activity of work in the audience, i.e., in the classes, which can be held in the form of case studies, role-playing games, brainstorming, disputes, round tables; 2. Timeliness of written work; 3. Examinations, surveys, reports, essays, mini-tests, research work; 3. Group project, presentation; Final control - passing an exam in a discipline that can pass in the form of comprehensive testing, oral or written answer on tickets.	

16	**Literature**
	Main: 1. Абдуова Б.С., Асанова Ұ.О. Қазақ тілі: Орыс тілді топтарға арналған оқу құралы.- Астана, 2017. -282 б. 2. Балабеков А.К., Бозбаева-Хунг А.Т., Досмамбетова Г.Қ., Салыхова Б.О., ХазимоваӘ.Ж.. Қазақ тілі: ортадан жоғары деңгейге арналған оқулық. Ұлттық тестілеу орталығы. – Астана: 2017 3. Қазақ тілі (тіл үйренушілердің B1 және B2 деңгейлеріне арналған): орыс тілді топтарға арналған оқу құралы./ Қ.С. Құлманов, Б.С.Абдуова, т.б. - Астана: - 2015.- 298 б. 4. Русский язык. Учебное пособие для обучающихся казахских отд. университетов (бакалавриат) –Под редакцией Ахмедьярова К.К. Жаркынбековой Ш.К., Мухамадиева Х.С. – Алматы, Қазақ университеті, 2012. 5. Ахмедьяров К.К. Русский язык. Учебное пособие для обучающихся казахских отделений университетов. Алматы, 2012 6. Балуш Т.В. Русский язык. –М., 2018. 7. Murphy Raymond. Essential Grammar in Use. Intermediate. Cambridge University Press. – 2005. 8. British National Corpus: http://www.natcorp.ox.ac.uk 9. The New Cambridge English Course. Michael Swan, CatherineWalter. Student's book.Cambridge. 2001. 10. Светлана Тер-Минасова. Тіл және мәдениетаралық коммуникация. Астана, 2018г. 11. Виктория Фромкина. Тіл біліміне кіріспесі. –Астана, 2018г.

A: INFORMATION FOR ADMINISTRATION			
1.	**Module code**	**MNKSPZ 06**	
2.	**Module name**	**MODULE OF THE NATIONAL CODE AND SOCIO-POLITICAL KNOWLEDGE** 1) Modern history of Kazakhstan - 5 ECTS 2) Philosophy - 5 ECTS 3) Module of socio-political knowledge (sociology, political science, cultural studies, psychology)- 8 ECTS 4) Fundamentals of law and anti-corruption activities/ Leadership/Environmental science and societies/ Legal basis of professional activity - 5 ECTS	
3.	**Module developers**	Nigmetov B.S., Utelbayev K.T., Nursultan M.U., Kenzhebayeva S.E.	
4.	**The faculty-module owner**	Basic faculty	
5.	**Other faculties involved in the module implementation**	Faculty	% of participating
		Basic faculty	100
6.	**Module mustering duration**	3,4,5,6 semester	
7.	**Language of teaching and assessment**	Kazakh, russian, english	
8.	**Number of academic credits**	23 credits	
9.	**Module prerequisites**	Secondary educatlon program (world history, history of Kazakhstan, geography, natural science)	

B: DETAILED INFORMATION ABOUT TRAINING AND TEACHING	
10.	**Module description**
	Modern career growth presupposes not only professional knowledge, skills, but also skills of social behavior, assimilation of the values of world and national culture. The content of the module includes the following disciplines: Modern History of Kazakhstan, Philosophy, Fundamentals of law and anti-corruption activities, sociology, political science, cultural studies, psychology, helping students to expand their knowledge about the main stages of the history of modern Kazakhstan, strengthening Kazakhstan's identity, self-awareness, implementation of tasks related to the need for an intellectual breakthrough in the new millennium, increasing the level of eco-culture and entrepreneurship culture of students, and also to expand their knowledge in the field of functioning

	and historical development of politics, the state, political and social institutions, culture as a special part of the life of human society, as well as knowledge of human psychology, psychology of cognitive processes, physical and mental development at different stages of personality development. "Module of the national code and socio-political knowledge" - provides the necessary amount of knowledge about society, about the state, about politics, about social and political institutions, parties, groups, about the psychological characteristics of the individual and his interactions with the outside world, about the media and public opinion, as well as ideas about the continuity and continuity of cultural development, deep roots of spiritual heritage and scientifically reliable facts that contribute to the formation of young Kazakhstanis respect for the historical past and national traditions, preservation of the national code and national values in the conditions of globalization, It is aimed at forming students' holistic understanding of the national idea of Mangilik El, its role in the history of domestic political development and the formation of anti-corruption education, the importance of civic association for spiritual revival, preservation of cultural and historical values of the nation, their own national code - the ability to be a cultured and tolerant citizen of the world, while remaining a responsible citizen of their country.
11.	**Module aims**
A 1	To provide objective historical knowledge about the main stages of the history of modern Kazakhstan; to direct students' attention to the problems of formation and development of statehood and historical and cultural processes.
A2.1	Formation of students' holistic view of philosophy as a special form of cognition of the world, its main sections, problems and methods of their study in the context of future professional activity.
A2.2	The formation of students' openness of consciousness, understanding of their own national code and national identity, spiritual modernization, competitiveness, realism and pragmatism, independent critical thinking, the cult of knowledge and education, the assimilation of such key ideological concepts as justice, dignity and freedom, as well as the development and strengthening of the values of tolerance, intercultural dialogue and culture of peace.
A 3.1	Education of a new generation of specialists, socially active members of society with a high level of development of national consciousness, national spirit, spirit of patriotism, historical consciousness and social memory; spirit of professionalism and competitiveness, ready for active and decisive actions to preserve the stability, independence, security of our state, able to build a constructive dialogue with representatives of other cultures.
A 3.2	Formation of the socio-humanitarian worldview of students in the context of solving the tasks of modernization of public consciousness, defined by the state program "Looking into the future: modernization of public consciousness".
A 4.1	To develop students' ability to independently assess the essence and social purpose of state-legal phenomena, to creatively approach all state-legal problems of our time. Lays the foundation of a common legal and anti-corruption culture, forms a high legal awareness among students in the conditions of the development of the rule of law and civil society
Ц 4.2	Education of Kazakhstani patriotism, formation of students' worldview, improvement of public and individual legal awareness and legal culture, acting as necessary conditions for improving legal statehood in the Republic of Kazakhstan
12	**Learning results**

Code	*EP Description*	Aim codes
CC21	**To able to** demonstrate knowledge of the main periods of the formation of independent Kazakh statehood; **correlate** phenomena and events of the historical past with the general paradigm of the world historical development of human society through critical analysis; **master** the techniques of historical description and analysis of causes and consequences of events in the modern history of Kazakhstan; **offer** possible solutions to modern problems based on the analysis of the historical past and reasoned information; **analyze** the features and significance of the modern Kazakh model of development; to determine the practical potential of intercultural dialogue and respect for spiritual heritage; **to substantiate** the fundamental role of historical knowledge in the formation of Kazakhstan's identity and patriotism; **to form** their own civic position on the priorities of mutual understanding, tolerance and democratic values of modern society.	A1
CC22	Can **describe** the main content of ontology and metaphysics in the context of the historical development of philosophy; explain the specifics of philosophical understanding of reality; **substantiate** the worldview as a product of philosophical understanding and study of the natural and social world; classify methods of scientific and	A2.1 A2.2

	philosophical cognition of the world; **interpret** the content and specific features of the mythological, religious and scientific worldview; **substantiate** the role and significance of key worldview concepts as values of social and personal human existence in the modern world; **analyze** the philosophical aspect of media texts, socio-cultural and personal situations to justify and make ethical decisions; **formulate** and competently **argue** their own moral position in relation to the current problems of modern global society; **conduct** research relevant to identify the philosophical content of problems in the professional field and present the results for discussion.	
	able to explain and interpret subject knowledge (concepts, ideas, theories) in all fields of sciences that form the academic disciplines of the module (sociology, political science, cultural studies, psychology); **explain** the socio-ethical values of society as a product of integration processes in the systems of basic knowledge of the disciplines of the socio-political module; algorithmically represent the use of scientific methods and research techniques in the context of a specific academic discipline and in the procedures of interaction of the disciplines of the module; to explain the nature of situations in various spheres of social communication based on the content of theories and ideas of scientific fields of the studied disciplines; **to provide** reasoned and reasonable information about the various stages of development of Kazakh society, political programs, culture, language, social and interpersonal relations; to analyze the features of social, political, cultural, psychological institutions in the context of their role in the modernization of Kazakh society; **to analyze** different situations in different spheres of communication from the standpoint of correlation with the system of values, social, business, cultural, legal and ethical norms of Kazakhstan society; **to distinguish** strategies of different types of research of society and justify the choice of methodology for analyzing specific problems; to assess the specific situation of relations in society from the standpoint of a particular science of socio-humanitarian type, to design prospects for its development taking into account possible risks; **develop** programs for resolving conflict situations in society, including in professional society; **carry out** research and project activities in various fields of communication, generate socially valuable knowledge, present it; correctly **express** and **argue** their own opinion on issues of social significance.	A 3.1 A 3.2
CC23	**to work** on raising the level of moral and legal culture; **to use** spiritual and moral mechanisms to prevent corruption; **to analyze** situations of conflict of interests and moral choice, **to improve** the anti-corruption culture;	A 4.1 A 4.2
13	**Teaching methods**	
	The overall Learning results will be achieved through the following training activities: 1) classroom classes: lectures, seminars (practical) - are conducted taking into account innovative teaching technologies, using the latest achievements of science, technology, information systems and in an interactive form; 2) extracurricular activities: independent work of the student (IWS), including under the guidance of a teacher (IWST), individual consultations;	
14	**Training methods and technologies**	
	Methods and learning technologies used in the process of implementing the module: 1) student-centered learning based on a reflexive approach to learning from the learner; 2) competence-based learning; 3) role-playing games and educational discussions of various formats; 4) case studies; 5) project method.	
15	**Evaluation methods (evaluation criteria)**	
	The final grade for the discipline includes an assessment of current performance and final control (examination grade). The share of assessment of current performance is 60% in the final assessment. Assessment of final control is 40% of the final assessment of knowledge in the discipline. The assessment of current performance is made up of the average value of the scores of the 1st and 2nd tolerance rating (TR 1 and TR 2), each of which is rated at a maximum of 100 points. The current monitoring of progress - a systematic check of the student's educational achievements on each topic of the academic discipline, conducted by the teacher conducting the training lesson. The current control is carried out in the form of checking lecture notes, fulfilling tasks of self-regulatory organizations, examinations, practical and laboratory works, etc. The final grade for the discipline as a percentage is determined by the following formula:	

	T% = ((TR 1+ TR 2) / 2) x 0.6 + E x 0.4 where: TR 1 - the percentage content of the assessment of the 1st admission rating; TR 2 - the percentage content of the assessment of the 2nd admission rating; E - the percentage of the examination grade. The current and two major controls (LC1 and LC2) take into account: 1. Activity of work in the audience, i.e., in the classes, which can be held in the form of case studies, role-playing games, brainstorming, disputes, round tables; 2. Timeliness of written work; 3. Examinations, surveys, reports, essays, mini-tests, research work; 3. Group project, presentation; Final control - passing an exam in a discipline that can pass in the form of comprehensive testing, oral or written answer on tickets.	
16	**Literature**	

Main:

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2. Қазақстан (Қазақ елі) тарихы. – 4 кітаптан тұратын оқулық. Тәуелсіз Қазақстан: алғышарттары және қалыптасуы. 4 кітап/ Т.Омарбеков, Б.С.Сайлан, А.Ш.Алтаев және т.б.. – Алматы, Қазақ университеті, 2016. – 264 с.
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14. Барлыбаева Г.Г. «Эволюция этических идей в казахской философии». – Алматы, 2011.
15. Зотов А.Ф. «Современная Западная философия».– М.: Высшая школа, 2012.
16. Антикоррупционная политика: учебное пособие / под ред. Г. А. Сатарова. – М., 2014. – 368 с
17. Дулатбеков Н. О.и др. Основы государства и права современного Казахстана. Учебное пособие. Астана: Фолиант, 2015.

A: INFORMATION FOR ADMINISTRATION			
1	**Module code**	**MFV 07**	
2	**Module name**	**Physical education module** Physical education - 8 ECTS	
3	**Module developers**	Kaziev A.Kh.	
4	**The faculty-module owner**	Basic faculty	
5	**Other faculties involved in the module implementation**	Faculty	% of participating
		Basic faculty	100
6	**Module mustering duration**	1,2,3,4 semester	
7	**Language of teaching and assessment**	russian, kazakh	
8	**Number of academic credits**	8 credits	
9	**Module prerequisites**	Secondary education program	
B. DETAILED INFORMATION ABOUT TRAINING AND TEACHING			
10	**Module description**		
The module is aimed at studying the general educational disciplines "Physical culture" providing			

physical training in accordance with world standards in the field of education. The module defines the joint cooperation of a teacher and a student in the process of physical education throughout the entire course of training in the context of the requirements for the level of mastering the discipline. Being an integral part of the general culture and professional training of the student during the period of study, physical education is an obligatory section in the humanitarian component of education, the significance of which is manifested through the harmonization of spiritual and physical forces, the formation of such universal values as health, physical and mental well-being, physical perfection.		
11	**Module aims**	
A1	Formation of social and personal competencies of students and the ability to purposefully use the means and methods of physical culture, ensuring the preservation, strengthening of health for preparation for professional activity; to persistent transfer of physical exertion, neuropsychic stress and unfavorable factors in future labor activity.	
12	**Learning results**	
Code	*EP Description*	Aim codes
CC24	personal: readiness and ability for self-development and personal self-determination, readiness to independently use the skills of professional adaptive physical culture in work and life situations.	A1
CC25	interdisciplinary: the ability to use concepts and universal educational actions (regulatory, cognitive, communicative) in cognitive, sports, physical culture, wellness and social practice; readiness and ability to independent information and cognitive activity;	A1
CC26	formation of skills of participation in various types of competitive activities.	A1
13	**Teaching methods**	
	The overall learning results will be achieved through the following training activities: 1) classroom classes: lectures, seminars (practical) - are conducted taking into account innovative teaching technologies, using the latest achievements of science, technology, information systems and in an interactive form; 2) extracurricular activities: independent work of the student (IWS), including under the guidance of a teacher (IWST), individual consultations;	
14	**Training methods and technologies**	
	Methods and learning technologies used in the process of implementing the module: 1) student-centered learning based on a reflexive approach to learning from the learner; 2) competence-based learning; 3) role-playing games and educational discussions of various formats; 4) case studies; 5) project method.	
15	**Evaluation methods (evaluation criteria)**	
	The final grade for the discipline includes an assessment of current performance and final control (examination grade). The share of assessment of current performance is 60% in the final assessment. Assessment of final control is 40% of the final assessment of knowledge in the discipline. The assessment of current performance is made up of the average value of the scores of the 1st and 2nd tolerance rating (TR 1 and TR 2), each of which is rated at a maximum of 100 points. The current monitoring of progress - a systematic check of the student's educational achievements on each topic of the academic discipline, conducted by the teacher conducting the training lesson. The current control is carried out in the form of checking lecture notes, fulfilling tasks of self-regulatory organizations, examinations, practical and laboratory works, etc. The final grade for the discipline as a percentage is determined by the following formula. $T\% = ((TR\ 1 + TR\ 2) / 2) \times 0.6 + E \times 0.4$ where: TR 1 - the percentage content of the assessment of the 1st admission rating; TR 2 - the percentage content of the assessment of the 2nd admission rating, E - the percentage of the examination grade. The current and two major controls (LC1 and LC2) take into account: 1. Activity of work in the audience, i.e., in the classes, which can be held in the form of case studies, role-playing games, brainstorming, disputes, round tables; 2. Timeliness of written work; 3. Examinations, surveys, reports, essays, mini-tests, research work; 3. Group project, presentation;	

	Final control - passing an exam in a discipline that can pass in the form of comprehensive testing, oral or written answer on tickets.
16	**Literature**
Main: 1. Бароненко В.А. «Здоровье и физическая культура студента»: Учебное пособие / В.А. Бароненко. - М.: Альфа-М, ИНФРА-М, 2012. 2. Евсеев Ю.И. «Физическая культура»: Учебное пособие / Ю.И. Евсеев. - Рн/Д: Феникс, 2012. 3. Виленский М.Я. «Физическая культура и здоровый образ жизни студента»: Учебное пособие / М.Я. Виленский, А.Г. Горшков. - М.: КноРус, 2013. 4. Кобяков Ю.П. «Физическая культура. Основы здорового образа жизни»: Учебное пособие / Ю.П. Кобяков. - Рн/Д: Феникс, 2012. - 252 с. 5. Мельников П.П. «Физическая культура и здоровый образ жизни студента (для бакалавров)» / П.П. Мельников. - М.: КноРус, 2013.	

A: INFORMATION FOR ADMINISTRATION			
1	**Module code**	**MICT 08**	
2	**Module name**	**MODULE OF INFORMATION AND COMMUNICATION TECHNOLOGIES** Information and Communication Technologies (in English) – 5 ECTS	
3	**Module developers**	Abdigalieva A.N.	
4	**The faculty-module owner**	Faculty of information technology	
5	**Other faculty involved in the module implementation**	Faculty	% of participating
		Information technologies	100
6	**Module mustering duration**	1 semester	
7	**Language of teaching and assessment**	english	
8	**Number of academic credits**	5 credits	
9	**Module prerequisites**	Mathematics, Physics, Secondary education program (Computer science)	
B. DETAILED INFORMATION ABOUT TRAINING AND TEACHING			
10	**Module description**		
The IT module is aimed at a new format for studying modern information and communication technologies in the era of digital globalization, the formation of new "digital" thinking, the acquisition of knowledge and skills in the use of modern information and communication technologies in various activities, at the development of theory, methods and technologies in the field of management and development of the IT infrastructure of organizations of various profiles and sizes, as well as obtaining practical skills in effective work and modernization of IT infrastructure.			
11	**Module aims**		
A1	Formation of the ability to critically evaluate and analyze processes, methods of searching, storing and processing information, methods of collecting and transmitting information through digital technologies.		
A2	Formation of students' knowledge of the basics of digital technology, design methods and minimization of logical functions.		
A3	Teaching students the basics of theory and practice of information infrastructure management, the formation of theoretical knowledge and practical skills about modern trends in the formation of enterprise development, about their driving forces, about the versatility of the impact of information and telecommunication technologies on the architecture of an enterprise, about the organizational and legislative aspects of building organizational, management and information systems of the enterprise, about the methods of strategic planning.		
12	**Learning results**		
Code	*EP Description*		Aim codes
CC27	**Able to** use information Internet resources, cloud and mobile services for the search, storage, processing and dissemination of information; Able to use software and hardware of computer systems and networks for collecting, transmitting, processing and storing		A1

	data;	
CC28	Can **carry out** project activities in the specialty using modern information and communication technologies.	A2
CC29	**Able to** explain the purpose, content and development trends of information and communication technologies, justify the choice of the most appropriate technology for solving specific problems; **know** and **apply** methods of collecting, storing and processing information, methods of implementing information and communication processes using digital technologies; **develop** analysis and data management tools for various activities using digital technologies.	A3
CC30	**Know** the components of the IT infrastructure of various profiles and scales; structure, composition of IT infrastructure; methodology for building and managing IT infrastructure; basic standards in the field of development and maintenance of IT infrastructure; methods of organizing the maintenance and operation of the IT infrastructure component.	A3
13	**Teaching methods**	
	The overall learning results will be achieved through the following training activities: 1) classroom classes: lectures, seminars (practical) - are conducted taking into account innovative teaching technologies, using the latest achievements of science, technology, information systems and in an interactive form; 2) extracurricular activities: independent work of the student (IWS), including under the guidance of a teacher (IWST), individual consultations;	
14	**Training methods and technologies**	
	Methods and learning technologies used in the process of implementing the module: 1) student-centered learning based on a reflexive approach to learning from the learner; 2) competence-based learning; 3) role-playing games and educational discussions of various formats; 4) case studies; 5) project method.	
15	**Evaluation methods (evaluation criteria)**	
	The final grade for the discipline includes an assessment of current performance and final control (examination grade). The share of assessment of current performance is 60% in the final assessment. Assessment of final control is 40% of the final assessment of knowledge in the discipline. The assessment of current performance is made up of the average value of the scores of the 1st and 2nd tolerance rating (TR 1 and TR 2), each of which is rated at a maximum of 100 points. The current monitoring of progress - a systematic check of the student's educational achievements on each topic of the academic discipline, conducted by the teacher conducting the training lesson. The current control is carried out in the form of checking lecture notes, fulfilling tasks of self-regulatory organizations, examinations, practical and laboratory works, etc. The final grade for the discipline as a percentage is determined by the following formula: $T\% = ((TR\ 1 + TR\ 2) / 2) \times 0.6 + E \times 0.4$ where: TR 1 - the percentage content of the assessment of the 1st admission rating; TR 2 - the percentage content of the assessment of the 2nd admission rating; E - the percentage of the examination grade. The current and two major controls (LC1 and LC2) take into account: 1. Activity of work in the audience, i.e., in the classes, which can be held in the form of case studies, role-playing games, brainstorming, disputes, round tables; 2. Timeliness of written work; 3. Examinations, surveys, reports, essays, mini-tests, research work; 3. Group project, presentation; Final control - passing an exam in a discipline that can pass in the form of comprehensive testing, oral or written answer on tickets.	
16	**Literature**	
Main: 1. Shynybekov D.A., Uskenbayeva R.K., Serbin V.V., Duzbayev N.T., Moldagulova A.N., Duisebekova K.S., Satybaldiyeva R.Z., Hasanova G.I., Urmashev B.A. Information and communication technologies. Textbook: in 2 parts. Part 1, 1st ed. - Almaty: IITU, 2017. - 588 p., ISBN 978-601-7911-03-4 (A textbook in English with the stamp of the Ministry of Education and Science of the Republic of		

Kazakhstan)
ИТСервис-менеджмент, введение.
2. Shynybekov D.A., Uskenbayeva R.K., Serbin V.V., Duzbayev N.T., Moldagulova A.N., Duisebekova K.S., Satybaldiyeva R.Z., Hasanova G.I., Urmashev B.A. Information and communication technologies. Textbook: in 2 parts. Part 1, 1st ed. - Almaty: IITU, 2017. - 588 p., ISBN 978-601-7911-04-1 (A textbook in English with the stamp of the Ministry of Education and Science of the Republic of Kazakhstan).
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4. Lorenzo Cantoni (University of Lugano, Switzerland), James A. Danowski (University of Illinois at Chicago, IL, USA) Communication and Technology, 576 p.
5. Нурпеисова Т.Б., Кайдаш И.Н. ИКТ. Учебное пособие / Алматы, изд-во Бастау, 2017, 183 с.
6. Nurpeisova T.B., Kaidash I.N. ICT, Almaty, Bastau, 2017. 241 p.
7. Васильев Р.Б., Калянов Г.Н., Лёвочкина Г.А. Управление развитием информационных систем. - М.: Горячая линия-Телеком, 2009.

Additional :

1. Brynjolfsson, E. and A. Saunders (2010). Wired for Innovation: How Information Technology Is Reshaping the Economy. Cambridge, MA: MIT Press.
2. Вилкинсон П., Джонсон Б. Управление ITSM-проектами от лукавого; Пер. с англ. - М.: Лайвбук, 2012.
3. Зайцев Геннадий Григорьевич Управление человеческими ресурсами [Текст] : учебник для студентов высших учебных заведений, обучающихся по направлению подготовки "Менеджмент" (квалификация (степень) "бакалавр") / Г. Г. Зайцев, Г. В. Черкасская, М. Л. Бадхен. - Москва: Академия, 2014. – 304с.
4. А.Н. Бирюков Лекции о процессах управления информационными технологиями, М.: Бином, 2010.
5. Черкешов Ж., Ақшуақова Т., Орынбаев Қ. Мұнай және газ кенорындарын пайдалану. 1-кітап. – Алматы, «Эверо» баспасы, 2013. -152 б.

A: INFORMATION FOR ADMINISTRATION			
1	**Module code**	**M BK(m) 09**	
2	**Module name**	**MODULE "BASIC KNOWLEDGE (MINIMUM)"** 1) Theoretical foundations of eectrical engineering 1-5 ECTS 2) Theoretical foundations of electrical engineering 2-5 ECTS 3) Electronics and digital design - 5 ECTS 4) Elements and devices of automation - 5 ECTS 5) Introduction to signal theory - 5 ECTS	
3	**Module developers**	F.A. Hajiyev, Shabdirov D.N.	
4	**The faculty-module owner**	Faculty of information technology	
5	**Other faculty involved in the module implementation**	Faculty	% of participating
		Information technologies	100
6	**Module mustering duration**	3, 4, 5 semester	
7	**Language of teaching and assessment**	russian, kazakh	
8	**Number of academic credits**	25 credits	
9	**Module prerequisites**	Matanalysis-1, Matanalysis-2, Linear algebra, Discrete structures, Differential equations, Matanalysis of a complex variable, Physics-1, Physics-2	
B. DETAILED INFORMATION ABOUT TRAINING AND TEACHING			
10	**Module description**		
11	**Module aims**		
A1	Acquisition of the necessary knowledge and skills by students, methods of analysis of AC and DC circuits, the basic concepts of building automated systems		

A2	Study of the foundations of the basic concepts and laws of the electromagnetic field and the theory of electrical and magnetic circuits	
A3	To give objective knowledge about modern control methods and means of automation, tasks and ways of improving methods and means of controlling mechatronic objects	
12	**Learning results**	
Code	*EP Description*	Aim codes
CC31	Able to describe the essence of physical processes in the simplest electrical, electronic and magnetic circuits and electromagnetic fields; block diagram of the regulator;	A1
CC32	knows how to collect, process, systematize and transfer the output information of the systems of automated processes.	A2
CC33	Apply deep natural-scientific, mathematical knowledge in the field of analysis, synthesis and design for solving scientific and engineering problems of production and operation of technical devices and systems, including their control systems.	A2
CC34	Able to plan and implement analytical, simulation and experimental studies for the design, production and operation of technical means and systems using advanced domestic and foreign experience, be able to critically evaluate the theoretical and experimental data and draw conclusions, plan future activities in the professional sphere.	A3
13	**Teaching methods**	
	The overall learning results will be achieved through the following training activities: 1) classroom classes: lectures, seminars (practical) - are conducted taking into account innovative teaching technologies, using the latest achievements of science, technology, information systems and in an interactive form; 2) extracurricular activities: independent work of the student (IWS), including under the guidance of a teacher (IWST), individual consultations;	
14	**Training methods and technologies**	
	Methods and learning technologies used in the process of implementing the module: 1) student-centered learning based on a reflexive approach to learning from the learner; 2) competence-based learning; 3) role-playing games and educational discussions of various formats; 4) case studies; 5) project method.	
15	**Evaluation methods (evaluation criteria)**	
	The final grade for the discipline includes an assessment of current performance and final control (examination grade). The share of assessment of current performance is 60% in the final assessment. Assessment of final control is 40% of the final assessment of knowledge in the discipline. The assessment of current performance is made up of the average value of the scores of the 1st and 2nd tolerance rating (TR 1 and TR 2), each of which is rated at a maximum of 100 points. The current monitoring of progress - a systematic check of the student's educational achievements on each topic of the academic discipline, conducted by the teacher conducting the training lesson. The current control is carried out in the form of checking lecture notes, fulfilling tasks of self-regulatory organizations, examinations, practical and laboratory works, etc. The final grade for the discipline as a percentage is determined by the following formula: $T\% = ((TR\ 1 + TR\ 2) / 2) \times 0.6 + E \times 0.4$ where: TR 1 - the percentage content of the assessment of the 1st admission rating; TR 2 - the percentage content of the assessment of the 2nd admission rating; E - the percentage of the examination grade. The current and two major controls (LC1 and LC2) take into account: 1. Activity of work in the audience, i.e., in the classes, which can be held in the form of case studies, role-playing games, brainstorming, disputes, round tables; 2. Timeliness of written work; 3. Examinations, surveys, reports, essays, mini-tests, research work; 3. Group project, presentation; Final control - passing an exam in a discipline that can pass in the form of comprehensive testing, oral or written answer on tickets.	

16	Literature

Main:

1. Бессонов Л.А. Теоретические основы электротехники: Электрические цепи: Учебник для обучающихся электротехнических, энергетических и приборостроительных специальностей вузов.–7-е изд., перераб. и доп.– М.: Высш. школа, 2008. – 528 с.
2. Бессонов Л.А. Теоретические основы электротехники: Электромагнитное поле: Учебник для обучающихся вузов.–7-е изд., перераб. и доп.– М.: Высш. школа, 2008. – 231 с.
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5. Теоретические основы электротехники. Учебник для вузов. Том I / Демирчян К.С., Нейман Л.Р., Коровкин Н.В. С.-Пб., Питер Пресс. 2009.
6. 21. Теоретические основы электротехники. Учебник для вузов. Том II / Демирчян К.С., Нейман Л.Р., Коровкин Н.В. С.-Пб., Питер Пресс. 2009.
6. Щербина Ю.В. Технические средства автоматизации: учеб. пособие. – М.: Изд-во МГУП, 2008.
7. Елизаров Е.А. Технические средства автоматизации. Программнотехнические комплексы, контроллеры: Учеб. пособие / Е.А. Елизаров, Ю.Ф. Мартемьянов, А.Г. Схиртладзе, С.В. Фролов. – М.: Машиностроение, 2014.
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Additional

1. Теоретические основы электротехники. В 3-х ч. – Ч. I. Атабеков Г.И. Линейные электрические цепи: Учебник для вузов. – 5-е изд., испр. и доп. – М.: Энергия, 2008. – 592 с.
2. Федорченко А. А. Электротехника с основами электроники: учеб. для учащ. проф. училищ, лицеев и студ. колледжей / А. А. Федорченко, Ю. Г. Синдеев. - 2-е изд. - М.: Дашков и К°, 2010. - 415 с.
3. Куликов Д.Д, Падун Б.С. Интеллектуальные программные комплексы для технической и технологической подготовки производства. Часть 6. Системы анализа и моделирования технологической подготовки производства: Учебно-методическое пособие. - СПб.: НИУ ИТМО, 2011. - 124 с.

4.Петров И.В. Программируемые контроллеры. Стандартные языки и приемы прикладного проектирования. /Под ред. Проф, В.П. Дьяконова. – М.: Солон-Пресс, 2014. – 256 с.

5. Радкевич Я.М. и др. Метрология, стандартизация и сертификация: Учеб. для вузов. – М.: Высш. школа, 2009.

A:	INFORMATION FOR ADMINISTRATION		
1	**Module code**	**M PK(m) 10**	
2	**Module name**	**Module "Professional knowledge (minimum)"** 1) Introduction to linear and nonlinear control systems - 6ECTS 2) Automation of standard technological processes - 6ECTS 3) Introduction to microcontrollers and microprocessor systems - 5ECTS 4) Theoretical mechanics - 5 ECTS	
3	**Module developers**	Shabdirov D.N.	
4	**The faculty-module owner**	Faculty of information technology	
5	**Other faculty involved in the module implementation**	Faculty	% of participating
		Information technologies	100
6	**Module mustering duration**	5, 6 semester	
7	**Language of teaching and assessment**	Kazakh, russian, english	
8	**Number of academic credits**	22 credits	
9	**Module prerequisites**	Matanalysis-1,2, Linear algebra, Discrete structures, Differential equations, Matanalysis of a complex variable, Physics-1, 2, Theoretical foundations of electrical engineering-1,2, Electronics and digital design	

B. DETAILED INFORMATION ABOUT TRAINING AND TEACHING		
10	**Module description**	
11	**Module aims**	
A1	**To give** knowledge about the basic schemes and principles of control, knowledge and skills of the mathematical description of linear, nonlinear objects and control systems. To teach the features of the study of both continuous and discrete technical systems and control objects.	
	Acquaintance of students with the methods and stages of design and construction of an automated process control system using the example of the oil and gas industry, training students with a modern method of developing supporting parts and subsystems of an automated control system.	
A2	**Study of** a complex of technical means of automation, principles of construction and modern methods of designing microprocessor and microcontroller systems; architecture of modern microprocessors and microcontrollers; basic schemes for switching on and testing MPS; programming of microprocessors and microcontrollers, study of architecture and composition of typical series of industrial controllers; the principle of operation of industrial controllers; tasks solved by industrial controllers in automated process control systems.	
	Acquaintance of students with the basics of theoretical mechanics related to automation; Study of executive mechanisms: mechanical, pneumatic and hydraulic effects on automation elements.	
A3	**To give** knowledge about the basic schemes and principles of control, knowledge and skills of the mathematical description of linear, nonlinear objects and control systems. To teach the features of the study of both continuous and discrete technical systems and control objects.	
A4	**Acquaintance** of students with the methods and stages of design and construction of an automated process control system using the example of the oil and gas industry, training students with a modern method of developing supporting parts and subsystems of an automated control system.	
12	**Learning results**	
Code	*EP Description*	Aim codes
CC35	**Able to** apply mathematical methods to analyze the general properties of linear, nonlinear systems, on this basis, master the methods of analysis and synthesis of automatic control, **demonstrate** knowledge of modeling, offer possible solutions to modern automation problems based on the analysis of continuous and discrete systems.	A1
CC36	**Able to** make a choice of controllers according to the requirements for an automated technological process; **determine** the structure and make a choice of means for interfacing the controller with measuring sensors and actuators.	A2,4
CC37	**Able to** plan and implement analytical, simulation and experimental studies for the design, production and operation of technical means and systems using advanced domestic and foreign experience, be able to critically evaluate the theoretical and experimental data and draw conclusions, plan future activities in the professional sphere.	A3
CC38	**Able to** plan and implement mechanical, pneumatic and hydraulic effects on the actuators of structural automation schemes and be able to critically evaluate the theoretical and experimental data obtained and draw conclusions.	A3
13	**Teaching methods**	
	The overall learning results will be achieved through the following training activities: 1) classroom classes: lectures, seminars (practical) are conducted taking into account innovative teaching technologies, using the latest achievements of science, technology, information systems and in an interactive form; 2) extracurricular activities: independent work of the student (IWS), including under the guidance of a teacher (IWST), individual consultations;	
14	**Training methods and technologies**	
	Methods and learning technologies used in the process of implementing the module: 1) student-centered learning based on a reflexive approach to learning from the learner; 2) competence-based learning; 3) role-playing games and educational discussions of various formats; 4) case studies; 5) project method.	
15	**Evaluation methods (evaluation criteria)**	
	The final grade for the discipline includes an assessment of current performance and final control (examination grade). The share of assessment of current performance is 60% in the final assessment. Assessment of final control is 40% of the final assessment of knowledge in the	

	discipline. The assessment of current performance is made up of the average value of the scores of the 1st and 2nd tolerance rating (TR 1 and TR 2), each of which is rated at a maximum of 100 points. The current monitoring of progress - a systematic check of the student's educational achievements on each topic of the academic discipline, conducted by the teacher conducting the training lesson. The current control is carried out in the form of checking lecture notes, fulfilling tasks of self-regulatory organizations, examinations, practical and laboratory works, etc. The final grade for the discipline as a percentage is determined by the following formula: T% = ((TR 1+ TR 2) / 2) x 0.6 + E x 0.4 where: TR 1 - the percentage content of the assessment of the 1st admission rating; TR 2 - the percentage content of the assessment of the 2nd admission rating; E - the percentage of the examination grade. The current and two major controls (LC1 and LC2) take into account: 1. Activity of work in the audience, i.e., in the classes, which can be held in the form of case studies, role-playing games, brainstorming, disputes, round tables; 2. Timeliness of written work; 3. Examinations, surveys, reports, essays, mini-tests, research work; 3. Group project, presentation; Final control - passing an exam in a discipline that can pass in the form of comprehensive testing, oral or written answer on tickets.
16	**Literature**

Main:

1. Ицкович Э.Л. Перспективная автоматизация агрегатов предприятий технологических отраслей. — М.: Горячая линия - Телеком, 2018. — 544 с.
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5. В.А. Бесекерский, Е.П. Попов. Теория систем автоматического управления. С-П., Профессия., 2013г. – 752с.
6. Ротач В.Я. Теория автоматического управления: учебник для вузов. М.: Издательский дом МЭИ, 2009. – 400 с.
7. Теория автоматического управления. Часть 1. /Воронов А.А. - М.:, 2016. – 277с.
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10. Лазарев Ю. Моделирование процессов и систем в Matlab. Учебный курс. – СПб.: Питер, 2008. – 512с.
11. Лурье Б.Я., Энрайт П.Д. Классические методы автоматического управления. – СПб: БХВ – Петербург, 2014.-628с.
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13. Имаев Д.Х., Красношпорина А.А., Яковлев В.Б. Теория автоматического управления. Часть 2. Нелинейные, импульсные и стохастические системы автоматического управления. Киев: Выща школа. 2009.
14. Крестин, Е. А. Примеры решения задач по гидравлике , 2006. – 101 с. : ил.,табл., схем. – Режим доступа: по подписке. – URL: https://biblioclub.ru/index.php?page=book&id=143485 (дата обращения: 01.07.2021). – Библиогр.: с. 100. – ISBN 5-9585-0055-4.
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Additional :

1. O.I.Shiryaeva. Linear control systems(using MatLab): Textbook-Almaty, 2016y.
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A: INFORMATION FOR ADMINISTRATION			
1	**Module code**	M ME 11	
	Trajectory code	MABD 11.1	
2	**Module name**	**MODULE ANALYSIS OF BIG DATA** 1) Intelligent data analysis- 5ECTS 2) Advanced statistics course - 5ECTS 3) Machine learning - 5ECTS 4) Data storage and analysis - 5ECTS 5) Deep learning - 5ECTS 6) Big data analysis workshop - 5ECTS	
3	**Module developers**	F.A. Hajiyev, Shabdirov D.N.	
4	**The faculty-module owner**	Faculty of information technology	
5	**Other faculty involved in the module implementation**	Faculty	% of participating
		Information technologies	100
	Module mustering duration		
6		4, 5, 6, 7, 8 semester	
7	**Language of teaching and assessment**	russian, kazakh, english	
8	**Number of academic credits**	30 credits	
9	**Module prerequisites**	Mathematical analysis-1,2, Linear algebra, Discrete structures, Differential equations, Mathematical analysis of a complex variable, Physics-1, 2, Theoretical foundations of electrical engineering-1,2, Electronics and digital design, Information and communication technologies	

B. DETAILED INFORMATION ABOUT TRAINING AND TEACHING	
10	**Module description**

Today the world is gradually moving from the information age to the knowledge age. The IT industry, in order to analyze the growing volume of data generated in all areas of modern society, raises the problem of Big Data, and the academic community forms Data Science.

The labor market is in demand for specialists who can work in the field of analysis of multidimensional data of a complex structure. Organizations have accumulated huge amounts of data, many of which are poorly structured. Their processing and analysis becomes more and more relevant as business processes accelerate, the price of a timely and correctly made decision rises. More and more available for analysis personal and personal data posted on the Internet, especially in the form of "social networks".

The classical scheme of training analysts does not correspond to these challenges, since it does not systematically cover additional tasks of data processing and analysis, including unstructured data of large volumes. At the same time, there is an obvious shortage of specialists who are ready to systematically approach the solution of problems related specifically to the methodology for processing data of different types and types, streamlining access to data warehouses, restructuring the storage structure, the efficiency of processing processes, analyzing big data (requiring a reduction in dimension, special schemes for conducting statistical experiments, approximate methods, efficient algorithms), etc. The deficit is exacerbated with the development of related technologies: 3D printing, augmented reality, cloud computing, smart environment, etc.

The **BigDataAnalytics** track provides training in the field of modern methods of extracting knowledge from data, mathematical modeling and forecasting methods, modern software systems and programming methods for data analysis..

11	**Module aims**
A 1	**To master** the technologies for developing databases and protecting information, studying the principles of construction and the field of application of intelligent systems, data transmission systems. Active use of mathematical methods, such as optimization, genetic algorithms, pattern recognition, statistics, data mining, etc., as well as using visual presentation of information.
A2	**To study** of statistical patterns, the identification of which is aimed at data analysis;

	drawing the boundary between data analysis and mathematical statistics, which is also designed to search for statistical patterns; to consider some aspects of data analysis.
A 3	**Develop, improve** the skills of independent work, master the methodology for substantiating design solutions for building an information base, technologies for collecting, processing and issuing information, designing software and conducting scientific research;

12	**Learning results**	
Code	*EP Description*	Aim codes
CC-39	Mastering the technologies for developing databases and protecting information, studying the principles of construction and the field of application of intelligent systems, data transmission systems.	A1
CC-40	Formation of knowledge and skills of administration of data transmission systems and networks.	A2
CC-41	Forms the skills and abilities of future specialists: - a technical solution for the collection, storage and processing of large amounts of data, indicated in the diagram as Big Data Tools. - advanced data analysis using data science methods and machine learning algorithms - visualization of big data, as well as the creation of interactive reports for company management, employees and customers (Business Intelligence).	A3
CC-42	Able to substantiate the relevance and importance of the problem of information support of the design object in a given subject area;	A3

13	**Teaching methods**
	The overall learning results will be achieved through the following training activities: 1) classroom classes: lectures, seminars (practical) - are conducted taking into account innovative teaching technologies, using the latest achievements of science, technology, information systems and in an interactive form; 2) extracurricular activities: independent work of the student (IWS), including under the guidance of a teacher (IWST), individual consultations;
14	**Training methods and technologies**
	Methods and learning technologies used in the process of implementing the module: 1) student-centered learning based on a reflexive approach to learning from the learner; 2) competence-based learning; 3) role-playing games and educational discussions of various formats; 4) case studies; 5) project method.
15	**Evaluation methods (evaluation criteria)**
	The final grade for the discipline includes an assessment of current performance and final control (examination grade). The share of assessment of current performance is 60% in the final assessment. Assessment of final control is 40% of the final assessment of knowledge in the discipline. The assessment of current performance is made up of the average value of the scores of the 1st and 2nd tolerance rating (TR 1 and TR 2), each of which is rated at a maximum of 100 points. The current monitoring of progress - a systematic check of the student's educational achievements on each topic of the academic discipline, conducted by the teacher conducting the training lesson. The current control is carried out in the form of checking lecture notes, fulfilling tasks of self-regulatory organizations, examinations, practical and laboratory works, etc. The final grade for the discipline as a percentage is determined by the following formula: $T\% = ((TR\ 1 + TR\ 2) / 2) \times 0.6 + E \times 0.4$ where: TR 1 - the percentage content of the assessment of the 1st admission rating; TR 2 - the percentage content of the assessment of the 2nd admission rating; E - the percentage of the examination grade. The current and two major controls (LC1 and LC2) take into account: 1. Activity of work in the audience, i.e., in the classes, which can be held in the form of case studies, role-playing games, brainstorming, disputes, round tables; 2. Timeliness of written work; 3. Examinations, surveys, reports, essays, mini-tests, research work;

	3. Group project, presentation; Final control - passing an exam in a discipline that can pass in the form of comprehensive testing, oral or written answer on tickets.
16	**Literature**

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A: INFORMATION FOR ADMINISTRATION			
1	**Module code**	M ME 11	
	Trajectory code	MK 11.2	
2	**Module name**	**THE CYBER SECURITY MODULE** 1) Mathematical foundations of information security - 5ECTS 2) Network security - 5ECTS 3) Operating systems and security issues - 5ECTS 4) Ethical hacking and industrial espionage and countermeasures - 5ECTS 5) Security of VEB and mobile applications - 5ECTS 6) Cybersecurity management: enterprise, country and international - 5ECTS	
3	**Module developers**	F.A. Hajiyev, Shabdirov D.N.	
4	**The faculty-module owner**	Faculty of information technology	
5	**Other faculty involved in the module implementation** **Module mustering duration**	**Faculty**	**% of participating**
		Information technologies	100
6		4, 5, 6, 7, 8 semester	
7	**Language of teaching and assessment**	russian, kazakh, english	
8	**Number of academic credits**	30 credits	
9	**Module prerequisites**	Matanalysis-1,2, Linear algebra, Discrete structures, Differential equations, Matanalysis of a complex variable, Physics-1, 2, Theoretical foundations of electrical engineering-1,2, Electronics and digital design, Information and communication technologies	

B. DETAILED INFORMATION ABOUT TRAINING AND TEACHING	
10	**Module description**

Almost from the first days of the emergence of local networks and later on the Internet, the number of threats and attacks on information systems has increased dramatically and continues to grow exponentially. Reports of commercial hacks, data leaks, electronic fraud, disruptions to government or critical infrastructure, intellectual property thefts, and national security-related information leaks are reported on a daily basis.

Since today the functioning of almost all structures almost entirely takes place in cyberspace, the issue of information protection on a country scale is of particular importance! Taking this into account, at the end of 2017, the Ministry of Defense and Aerospace Industry was formed, to which all functions for ensuring information security were transferred.

On the other hand, market demand for cybersecurity specialists exceeds supply by an order of magnitude.

Taking into account the global challenges of the market and despite the presence of a separate educational program "Information Security", FIT AUNG launches the Cybersecurity educational track, available to students of all EP.

11	**Module aims**
A 1	Research of methods for constructing information security systems.
A 2	Study of the theoretical foundations and methods of information protection, the mathematical structure of secret systems.
A 3	Research of mathematical representation of information, methods of analysis of information characteristics and redundancy of language systems.
A 4	Mastering the basic methods and means of information protection.
A 5	Research of the theoretical foundations of correction and restoration of informational characteristics of arbitrary texts.
A 6	Study of methods for analyzing information characteristics and redundancy of language systems

12	**Learning results**	
Code	*EP Description*	Aim codes
CC-43	the ability to understand the theoretical foundations and general principles of using IT security management	A1,2

CC-44	the ability to understand and apply international and professional standards in the field of information technology, the ability to use modern instrumental and computing means in the field of information security	A2,3
CC-45	the ability to develop and implement the processes of the life cycle of information systems, software, services of information technology systems, as well as methods and mechanisms for assessing and analyzing the functioning of information technology tools and systems; ability to develop design and software documentation that meets regulatory requirements	A3,4,5
CC-46	the ability to understand and apply in research and applied activities modern mathematical apparatus, fundamental concepts and systemic methodologies.	A4,5,6
13	**Teaching methods**	
	The overall learning results will be achieved through the following training activities: 1) classroom classes: lectures, seminars (practical) - are conducted taking into account innovative teaching technologies, using the latest achievements of science, technology, information systems and in an interactive form; 2) extracurricular activities: independent work of the student (IWS), including under the guidance of a teacher (IWST), individual consultations;	
14	**Training methods and technologies**	
	Methods and learning technologies used in the process of implementing the module: 1) student-centered learning based on a reflexive approach to learning from the learner; 2) competence-based learning; 3) role-playing games and educational discussions of various formats; 4) case studies; 5) project method.	
15	**Evaluation methods (evaluation criteria)**	
	The final grade for the discipline includes an assessment of current performance and final control (examination grade). The share of assessment of current performance is 60% in the final assessment. Assessment of final control is 40% of the final assessment of knowledge in the discipline. The assessment of current performance is made up of the average value of the scores of the 1st and 2nd tolerance rating (TR 1 and TR 2), each of which is rated at a maximum of 100 points. The current monitoring of progress - a systematic check of the student's educational achievements on each topic of the academic discipline, conducted by the teacher conducting the training lesson. The current control is carried out in the form of checking lecture notes, fulfilling tasks of self-regulatory organizations, examinations, practical and laboratory works, etc. The final grade for the discipline as a percentage is determined by the following formula: $T\% = ((TR\ 1 + TR\ 2) / 2) \times 0.6 + E \times 0.4$ where: TR 1 - the percentage content of the assessment of the 1st admission rating; TR 2 - the percentage content of the assessment of the 2nd admission rating; E - the percentage of the examination grade. The current and two major controls (LC1 and LC2) take into account. 1 Activity of work in the audience, i.e., in the classes, which can be held in the form of case studies, role-playing games, brainstorming, disputes, round tables; 2. Timeliness of written work; 3. Examinations, surveys, reports, essays, mini-tests, research work; 3. Group project, presentation; Final control - passing an exam in a discipline that can pass in the form of comprehensive testing, oral or written answer on tickets.	
16	**Literature**	
1. Ярочкин В.И. Информационная безопасность: учеб. для студентов вузов, обучающихся по гуманитар. и социаль.-эконом. Специальностям/ В.И.Ярочкин.-М.: Гаудеамус: Акад.Проект, 2008. 2. Мельников В.П., Клейменов С.А., Петраков А.М. Информационная безопасность и защита информации: учебное пособие для студентов вузов- 4-е изд., -М.: Изд. центр «Академия», 2009. 3. Башлы П.Н. Информационная безопасность и защита информации: учебное письмо – Москва: Евразийский открытый институт, 2012.- 311с. 4. Малюк А.А. Информационная безопасность: концептуальные и методологические основы защиты информации: учебное пособие.-М.: Горячая линия- Телеком,2004.		

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A: INFORMATION FOR ADMINISTRATION			
1	**Module code**	M ME 11	
	Trajectory code	MKGD 11.3	
2	**Module name**	**MODULE COMPUTER GRAPHICS AND DESIGN** 1) Modeling objects using a polygon surface - 5ECTS 2) 3D Character Modeling - 5ECTS 3) VFX and 3D physics - 5ECTS 4) Filmmaking and Motion Graphics - 5ECTS 5) Augmented and virtual reality - 5ECTS 6) Game development and design - 5ECTS	
3	**Module developers**	Hajiyev F.A., Shabdirov D.N.	
4	**The faculty-module owner**	Faculty of information technology	
5	**Other faculty involved in the module implementation**	Faculty	% of participating
		Information technologies	100
	Module mustering duration		
6		4, 5, 6, 7 semester	
7	**Language of teaching and assessment**	russian, kazakh, english	
8	**Number of academic credits**	30 credits	
9	**Module prerequisites**	Matanalysis-1,2, Linear algebra, Discrete structures, Differential equations, Matanalysis of a complex variable, Physics-1, 2, Theoretical foundations of electrical engineering-1,2, Electronics and digital design, Information and communication technologies	

B. DETAILED INFORMATION ABOUT TRAINING AND TEACHING		
10	**Module description**	
The growing capabilities of modern IT technologies have made them an almost indispensable tool in scientific research, advertising and show business, film and gaming industry. Not a single field of activity can do without design these days. Industrial design, graphic design, interior design, web design, game design, advertising design - there are many options. The statement would probably be correct - it is difficult to find applications where computer graphics in one format or another would not be used. Designers are in-demand specialists in any field of activity. The level of wages depends on qualifications, practical experience and, on average, in Kazakhstan is more than 350 thousand tenge / month. The labor market based on CGI and design specialists is growing with a positive trend. On the other hand, universities have also started to open companies in which students are busy creating videos, films, etc., using computer design methods. The computer games market has grown tremendously, turning into a sports industry. The world's largest brands hold global competitions for students, in which there is always a nomination related in one way or another to computer graphics (for example, MicrosoftImagineCup).		
11	**Module aims**	
A 1	**Study** of the creation of polygonal models; creating volumetric models of objects with precise shapes and clear contours.	
A 2	**Learn** how to build an interesting and readable character silhouette. Learning to work with Zmodeller in the ZBrush program. Learning to develop computer games.	
A 3	**Master** VFX-designer (English Visual Effects Artist) - visual effects artist.	
A 4	**Study** the creation of virtual reality (VR), a computer simulation of reality, or the reproduction of a situation. Mastering technical means (objects and subjects) transmitted to the user through his sensations: sight, hearing, smell, touch, etc.	
12	**Learning results**	
Code	*EP Description*	Aim codes
CC-47	Able to master computer information technologies, to analyze the features of the	A1

	organization and design of systems.	
CC-48	Able to identify the level of informatization of the object under consideration and the definition of the tasks of its development in order to increase the efficiency of the object's functioning;	A2
CC-49	Knows the theory, basic principles of game design and will learn how to work with the popular Unity and Unreal Engine 4 engines	A3
CC-50	Able to do game design programming with a focus on storylines, game structure and rules.	A4

13	**Teaching methods**
	The overall learning results will be achieved through the following training activities: 1) classroom classes: lectures, seminars (practical) - are conducted taking into account innovative teaching technologies, using the latest achievements of science, technology, information systems and in an interactive form; 2) extracurricular activities: independent work of the student (IWS), including under the guidance of a teacher (IWST), individual consultations;
14	**Training methods and technologies**
	Methods and learning technologies used in the process of implementing the module: 1) student-centered learning based on a reflexive approach to learning from the learner; 2) competence-based learning; 3) role-playing games and educational discussions of various formats; 4) case studies; 5) project method.
15	**Evaluation methods (evaluation criteria)**
	The final grade for the discipline includes an assessment of current performance and final control (examination grade). The share of assessment of current performance is 60% in the final assessment. Assessment of final control is 40% of the final assessment of knowledge in the discipline. The assessment of current performance is made up of the average value of the scores of the 1st and 2nd tolerance rating (TR 1 and TR 2), each of which is rated at a maximum of 100 points. The current monitoring of progress - a systematic check of the student's educational achievements on each topic of the academic discipline, conducted by the teacher conducting the training lesson. The current control is carried out in the form of checking lecture notes, fulfilling tasks of self-regulatory organizations, examinations, practical and laboratory works, etc. The final grade for the discipline as a percentage is determined by the following formula: $T\% = ((TR\ 1 + TR\ 2) / 2) \times 0.6 + E \times 0.4$ where: TR 1 - the percentage content of the assessment of the 1st admission rating; TR 2 - the percentage content of the assessment of the 2nd admission rating; E - the percentage of the examination grade. The current and two major controls (LC1 and LC2) take into account: 1. Activity of work in the audience, i.e., in the classes, which can be held in the form of case studies, role-playing games, brainstorming, disputes, round tables; 2. Timeliness of written work; 3. Examinations, surveys, reports, essays, mini-tests, research work; 3. Group project, presentation; Final control - passing an exam in a discipline that can pass in the form of comprehensive testing, oral or written answer on tickets.
16	**Literature**

1. Unity и C#. Геймдев от идеи до реализации. ДжеремиГибсонБонд,2012;
2. The Art of Interactive Design by Chris Crawford, 2002:
3. Chris Crawford on Game Design by Chris Crawford, 2003;
4. Rules of Play: Game Design Fundamentals by Katie Salen, Eric Zimmerman, 2003;
5. Chris Crawford on Interactive Storytelling by Chris Crawford, 2004;
6. Game Design Workshop: A Playcentric Approach to Creating Innovative Games by Tracy Fullerton,2004;
7. A Theory of Fun for Game Design by Raph Koster,2004;
8. Fundamentals of Game Design by Ernest Adams, 2006;
9. Game Feel: A Game Designer's Guide to Virtual Sensation by Steve Swink,2008;
10.The Art of Game Design: A Book of Lenses by Jesse Schell, 2008;

A: INFORMATION FOR ADMINISTRATION			
1	**Module code**	M ME 11	
	Module name	MPDPIT 11.4	
2	**Module developers**	**MODULE DATA COMMUNICATION AND INDUSTRIAL IT** 1) Industrial networks, nodes and interfaces - 5ECTS 2) Internet of yhings and embedded systems - 5ECTS 3) Real time operating systems - 5ECTS 4) Engineering graphics on AutoCad - 5ECTS 5) Server engineering: setting up and configuring servers - 5ECTS 6) SCADA systems and industrial networks - 5ECTS	
3	**The faculty-module owner**	F.A. Hajiyev, D. N. Shabdirov	
4	**Other faculty involved in the module implementation**	Faculty of information technology	
5	**Module mustering duration**	Faculty	% of participating
		Information technologies	100
6	**Language of teaching and assessment**	4, 5, 6, 7, 8 semester	
7	**Number of academic credits**	russian, kazakh, english	
8	**Module prerequisites**	30 credits	
9	**Module code**	Matanalysis-1,2, Linear algebra, Discrete structures, Differential equations, Matanalysis of a complex variable, Physics-1, 2, Theoretical foundations of electrical engineering-1,2, Electronics and digital design, Information and communication technologies	

B. DETAILED INFORMATION ABOUT TRAINING AND TEACHING	
10	**Module description**
The exponential growth of data on the Internet, the need for their processing and transmission for almost all the needs of human activity pose many challenges to technologies and their optimal use. The coming age of 5G makes it possible to transfer data in the most complex and voluminous formats at the required speed. These opportunities open up new horizons for both industrial use of technologies and their operational management "at a distance". On the other hand, the concept of "smart cities, enterprises" is taking a new level of understanding and implementation. A new understanding of process automation is emerging, where, in fact, it is not people who are behind the automation, but the smart systems created by them. The track is an introduction to the industrial use of IT, taking into account the emergence of new philosophies of collecting, storing and transferring data and the optimal management of such processes. Bearing in mind the engineering focus of the track, the use of various CAD systems for industrial design is proposed. Graduates of this direction are in high demand in the largest industrial companies in almost all spheres of industry both in Kazakhstan (especially in the oil and gas, mining, energy sectors and not only), and far beyond..	
11	**Module aims**
A 1	studying the basics of building subsystems in infocommunication systems of various architectures;
A 2	mastering the Internet of Things - a network of physical objects that have built-in technologies that allow interaction with the external environment, transmit information about their state and receive data from the outside;
A 3	studying the real-time operating system, mastering a set of functions for the design, development and operation of real-time systems on specific hardware.
A 4	studing of drawing techniques, the basics of descriptive geometry, geometric and projection drawing, mechanical drawing, rules for the implementation of schemes, as well as the acquisition of practical skills by students in the implementation of design documentation in accordance with State Standards
A 5	mastering the typical settings of server software designed for minimal hardware and static HTML applications. Examining some of the configuration changes to the server software.
A 6	study of **SCADA**, designed to develop or provide real-time operation of systems for collecting,

	processing, displaying and archiving information about a monitoring or control object.
12	**Learning results**

Code	*EP Description*	Aim codes
CC-51	the ability to organize workplaces, their technical equipment, placement of funds and equipment of infocommunication facilities.	A1-5
CC-52	the ability to organize the installation and configuration of infocommunication equipment;	A1-5
CC-53	the ability to apply modern methods of maintenance and repair.	A3,4
CC-54	the ability to organize the work of the control system in industry: a system for monitoring and controlling the process using a computer.	A6

13	**Teaching methods**
	The overall learning results will be achieved through the following training activities: 1) classroom classes: lectures, seminars (practical) - are conducted taking into account innovative teaching technologies, using the latest achievements of science, technology, information systems and in an interactive form; 2) extracurricular activities: independent work of the student (IWS), including under the guidance of a teacher (IWST), individual consultations;
14	**Training methods and technologies**
	Methods and learning technologies used in the process of implementing the module: 1) student-centered learning based on a reflexive approach to learning from the learner; 2) competence-based learning; 3) role-playing games and educational discussions of various formats; 4) case studies; 5) project method.
15	**Evaluation methods (evaluation criteria)**
	The final grade for the discipline includes an assessment of current performance and final control (examination grade). The share of assessment of current performance is 60% in the final assessment. Assessment of final control is 40% of the final assessment of knowledge in the discipline. The assessment of current performance is made up of the average value of the scores of the 1st and 2nd tolerance rating (TR 1 and TR 2), each of which is rated at a maximum of 100 points. The current monitoring of progress - a systematic check of the student's educational achievements on each topic of the academic discipline, conducted by the teacher conducting the training lesson. The current control is carried out in the form of checking lecture notes, fulfilling tasks of self-regulatory organizations, examinations, practical and laboratory works, etc. The final grade for the discipline as a percentage is determined by the following formula: $T\% = ((TR\ 1 + TR\ 2) / 2) \times 0.6 + E \times 0.4$ where: TR 1 - the percentage content of the assessment of the 1st admission rating; TR 2 - the percentage content of the assessment of the 2nd admission rating; E - the percentage of the examination grade. The current and two major controls (LC1 and LC2) take into account: 1. Activity of work in the audience, i.e., in the classes, which can be held in the form of case studies, role-playing games, brainstorming, disputes, round tables; 2. Timeliness of written work; 3. Examinations, surveys, reports, essays, mini-tests, research work; 3. Group project, presentation; Final control - passing an exam in a discipline that can pass in the form of comprehensive testing, oral or written answer on tickets.
16	**Literature**

1. Пятибратов А.П., Гудыно Л.П., Кириченко А.А. Вычислительные системы, сети и телекоммуникации. М.; «Финансы и статистика», 2011г.
2. Олифер В.Г., Олифер Н.А. Компьюеные сети. СПб.:Питер,2010.-672с.
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7. Хейфец, А.Л. Инженерная компьютерная графика. AutoCAD: учеб. пособие: рек. Мин. обр. РФ/ А. Л. Хейфец. -СПб.: БХВ-Петербург, 2007. –316 с.
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10. Scada . ru - Публикации - SCADA - системы: взгляд изнутри
// URL: http://www.scada.ru/publication/book/preface html
11. Кабаев С.В. Пакет программного обеспечения Intouch - система мониторинга и управления в объектах промышленной автоматизации
// URL: http://www.mka.ru/go/?id=40463&url=www.rtsoft.ru
12. ТРЕЙС МОУД - интегрированная SCADA- и softlogic-система для разработки АСУТП // URL: http://adastra.ru/ru/tm/tm5/
13. Кузнецов А. Genesis for Windows - графическая scada-система для разработки АСУ ТП. // Современные технологии автоматизации.- 1997.- №3.

A:	INFORMATION FOR ADMINISTRATION		
1	**Module code**	M ME 11	
	Module name	MRPM 11.5	
2	**Module developers**	**MODULE ROBOTIZATION OF PRODUCTION FACILITIES** 1) Computer planning of moving objects - 5ECTS 2) Designing robots - 5ECTS 3) Robot control using PLC - 5 ECTS 4) Robotics in production- 5ECTS 5) Robotization of operations in industry- 5ECTS 6) Introduction to the design of industrial chips - 5ECTS	
3	**The faculty-module owner**	F.A. Hajiyev, D. N. Shabdirov	
4	**Other faculty involved in the module implementation**	Faculty of information technology	
5	**Module mustering duration**	Faculty	% of participating
		Information technologies	100
6	**Language of teaching and assessment**	4, 5, 6, 7, 8 semester	
7	**Number of academic credits**	russian, kazakh, english	
8	**Module prerequisites**	30 credits	
9	**Module code**	Matanalysis-1,2, Linear algebra, Discrete structures, Differential equations, Matanalysis of a complex variable, Physics-1, 2, Theoretical foundations of electrical engineering-1,2, Electronics and digital design, Information and communication technologies, Theoretical mechanics	
B. DETAILED INFORMATION ABOUT TRAINING AND TEACHING			
10	**Module description**		

The exponential growth of data on the internet, the need for their processing and transmission for almost all the needs of human activity pose many challenges to technologies and their optimal use. The coming age of 5G makes it possible to transfer data in the most complex and voluminous formats at the required speed. These opportunities open up new horizons for both the industrial use of technologies and their operational management "at a distance". On the other hand, the concept of "smart cities, enterprises" is becoming a new level of understanding and implementation.

A new understanding of process automation is emerging, where, in fact, it is no longer people who are behind automation, but smart systems created by them.

The track is an introduction to the industrial use of IT, taking into account the emergence of new philosophies of data collection, storage and transmission and optimal management of such processes. Bearing in mind the engineering orientation of the track, the use of various CAD systems for industrial design is proposed.

Graduates of this direction are in high demand in the largest industrial companies in almost all spheres of industry both in the Republic of Kazakhstan (especially in the oil and gas, mining, energy sectors and not

only) and far beyond.	
11	**Module aims**
A 1	The formation of students ' knowledge about the principles of construction, composition, purpose, characteristics and application of technical means of automation and industrial General purpose, methods of their choice for the construction of automated and automatic control systems and management on existing methods of automatic control, structure and means of automation and control of technical objects and technological processes
A 2	to systematize, consolidate, expand theoretical and practical knowledge to use when designing robots
A 3	preparation of specialists for research work and creative innovation in the field of design, construction and control of robotic systems, formation of modern ideas and skills in the field of complex automation of production processes for various purposes using modern flexible automation tools - mechatronic devices and industrial robots.
A 4	Study of the complex of automation equipment, principles of construction and modern methods of designing microprocessor and microcontroller systems; architecture of modern microprocessors and microcontrollers; basic circuits for switching on and testing of MPS; programming of microprocessors and microcontrollers, study of architecture and composition of standard series of industrial controllers; the principle of operation of industrial controllers; tasks solved by industrial controllers in automated process control systems.

12	**Learning results**	
Code	*EP Description*	Aim codes
CC-55	**Able to** master computer information technologies, analyze the features of the organization of system design.	A1
CC-56	**To perceive, process, analyze** and **summarize** scientific and technical information, advanced domestic and foreign experience in the field of theory, design, production and operation of mechatronic and robotic devices and systems, to participate in teams for the development and operation of such devices and systems.	A2
CC-57	**Apply** the acquired knowledge to solve engineering problems in the development, production and operation of modern technical means, mechatronic and robotic devices and systems (including intelligent ones) using world-class technologies, modern tools and software. **Able to** select control controllers according to the requirements for the automated technological process; determine the structure and select the means of coupling the controller with measuring sensors and actuators.	A3
CC-58	**Able to plan** and **implement** analytical, simulation and experimental studies for the purposes of design, production and operation of technical means and systems using advanced domestic and foreign experience, be able to critically evaluate the theoretical and experimental data obtained and draw conclusions, plan future activities in the professional field.	A4

13	**Teaching methods**
	The overall learning results will be achieved through the following training activities: 1) classroom classes: lectures, seminars (practical) - are conducted taking into account innovative teaching technologies, using the latest achievements of science, technology, information systems and in an interactive form; 2) extracurricular activities: independent work of the student (IWS), including under the guidance of a teacher (IWST), individual consultations;
14	**Training methods and technologies**
	Methods and learning technologies used in the process of implementing the module: 1) student-centered learning based on a reflexive approach to learning from the learner; 2) competence-based learning; 3) role-playing games and educational discussions of various formats; 4) case studies; 5) project method.
15	**Evaluation methods (evaluation criteria)**
	The final grade for the discipline includes an assessment of current performance and final control (examination grade). The share of assessment of current performance is 60% in the final assessment. Assessment of final control is 40% of the final assessment of knowledge in the discipline. The assessment of current performance is made up of the average value of the scores of the 1st and 2nd tolerance rating (TR 1 and TR 2), each of which is rated at a maximum of 100 points. The current

	monitoring of progress - a systematic check of the student's educational achievements on each topic of the academic discipline, conducted by the teacher conducting the training lesson. The current control is carried out in the form of checking lecture notes, fulfilling tasks of self-regulatory organizations, examinations, practical and laboratory works, etc. The final grade for the discipline as a percentage is determined by the following formula: T% = ((TR 1+ TR 2) / 2) x 0.6 + E x 0.4 where: TR 1 - the percentage content of the assessment of the 1st admission rating; TR 2 - the percentage content of the assessment of the 2nd admission rating; E - the percentage of the examination grade. The current and two major controls (LC1 and LC2) take into account: 1. Activity of work in the audience, i.e., in the classes, which can be held in the form of case studies, role-playing games, brainstorming, disputes, round tables; 2. Timeliness of written work; 3. Examinations, surveys, reports, essays, mini-tests, research work; 3. Group project, presentation; Final control - passing an exam in a discipline that can pass in the form of comprehensive testing, oral or written answer on tickets.
16	**Literature**

1. Егоров О.Д., Подураев Ю.В. Мехатронные модули. Расчет и конструирование: Учеб. пособие. – М.: МГТУ «СТАНКИН», 2004. – 360 с.
2. Куприков М.Ю., Маслов Ю.В., Хотина Г.К., Никишина Л.Б. Твердотельное моделирование деталей в среду геометрического моделирования SolidWorks. – М.: Изд-во: "МАИ-ПРИНТ", 2009. ISBN 978-5- 7035-2069-7;
3. Пшихопов В.Х. Организация репеллеров при движении мобильных роботов в среде с препятствиями // Мехатроника, автоматизация и управление. – 2008. – № 2.
4. Готлиб Б.М. Проектирование мехатронных систем: Конспект лекций [Текст]. Режим доступа http://mehatron.ru/.
5. Лукинов А.П. Проектирование мехатронных и робототехнических устройств. СПб.: Изд-во «Лань», 2012.;
6. Пшихопов В.Х., Медведев М.Ю. Оценивание и управление в сложных динамических системах. – М.: Физматлит, 2009.- С. 295. ISSN 978-5-9221-1176-8.

A: INFORMATION FOR ADMINISTRATION			
1	**Module code**	M ME 11	
	Module name	MIIUS 11.6	
2	**Module developers**	**MODULE ARTIFICIAL INTELLIGENCE AND SMART SYSTEMS** 1) Data mining - 5ECTS 2) Advanced statistics course - 5ECTS 3) Machine learning - 5ECTS 4) Designing robots - 5ECTS 5) Deep learning - 5ECTS 6) Convolutional neural networks - 5ECTS	
3	**The faculty-module owner**	F.A. Hajiyev, D. N. Shabdirov	
4	**Other faculty involved in the module implementation**	Faculty of information technology	
5	**Module mustering duration**	Faculty	% of participating
		Information technologies	100
6	**Language of teaching and assessment**	4, 5, 6, 7, 8 semester	
7	**Number of academic credits**	russian, kazakh, english	
8	**Module prerequisites**	30 credits	
9	**Module code**	Matanalysis-1,2, Linear algebra, Discrete structures, Differential equations, Matanalysis of a complex variable, Physics-1, 2, Theoretical foundations of electrical	

		engineering-1,2, Electronics and digital design, Information and communication technologies, Theoretical mechanics, Elements and devices of automation

B. DETAILED INFORMATION ABOUT TRAINING AND TEACHING

10	**Module description**
	The exponential growth of data on the internet, the need for their processing and transmission for almost all the needs of human activity pose many challenges to technologies and their optimal use. The coming age of 5G makes it possible to transfer data in the most complex and voluminous formats at the required speed. These opportunities open up new horizons for both the industrial use of technologies and their operational management "at a distance". On the other hand, the concept of "smart cities, enterprises" is becoming a new level of understanding and implementation. A new understanding of process automation is emerging, where, in fact, it is no longer people who are behind automation, but smart systems created by them. The track is an introduction to the industrial use of IT, taking into account the emergence of new philosophies of data collection, storage and transmission and optimal management of such processes. Bearing in mind the engineering orientation of the track, the use of various CAD systems for industrial design is proposed. Graduates of this direction are in high demand in the largest industrial companies in almost all spheres of industry both in the Republic of Kazakhstan (especially in the oil and gas, mining, energy sectors and not only) and far beyond.

11	**Module aims**
A 1	**Justification** of partial or full automation of solving complex professional tasks in various fields of human activity. Introduction to Data Mining, a method of data analysis designed to search for previously unknown patterns in large amounts of information.
A 2	**systematize, consolidate, expand** theoretical and practical knowledge on the study of modern statistical methods of data analysis, training in the use of data analysis methods in modern statistical packages on the example of specific data.
A 3	**to develop** and **improve** the skills of working with neural networks, to master the methodology of substantiating the network structure, technology for collecting, processing and issuing information, software design and conducting scientific research;
A 4	**determine** the level of self-study on a large amount of data instead of rigidly postulated rules.

12	**Learning results**	
Code	*EP Description*	Aim codes
CC-59	**Able to master** Data Mining technology to obtain effective and non-trivial management solutions, within the framework of which theoretical and practical training is conducted in data collection and processing using modern digital technologies.	A1
CC-60	**Able to identify** the boundaries between data analysis and mathematical statistics, which is also designed to search for statistical patterns; to consider some aspects of data analysis.	A2
CC-61	**Know** the ways of parallelization of calculations, and therefore the possibility of implementing algorithms for the operation and training of the network on GPUs	A3
CC-62	**Able to compare** and **analyze** neural networks and apply appropriate methods to improve network performance, increase its stability and prevent overfitting	A4

13	**Teaching methods**
	The overall learning results will be achieved through the following training activities: 1) classroom classes: lectures, seminars (practical) - are conducted taking into account innovative teaching technologies, using the latest achievements of science, technology, information systems and in an interactive form; 2) extracurricular activities: independent work of the student (IWS), including under the guidance of a teacher (IWST), individual consultations;

14	**Training methods and technologies**
	Methods and learning technologies used in the process of implementing the module: 1) student-centered learning based on a reflexive approach to learning from the learner; 2) competence-based learning; 3) role-playing games and educational discussions of various formats; 4) case studies; 5) project method.

15	**Evaluation methods (evaluation criteria)**
	The final grade for the discipline includes an assessment of current performance and final control (examination grade). The share of assessment of current performance is 60% in the final assessment. Assessment of final control is 40% of the final assessment of knowledge in the discipline. The assessment of current performance is made up of the average value of the scores of the 1st and 2nd tolerance rating (TR 1 and TR 2), each of which is rated at a maximum of 100 points. The current monitoring of progress - a systematic check of the student's educational achievements on each topic of the academic discipline, conducted by the teacher conducting the training lesson. The current control is carried out in the form of checking lecture notes, fulfilling tasks of self-regulatory organizations, examinations, practical and laboratory works, etc. The final grade for the discipline as a percentage is determined by the following formula: T% = ((TR 1+ TR 2) / 2) x 0.6 + E x 0.4 where: TR 1 - the percentage content of the assessment of the 1st admission rating; TR 2 - the percentage content of the assessment of the 2nd admission rating; E - the percentage of the examination grade. The current and two major controls (LC1 and LC2) take into account: 1. Activity of work in the audience, i.e., in the classes, which can be held in the form of case studies, role-playing games, brainstorming, disputes, round tables; 2. Timeliness of written work; 3. Examinations, surveys, reports, essays, mini-tests, research work; 3. Group project, presentation; Final control - passing an exam in a discipline that can pass in the form of comprehensive testing, oral or written answer on tickets.
16	**Literature**

	1. Y. LeCun, B. Boser, J. S. Denker, D. Henderson, R. E. Howard, W. Hubbard and L. D. Jackel: Backpropagation Applied to Handwritten Zip Code Recognition, Neural Computation, 1(4):541-551, Winter 1989.;
	2. *Matusugu, Masakazu; Katsuhiko Mori; Yusuke Mitari; Yuji Kaneda.* Subject independent facial expression recognition with robust face detection using a convolutional neural network (англ.) // Neural Networks : journal. — 2003. — Vol. 16, no. 5. — P. 555—559.;
	3. *Romanuke, Vadim.* Appropriate number and allocation of ReLUs in convolutional neural networks (англ.) // Research Bulletin of NTUU "Kyiv Polytechnic Institute" : journal. — 2017. — Vol. 1. — P. 69—78.;
	4. Graham, Benjamin (2014-12-18), Fractional Max-Pooling, *arXiv:1412.6071*[cs.CV];
	5. Springenberg, Jost Tobias; Dosovitskiy, Alexey; Brox, Thomas & Riedmiller, Martin (2014-12-21), Striving for Simplicity: The All Convolutional Net, *arXiv:1412.6806*[cs.LG];
	6. Jain, V. and Seung, S. H. (2008). Natural image denoising with convolutional networks. In NIPS'2008.

A: INFORMATION FOR ADMINISTRATION			
1	**Module code**	M ME 11	
	Module name	MWRPS 11.7	
2	**Module developers**	**FULL CYCLE WEB DEVELOPMENT MODULE** 1) Web development- 5ECTS 2) JS Framework. React / JS Framework. Angular- 5ECTS 3) Backend Framework. Django / Backend Framework. Spring - 5ECTS 4) UI / UX design- 5ECTS 5) Backend for a high-load environment - 5ECTS 6)Cloud application development 5ECTS	
3	**The faculty-module owner**	F.A. Hajiyev, D. N. Shabdirov	
4	**Other faculty involved in the module implementation**	Faculty of information technology	
5	**Module mustering duration**	Faculty	% of participating
		Information technologies	100

6	**Language of teaching and assessment**	4, 5, 6, 7, 8 semester
7	**Number of academic credits**	russian, kazakh, english
8	**Module prerequisites**	30 credits
9	**Module code**	Matanalysis-1,2, Linear algebra, Discrete structures, Differential equations, Mathematical analysis of a complex variable, Physics-1, 2, Theoretical foundations of electrical engineering-1,2, Electronics and digital design, Information and communication technologies

B. DETAILED INFORMATION ABOUT TRAINING AND TEACHING

10	**Module description**

The exponential growth of data on the internet, the need for their processing and transmission for almost all the needs of human activity pose many challenges to technologies and their optimal use. The coming age of 5G makes it possible to transfer data in the most complex and voluminous formats at the required speed. These opportunities open up new horizons for both the industrial use of technologies and their operational management "at a distance". On the other hand, the concept of "smart cities, enterprises" is becoming a new level of understanding and implementation.

A new understanding of process automation is emerging, where, in fact, it is no longer people who are behind automation, but smart systems created by them.

The track is an introduction to the industrial use of IT, taking into account the emergence of new philosophies of data collection, storage and transmission and optimal management of such processes. Bearing in mind the engineering orientation of the track, the use of various CAD systems for industrial design is proposed.

Graduates of this direction are in high demand in the largest industrial companies in almost all spheres of industry both in the Republic of Kazakhstan (especially in the oil and gas, mining, energy sectors and not only) and far beyond.

11	**Module aims**
A 1	**teach** you how to create a website or web application. To familiarize with the main stages of the process (web design, page layout, client-side and server-side programming, as well as web server configuration).
A 2	
A 3	**systematize, consolidate, expand** theoretical and practical knowledge on the use of computer information technologies in the design of information processing systems and test your projects;
A 4	**to develop** and **improve** the skills of independent work for creating interactive web applications, to master the methodology of substantiating design solutions for building an information base, technology for collecting, processing and issuing information, software design and conducting scientific research with intellectual capabilities and autofill of the HTML component template;
A5	**determine** the level of compliance of the programming languages JavaScript, Python or Go for backend development, and which framework for developing server-side applications is worth paying attention to
A 6	**substantiation** of the relevance and significance of AUX design, interface design based on user experience and behavior research.

12	**Learning results**	
Code	*EP Description*	Aim codes
CC-63	**Able to master** computer information technologies, analyze the features of the organization of system design.	Ц1-4
CC-64	**Able to make** the right choice for each individual case when developing a product. Identify the pros and cons of each framework;	Ц2-5
CC-65	**To know** how to store data and programs in cloud storage, working with them online and without loading his computer's hard drives. Owns the architecture of microservices, uses managed services to ensure reliability and rapid market entry through continuous delivery	Ц5,6
CC-66	**Able to substantiate** the relevance and significance of the solved problem of information support of the design object in a given subject area;	Ц1-6
13	**Teaching methods**	

	The overall learning results will be achieved through the following training activities: 1) classroom classes: lectures, seminars (practical) - are conducted taking into account innovative teaching technologies, using the latest achievements of science, technology, information systems and in an interactive form; 2) extracurricular activities: independent work of the student (IWS), including under the guidance of a teacher (IWST), individual consultations;
14	**Training methods and technologies**
	Methods and learning technologies used in the process of implementing the module: 1) student-centered learning based on a reflexive approach to learning from the learner; 2) competence-based learning; 3) role-playing games and educational discussions of various formats; 4) case studies; 5) project method.
15	**Evaluation methods (evaluation criteria)**
	The final grade for the discipline includes an assessment of current performance and final control (examination grade). The share of assessment of current performance is 60% in the final assessment. Assessment of final control is 40% of the final assessment of knowledge in the discipline. The assessment of current performance is made up of the average value of the scores of the 1st and 2nd tolerance rating (TR 1 and TR 2), each of which is rated at a maximum of 100 points. The current monitoring of progress - a systematic check of the student's educational achievements on each topic of the academic discipline, conducted by the teacher conducting the training lesson. The current control is carried out in the form of checking lecture notes, fulfilling tasks of self-regulatory organizations, examinations, practical and laboratory works, etc. The final grade for the discipline as a percentage is determined by the following formula: $T\% = ((TR\ 1 + TR\ 2) / 2) \times 0.6 + E \times 0.4$ where: TR 1 - the percentage content of the assessment of the 1st admission rating; TR 2 - the percentage content of the assessment of the 2nd admission rating; E - the percentage of the examination grade. The current and two major controls (LC1 and LC2) take into account: 1. Activity of work in the audience, i.e., in the classes, which can be held in the form of case studies, role-playing games, brainstorming, disputes, round tables; 2. Timeliness of written work; 3. Examinations, surveys, reports, essays, mini-tests, research work; 3. Group project, presentation; Final control - passing an exam in a discipline that can pass in the form of comprehensive testing, oral or written answer on tickets.
16	**Literature**
	1. Марко Беллиньясо. Разработка Web-приложений в среде ASP.NET 2.0: задача — проект — решение = ASP.NET 2.0 Website Programming: Problem - Design - Solution. — М.: «Диалектика», 2007. — С. 640. — ISBN 0-7645-8464-2. *2. Олищук Андрей Владимирович.* Разработка Web-приложений на PHP 5. Профессиональная работа. — М.: «Вильямс», 2006. — С. 352. — ISBN 5-8459-0944-9. *3. Гото Келли, Котлер Эмили.* Веб редизайн, 2 е издание. — СПб.: «Символ-Плюс», 2006. — С. 416. — ISBN 5-93286-082-0. 4. Unifile product Overview [Электронный ресурс] // unifyle.co: сайт разработчика URL: https://www.unifyle.co/product-overview.html (дата обращения: 10.04.2016) 5. ZeroPC [Электронный ресурс] // zeropc.com: сайт разработчика URL: https://www.zeropc.com (дата обращения: 10.04.2016) 6. ASTRO File Manager [Электронный ресурс] // play.google.com: магазин приложений URL: https://play.google.com/store/apps/details?id=com.metago.astro&hl=ru (дата обращения: 10.04.2016) 7. ES Проводник [Электронный ресурс] // play.google.com: магазин приложений URL: https://play.google.com/store/apps/details?id=com.estrongs.android.pop&hl=ru (дата обращения: 10.04.2016) 8. Рынок облачных услуг [Электронный ресурс] // osp.ru : МИР ЦОД 2016 URL: http://www.osp.ru/dcworld/2013/12/13038703.html(дата обращения: 15.04.2016).

9. Обзор облачных хранилищ [Электронный ресурс] // iphones.ru : Информационный портал URL: https://www.iphones.ru/iNotes/402397(дата обращения: 15.04.2016)

A: INFORMATION FOR ADMINISTRATION			
1	**Module code**	M ME 11	
	Module name	MMR 11.8	
2	**Module developers**	**MOBILE DEVELOPMENT MODULE** 1) Mobile development based on Android - 5ECTS 2) Advanced Android- 5ECTS 3) Mobile development based on iOS - 5ECTS 4) Advanced iOS - 5ECTS 5) UI / UX design - 5ECTS 6)WEB and mobile application security- 5ECTS	
3	**The faculty-module owner**	F.A. Hajiyev, D. N. Shabdirov	
4	**Other faculty involved in the module implementation**	Faculty of information technology	
5	**Module mustering duration**	Faculty	% of participating
		Information technologies	100
6	**Language of teaching and assessment**	4, 5, 6, 7, 8 semester	
7	**Number of academic credits**	russian, kazakh, english	
8	**Module prerequisites**	30 credits	
9	**Module code**	Matanalysis-1,2, Linear Algebra, Discrete structures, Differential equations, Mathematical analysis of a complex variable, Physics-1, 2, Theoretical foundations of electrical engineering-1,2, Electronics and digital design, Information and communication technologies	

B. DETAILED INFORMATION ABOUT TRAINING AND TEACHING		
10	**Module description**	
The exponential growth of data on the internet, the need for their processing and transmission for almost all the needs of human activity pose many challenges to technologies and their optimal use. The coming age of 5G makes it possible to transfer data in the most complex and voluminous formats at the required speed. These opportunities open up new horizons for both the industrial use of technologies and their operational management "at a distance". On the other hand, the concept of "smart cities, enterprises" is becoming a new level of understanding and implementation. A new understanding of process automation is emerging, where, in fact, it is no longer people who are behind automation, but smart systems created by them. The track is an introduction to the industrial use of IT, taking into account the emergence of new philosophies of data collection, storage and transmission and optimal management of such processes. Bearing in mind the engineering orientation of the track, the use of various CAD systems for industrial design is proposed. Graduates of this direction are in high demand in the largest industrial companies in almost all spheres of industry both in the Republic of Kazakhstan (especially in the oil and gas, mining, energy sectors and not only) and far beyond.		
11	**Module aims**	
A 1	determination of the compliance of university graduates with the requirements of the state general education standard of education of the State Educational Institution of the Republic of Kazakhstan 3.08. and the qualification characteristics of this specialty;	
A 2	substantiation of the relevance and significance of the solved problem of information support of the design object in a given subject area;	
A 3	to develop and improve the skills of independent work, to master the methodology of substantiating design solutions for building an information base, technology for collecting, processing and issuing information, software design and conducting scientific research;	
A 4	Justification of the choice of the platform, the structure of the mobile application and ensuring the security of mobile applications	
12	**Learning results**	
Code	*EP Description*	Aim

		codes
CC-67	**Able to master** computer information technologies, analyze the features of the organization of system design.	A1
CC-68	**Able to identify** the level of informatization of the object under consideration and to determine the tasks of its development to improve the efficiency of the object;	A2
CC-69	**Able to identify** the attractiveness and popularity of Android and iOS for both users and developers.	A3
CC-70	**Able to** designing interfaces based on UX research and direct study of user experience and behavior.	A4
13	**Teaching methods**	
	The overall learning results will be achieved through the following training activities: 1) classroom classes: lectures, seminars (practical) - are conducted taking into account innovative teaching technologies, using the latest achievements of science, technology, information systems and in an interactive form; 2) extracurricular activities: independent work of the student (IWS), including under the guidance of a teacher (IWST), individual consultations;	
14	**Training methods and technologies**	
	Methods and learning technologies used in the process of implementing the module: 1) student-centered learning based on a reflexive approach to learning from the learner; 2) competence-based learning; 3) role-playing games and educational discussions of various formats; 4) case studies; 5) project method.	
15	**Evaluation methods (evaluation criteria)**	
	The final grade for the discipline includes an assessment of current performance and final control (examination grade). The share of assessment of current performance is 60% in the final assessment. Assessment of final control is 40% of the final assessment of knowledge in the discipline. The assessment of current performance is made up of the average value of the scores of the 1st and 2nd tolerance rating (TR 1 and TR 2), each of which is rated at a maximum of 100 points. The current monitoring of progress - a systematic check of the student's educational achievements on each topic of the academic discipline, conducted by the teacher conducting the training lesson. The current control is carried out in the form of checking lecture notes, fulfilling tasks of self-regulatory organizations, examinations, practical and laboratory works, etc. The final grade for the discipline as a percentage is determined by the following formula: $T\% = ((TR\ 1 + TR\ 2) / 2) \times 0.6 + E \times 0.4$ where: TR 1 - the percentage content of the assessment of the 1st admission rating; TR 2 - the percentage content of the assessment of the 2nd admission rating; E - the percentage of the examination grade. The current and two major controls (LC1 and LC2) take into account: 1. Activity of work in the audience, i.e., in the classes, which can be held in the form of case studies, role-playing games, brainstorming, disputes, round tables; 2. Timeliness of written work; 3. Examinations, surveys, reports, essays, mini-tests, research work; 3. Group project, presentation; Final control - passing an exam in a discipline that can pass in the form of comprehensive testing, oral or written answer on tickets.	
16	**Literature**	
1. Android [Электронный ресурс] // wikipedia.org : Электронная энциклопедия URL: https://ru.wikipedia.org/wiki/Android(дата обращения: 17.04.2016) 2. Android Studio [Электронный ресурс] // developer.android.com : Сайт разработчика URL: https://developer.android.com/studio/intro/index.html(дата обращения: 20.04.2016) 3. Intellij IDEA [Электронный ресурс] // jetbrains.com : Сайт разработчика URL: https://www.jetbrains.com/help/idea/2016.1/meet-intellij-idea.html(дата обращения: 20.04.2016) 4. Genymotion [Электронный ресурс] // genymotion.com : Сайт разработчика URL: https://www.genymotion.com/ (дата обращения: 10.05.2016) 5. Android x86 [Электронный ресурс] // android-x86.org : Сайт разработчика URL: http://www.android-		

x86.org/(дата обращения: 10.05.2016)
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12. Миковски, М.С. Разработка одностраничных веб-приложений / М.С. Миковски, Д.К. Пауэлл. - М.: ДМК, 2014. - 512 с.
13. Фиртман, М. jQuery Mobile: разработка приложений для смартфонов и планшетов / М. Фиртман; Пер. с англ. С. Иноземцев. - СПб.: БХВ-Петербург, 2013. - 256 с.
14. Нахавандипур, В. iOS. Разработка приложений для iPhone, iPad и iPod / В. Нахавандипур. - СПб.: Питер, 2013. - 864 с.

A: INFORMATION FOR ADMINISTRATION			
1	**Module code**	M ME 11	
	Module name	MKZ 11.9	
	Module developers	**COMPUTER VISION MODULE** 1) Data mining- 5 ECTS 2) Machine learning- 5ECTS 3) Deep learning- 5ECTS 4) Introduction to computer vision- 5ECTS 5) Convolutional neural networks - 5ECTS 6)Computer-based object movement planning - 5ECTS	
3	**The faculty-module owner**	F.A. Hajiyev, D. N. Shabdirov	
4	**Other faculty involved in the module implementation**	Faculty of information technology	
5	**Module mustering duration**	Faculty	% of participating
		Information technologies	100
6	**Language of teaching and assessment**	4, 5, 6, 7, 8 semester	
7	**Number of academic credits**	russian, kazakh, english	
8	**Module prerequisites**	30 credits	
9	**Module code**	Matanalysis-1,2, Linear algebra, Discrete structures, Differential equations, Matanalysis of a complex variable, Physics-1, 2, Theoretical foundations of electrical engineering-1,2, Electronics and digital design, Information and communication technologies	
B. DETAILED INFORMATION ABOUT TRAINING AND TEACHING			
10	**Module description**		

The exponential growth of data on the internet, the need for their processing and transmission for almost all the needs of human activity pose many challenges to technologies and their optimal use. The coming age of 5G makes it possible to transfer data in the most complex and voluminous formats at the required speed. These opportunities open up new horizons for both the industrial use of technologies and their operational management "at a distance". On the other hand, the concept of "smart cities, enterprises" is becoming a new level of understanding and implementation.

A new understanding of process automation is emerging, where, in fact, it is no longer people who are behind automation, but smart systems created by them.

The track is an introduction to the industrial use of IT, taking into account the emergence of new philosophies of data collection, storage and transmission and optimal management of such processes. Bearing in mind the engineering orientation of the track, the use of various CAD systems for industrial design is proposed.

Graduates of this direction are in high demand in the largest industrial companies in almost all spheres of industry both in the Republic of Kazakhstan (especially in the oil and gas, mining, energy sectors and not only) and far beyond.	
11	**Module aims**
Ц 1	determination of the compliance of university graduates with the requirements of the state general education standard of education of the State Educational Institution of the Republic of Kazakhstan 3.08. and the qualification characteristics of this specialty;
Ц 2	systematize, consolidate, expand theoretical and practical knowledge on the use of computer information technologies in the design of information processing systems;
Ц 3	to develop and improve the skills of independent work, to master the methodology of substantiating design solutions for building an information base, technology for collecting, processing and issuing information, software design and conducting scientific research;
Ц 4	Systematize pattern recognition based on computer vision technology. Definition of methods that endow a computer with the ability to "see" and extract information from what it sees.

12	**Learning results**	
Code	*EP Description*	Aim codes
CC-71	**Able to master** computer information technologies, analyze the features of the organization of system design.	A1
CC-72	**Able to identify** the level of informatization of the object under consideration and to determine the tasks of its development to improve the efficiency of the object;	A2
CC-73	**To know** how a computer "sees", is able to master machine learning technologies and analyze sets of data that allow you to identify features and combinations of features for further identification of similar objects.	A3
CC-74	**Able to substantiate** the relevance and significance of the solved problem of information support of the design object in a given subject area;	A4

13	**Teaching methods**
	The overall learning results will be achieved through the following training activities: 1) classroom classes: lectures, seminars (practical) - are conducted taking into account innovative teaching technologies, using the latest achievements of science, technology, information systems and in an interactive form; 2) extracurricular activities: independent work of the student (IWS), including under the guidance of a teacher (IWST), individual consultations;
14	**Training methods and technologies**
	Methods and learning technologies used in the process of implementing the module: 1) student-centered learning based on a reflexive approach to learning from the learner; 2) competence-based learning; 3) role-playing games and educational discussions of various formats; 4) case studies; 5) project method.
15	**Evaluation methods (evaluation criteria)**
	The final grade for the discipline includes an assessment of current performance and final control (examination grade). The share of assessment of current performance is 60% in the final assessment. Assessment of final control is 40% of the final assessment of knowledge in the discipline. The assessment of current performance is made up of the average value of the scores of the 1st and 2nd tolerance rating (TR 1 and TR 2), each of which is rated at a maximum of 100 points. The current monitoring of progress - a systematic check of the student's educational achievements on each topic of the academic discipline, conducted by the teacher conducting the training lesson. The current control is carried out in the form of checking lecture notes, fulfilling tasks of self-regulatory organizations, examinations, practical and laboratory works, etc. The final grade for the discipline as a percentage is determined by the following formula: $T\% = ((TR\ 1 + TR\ 2) / 2) \times 0.6 + E \times 0.4$ where: TR 1 - the percentage content of the assessment of the 1st admission rating; TR 2 - the percentage content of the assessment of the 2nd admission rating; E - the percentage of the examination grade.

	The current and two major controls (LC1 and LC2) take into account: 1. Activity of work in the audience, i.e., in the classes, which can be held in the form of case studies, role-playing games, brainstorming, disputes, round tables; 2. Timeliness of written work; 3. Examinations, surveys, reports, essays, mini-tests, research work; 3. Group project, presentation; Final control - passing an exam in a discipline that can pass in the form of comprehensive testing, oral or written answer on tickets.
16	**Literature**

1. Глория, Буэно Гарсия Обработка изображений с помощью OpenCV: моногр. / Глория Буэно Гарсия и др. - М.: ДМК Пресс, 2016. - 210 с.
2. Методы обработки и распознавания изображений лиц в задачах биометрии / Г.А. Кухарев и др. - М.: Политехника, 2013. - 416 с.
3. Обработка и анализ цифровых изображений с примерами на LabVIEW и IMAQ Vision / Ю.В. Визильтер и др. - М.: ДМК Пресс, 2016. - 464 с.
4. Таганов, Александр Иванович Нейросетевые системы искусственного интеллекта в задачах обработки изображений / Таганов Александр Иванович. - М.: Горячая линия - Телеком, 2016. - 531 с.
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7. Комашинский, В. Нейронные сети и их применение в системах управления и связи / В. Комашинский. - М.: ГЛТ, 2003. - 94 с.
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9. Усков, А.А. Интеллектуальные технологии управления. Искусственные нейронные сети и нечеткая логика. / А.А. Усков, А.В. Кузьмин. - М.: Горячая линия -Телеком , 2004. - 143 с.

A: INFORMATION FOR ADMINISTRATION		
1	**Module code**	M ME 11
	Module name	MISS 11.10
2	**Module developers**	**INFOCOMMUNICATION SYSTEMS AND NETWORKS MODULE** 1) Computer networks and architecture- 5ECTS 2) Introduction to signal theory- 5 ECTS 3) Digital communication technologies - 5ECTS 4) Routing and switching - 5 ECTS 5) Wireless communication systems and the internet of things - 5ECTS 6)Security in telecommunication systems- 5ECTS
3	**The faculty-module owner**	F.A. Hajiyev, D. N. Shabdirov
4	**Other faculty involved in the module implementation**	Faculty of information technology
5	**Module mustering duration**	Faculty: Information technologies; % of participating: 100
6	**Language of teaching and assessment**	4, 5, 6, 7, 8 semester
7	**Number of academic credits**	russian, kazakh, english
8	**Module prerequisites**	30 credits
9	**Module code**	Matanalysis-1,2, Linear algebra, Discrete structures, Differential equations, Matanalysis of a complex variable, Physics-1, 2, Theoretical foundations of electrical engineering-1,2, Electronics and digital design, Information and communication technologies, Programming principles-1,2
B. DETAILED INFORMATION ABOUT TRAINING AND TEACHING		
10	**Module description**	

The exponential growth of data on the internet, the need for their processing and transmission for almost all the needs of human activity pose many challenges to technologies and their optimal use. The coming age of 5G makes it possible to transfer data in the most complex and voluminous formats at the required speed. These opportunities open up new horizons for both the industrial use of technologies and their operational management "at a distance". On the other hand, the concept of "smart cities, enterprises" is becoming a new level of understanding and implementation.

A new understanding of process automation is emerging, where, in fact, it is no longer people who are behind automation, but smart systems created by them.

The track is an introduction to the industrial use of IT, taking into account the emergence of new philosophies of data collection, storage and transmission and optimal management of such processes. Bearing in mind the engineering orientation of the track, the use of various CAD systems for industrial design is proposed.

Graduates of this direction are in high demand in the largest industrial companies in almost all spheres of industry both in the Republic of Kazakhstan (especially in the oil and gas, mining, energy sectors and not only) and far beyondв нефтегазовом, добывающем, энергетическом секторах и не только), так и далеко за пределами.

11	**Module aims**
A 1	determination of the compliance of university graduates with the requirements of the state general education standard of education of the State Educational Institution of the Republic of Kazakhstan 3.08. and the qualification characteristics of this specialty;
A 2	systematize, consolidate, expand theoretical and practical knowledge on the use of computer information technologies in the design of information processing systems;
A 3	to develop and improve the skills of independent work, to master the methodology of substantiating design solutions for building an information base, technology for collecting, processing and issuing information, software design and conducting scientific research;
A 4	master the knowledge of fundamental sciences, programming languages and technologies, information and communication technologies, modern means and communication systems.

12	**Learning results**	
Code	*EP Description*	Aim codes
CC-75	Able to master computer information technologies, **analyze** the features of the organization of system design.	A1
CC-76	Able to **identify** the level of informatization of the object under consideration and to **determine** the tasks of its development to improve the efficiency of the object;	A2
CC-77	Able to master practical engineering skills in the development, design and operation of communication systems for various purposes, the ability to conduct scientific research and participate in the innovative development of the field of infocommunications.	A3
CC-78	Able to substantiate the relevance and significance of the solved problem of information support of the design object in a given subject area;	A4

13	**Teaching methods**
	The overall learning results will be achieved through the following training activities: 1) classroom classes: lectures, seminars (practical) - are conducted taking into account innovative teaching technologies, using the latest achievements of science, technology, information systems and in an interactive form; 2) extracurricular activities: independent work of the student (IWS), including under the guidance of a teacher (IWST), individual consultations;

14	**Training methods and technologies**
	Methods and learning technologies used in the process of implementing the module: 1) student-centered learning based on a reflexive approach to learning from the learner; 2) competence-based learning; 3) role-playing games and educational discussions of various formats; 4) case studies; 5) project method.

15	**Evaluation methods (evaluation criteria)**
	The final grade for the discipline includes an assessment of current performance and final control (examination grade). The share of assessment of current performance is 60% in the final assessment. Assessment of final control is 40% of the final assessment of knowledge in the discipline.

	The assessment of current performance is made up of the average value of the scores of the 1st and 2nd tolerance rating (TR 1 and TR 2), each of which is rated at a maximum of 100 points. The current monitoring of progress - a systematic check of the student's educational achievements on each topic of the academic discipline, conducted by the teacher conducting the training lesson. The current control is carried out in the form of checking lecture notes, fulfilling tasks of self-regulatory organizations, examinations, practical and laboratory works, etc. The final grade for the discipline as a percentage is determined by the following formula: T% = ((TR 1+ TR 2) / 2) x 0.6 + E x 0.4 where: TR 1 - the percentage content of the assessment of the 1st admission rating; TR 2 - the percentage content of the assessment of the 2nd admission rating; E - the percentage of the examination grade. The current and two major controls (LC1 and LC2) take into account: 1. Activity of work in the audience, i.e., in the classes, which can be held in the form of case studies, role-playing games, brainstorming, disputes, round tables; 2. Timeliness of written work; 3. Examinations, surveys, reports, essays, mini-tests, research work; 3. Group project, presentation; Final control - passing an exam in a discipline that can pass in the form of comprehensive testing, oral or written answer on tickets.
16	**Literature**

Main

1. Таненбаум, Э. Компьютерные сети. / Э. Таненбаум. – СПб.: Питер, 2012. – 955с.
2. Тузовский А.Ф. Проектирование и разработка WEB-приложений / Тузовский А.Ф. Учеб. пособие для бакалавриата; Нац. исслед. Томск. политехн. ун-т, 2016. – 218 с.
3. Шишов О.В. Современные технологии и технические средства информатизации / Шишов О.В. Учебник, М. ИНФРА-М, 2017. - 460 с.
4. Компьютерные сети: Учебное пособие / А.В. Кузин. - 3-е изд., перераб. и доп. - М.: Форум: ИНФРА-М, 2011. - 192 с.: ил.; 60x90 1/16. - (Профессиональное образование). (переплет) ISBN 978-5-91134-476-4(http://znanium.com/bookread2.php?book=249563)

Additional

1. Стохастические методы и средства защиты информации в компьютерных системах и сетях / Иванов М.А. и др.; под ред. Жукова И.Ю. – М.:Кудиц-Пресс, 2009. – 510 с. (2 экз)
2. Олифер, В. Г. Компьютерные сети: принципы, технологии, протоколы : учеб. пособие для высш. учеб. заведений / В. Г. Олифер, Н. А. Олифер. – 3-е изд. – СПб. : Питер, 2007. – 957 с. (25 экз)
3. Крылов, А. С. Информационные сети : учеб. пособие / А. С. Крылов, Е. В. Крылова ; Саратов. гос. техн. ун-т. – Саратов, 2009. – 239 с.(25 экз)
4. Могилев, А. В. Информатика : учеб. пособие для высш. учеб. заведений / А. В. Могилев, Н. И. Пак, Е. К. Хеннер ; под ред. Е. К. Хеннера. – 6-е изд., стер. – М. : Академия, 2008. – 840 с. (7 экз)
5. Топорков, С. С. Компьютерные сети для продвинутых пользователей [Электронный ресурс] / С. С. Топорков. - М.: ДМК Пресс, 2009. - 192 с. : ил. - (Серия «С компьютером на ты!»). - ISBN 5-94074-093-6

A: INFORMATION FOR ADMINISTRATION			
1	**Module code**	M FE 12	
2	**Module name**	**MODULE "LEVEL 3 (FREE ELECTIVE OR MINOR)"** 1) Optional discipline 1 2) Optional discipline 2 3) Optional discipline 3 4) Optional discipline 4 5) Optional discipline 5 6) Optional discipline 6	
3	**Module developers**		
4	**The faculty-module owner**		
5	**Other faculty involved in the module**	Faculty	% of

	implementation		participating
	Module mustering duration		100
6		5, 6, 7, 8 semester	
7	**Language of teaching and assessment**	Russian, kazakh, english	
8	**Number of academic credits**	20 credits	
9	**Module prerequisites**		

B. DETAILED INFORMATION ABOUT TRAINING AND TEACHING

10	**Module description**
This module is a free choice of the student within which he can choose courses taught at other Faculties of the university, at partner universities or companies. No connection with the OP is required in this case (a student can take a piano course at the conservatory or an anthropology course on an online platform recognized by the university). Level 3 can also be used to obtain Minor.	
11	**Module aims**
A 1	Studying the basic concepts of the course and mastering the basics of theory, methods of solving practical problems, studying the applications of the basic concepts and methods of the course in engineering.
A 2	The development of logical and algorithmic thinking, the ability to operate with physical models, the use of mathematical and physical methods and techniques for solving applied problems.
A 3	Formation of a student's complex of knowledge, skills, scientific outlook and logical thinking so necessary for a future engineer in the conditions of technological progress.
A 4	To promote the development of students' creative thinking, skills of independent, cognitive activity.

12	**Learning results**	
Code	*EP Description*	Aim codes
CC-79	Able to master computer information technologies, analyze the features of the organization of system design.	A1
CC-80	Able to identify the level of informatization of the object under consideration and to determine the tasks of its development to improve the efficiency of the object;	A2
CC-81	Able to possess practical engineering skills in the development, design and operation of communication systems for various purposes, the ability to conduct scientific research and participate in the innovative development of the chosen trajectory.	A3
CC-82	Able to substantiate the relevance and significance of the solved problem of information support of the design object in a given subject area;	A4

13	**Teaching methods**
	The overall learning results will be achieved through the following training activities: 1) classroom classes: lectures, seminars (practical) - are conducted taking into account innovative teaching technologies, using the latest achievements of science, technology, information systems and in an interactive form; 2) extracurricular activities: independent work of the student (IWS), including under the guidance of a teacher (IWST), individual consultations;
14	**Training methods and technologies**
	Methods and learning technologies used in the process of implementing the module: 1) student-centered learning based on a reflexive approach to learning from the learner; 2) competence-based learning; 3) role-playing games and educational discussions of various formats; 4) case studies; 5) project method.
15	**Evaluation methods (evaluation criteria)**
	The final grade for the discipline includes an assessment of current performance and final control (examination grade). The share of assessment of current performance is 60% in the final assessment. Assessment of final control is 40% of the final assessment of knowledge in the discipline. The assessment of current performance is made up of the average value of the scores of the 1st and 2nd tolerance rating (TR 1 and TR 2), each of which is rated at a maximum of 100 points. The current monitoring of progress - a systematic check of the student's educational achievements on each topic of

	the academic discipline, conducted by the teacher conducting the training lesson. The current control is carried out in the form of checking lecture notes, fulfilling tasks of self-regulatory organizations, examinations, practical and laboratory works, etc. The final grade for the discipline as a percentage is determined by the following formula: T% = ((TR 1+ TR 2) / 2) x 0.6 + E x 0.4 where: TR 1 - the percentage content of the assessment of the 1st admission rating; TR 2 - the percentage content of the assessment of the 2nd admission rating; E - the percentage of the examination grade. The current and two major controls (LC1 and LC2) take into account: 1. Activity of work in the audience, i.e., in the classes, which can be held in the form of case studies, role-playing games, brainstorming, disputes, round tables; 2. Timeliness of written work; 3. Examinations, surveys, reports, essays, mini-tests, research work; 3. Group project, presentation; Final control - passing an exam in a discipline that can pass in the form of comprehensive testing, oral or written answer on tickets.
16	**Literature**
According to the chosen subject	

A: INFORMATION FOR ADMINISTRATION			
1	**Module code**	MIntern 13	
2	**Module name**	**PRACTICE MODULE** 1) Industrial practice (6 credits) 2) Pre-graduate practice (8 credits)	
3	**Module developers**	F.A. Hajiyev, D. N. Shabdirov	
4	**The faculty-module owner**	Faculty of information technology	
5	**Other faculty involved in the module implementation**	Faculty	% of participating
		Information technologies	100
6	**Module mustering duration**	6, 8 semesterы	
7	**Language of teaching and assessment**	russian, kazakh, english	
8	**Number of academic credits**	14 credits	
9	**Module prerequisites**	Matanalysis-1,2, Linear algebra, Discrete structures, Differential equations, Matanalysis of a complex variable, Physics-1, 2, Theoretical foundations of electrical Engineering-1,2, Electronics and digital design, Information and communication technologies, Elements and devices of automation, Introduction to the theory of signals, Introduction to linear and nonlinear control systems, Introduction to microcontrollers and microprocessor systems	
B. DETAILED INFORMATION ABOUT TRAINING AND TEACHING			
10	**Module description**		
The module includes the degree of professional readiness to perform a certain type of work through the identification of common (key) professional competencies, through a value attitude to the chosen profession, assessed through a system of individual educational achievements, including: - academic achievements in terms of mastering training courses, subjects; - qualification as a system of acquired competencies, i.e. readiness to implement the main types of professional activities in terms of mastering training courses, subjects and professional modules. Assessment of graduates' qualifications is carried out with the participation of employers.			
11	**Module aims**		
A 1	формирование систематических знаний об основных устройствах автоматики управления нормальным режимом работы систем и противоаварийного управления ими и навыков практической работы.		

A 2	формирование знаний о современных средствах релейной защиты и автоматики как об основанных средствах повышения надежности работы систем в нормальных и аварийных режимах
A 3	расширение профессиональных знаний, полученных обучающими в процессе обучения, информирование практических умений и навыков ведения самостоятельной работы

12	**Learning results**	
Код	*EP Description*	Aim codes
CC-83	Able to master practical skills in setting up and testing automatic devices used in systems	A1
CC-84	knows the methods of solving professional problems, the use of modern technologies for determining the parameters of system modes and assessing the effectiveness of control actions in the system	A2
CC-85	knows the principles of construction and operation of the main types of relay protection and automation devices	A3
CC-86	Able to master the skills in formulating the goals and objectives of the practice	A4

13	**Teaching methods**
	The overall Learning results of the internship will be achieved through the following training activities: 1)Verbal: oral presentation (story, explanation, lecture), conversation, independent work teachingstudents with literature, written instruction; 2) Visual: demonstration of visual aids, independent observations of students, Industrial excursions; 3) Practical: exercises for performing techniques, operations, complex work, independent work For the effective conduct of pre-graduate practice, individual consultations with the head of the practice are actively used, collection of scientific literature on the subject of the assignment on pre-graduate practice; discussion of materials of pre-graduate practice, demonstration of presentations on the results of scientific research.
14	**Training methods and technologies**
	At the pre-graduate practice, research methods of teaching are actively used, related to the independent replenishment of knowledge. The overall Learning results will be achieved through the following training activities: -summing up the exam results (after the last student's answer on the examination ticket, the commission begins to discuss the results of the state exam in the conference room). - announcement of the exam results to graduates, -preparation of analysis based on the results; -registration of protocols.
15	**Evaluation methods (evaluation criteria)**
	A grade "A" (excellent) is given if the student during the complex exam has shown excellent knowledge of all programmatic issues of the discipline, as well as on SRO topics, showed independence in the study of theoretical and applied issues in the main program of the discipline being studied. Assessment "A-" (excellent) presupposes excellent knowledge of basic laws and processes, concepts, the ability to generalize theoretical issues of the discipline. The grade "B +" (good) is given if the student has shown good and excellent knowledge of the discipline. The grade "B" (good) is given if the student has shown good knowledge of issues that reveal the main content of a specific topic of the discipline. The mark "B -" (good) is given to the student if he is well-versed in theoretical and applied issues of the discipline, both in the classroom and in the topics of IWS. The mark "C +" (satisfactory) is given to the student in the event that he owns conceptual questions in all types of classroom studies and self-regulatory organizations, can reveal the content of individual modules of the discipline. The mark "C" (satisfactory) is given to the student in the event that he is familiar with the questions of a conceptual nature in all types of classroom studies and IWS, can reveal the content of individual modules of the discipline. The mark "C-" (satisfactory) is given to the student if the student knows only general concepts and can only explain certain patterns and their understanding within the framework of a specific topic. The mark "D +" (satisfactory) is given to the student if he knows only general concepts and can only

	explain certain patterns and their understanding within the framework of a particular topic. The mark "D-" (satisfactory) is given to the student if he possesses the minimum amount of knowledge. The mark "F" (unsatisfactory) is given when the student practically does not possess the minimum theoretical and practical material. The mark "FX" (unsatisfactory) is given when the theoretical content of the course is partially mastered by the student, the necessary practical skills have not been formed, and most of the classroom assignments provided for by the training program have not been completed. Final control - passing a comprehensive exam on tickets orally.
16	**Literature**

1. Закон Республики Казахстан «Об образовании» от 27 июля 2007 года № 319-III ЗРК;
2. Закон Республики Казахстан «О техническом регулировании» от 9 ноября 2004 г. № 603-II ЗРК;
3. Типовые правила деятельности организаций, реализующих образовательные программы высшего профессионального образования, утвержденные постановлением Правительства Республики Казахстан от 2 марта 2005 г. № 195;
4. ГОСО РК 5.04.019-2008 «Государственный общеобязательный стандарт образования Республики Казахстан. Высшее Образование. Бакалавриат. Основные положения», утвержденный приказом Министра образования и науки Республики Казахстан от 23 января 2008 г. № 26.;
5. «Правила проведения текущего контроля успеваемости, промежуточной и итоговой аттестации обучающихся», утвержденный приказом Министра образования и науки Республики Казахстан от 18 марта 2008г. № 125;
6. «Правила организации учебного процесса по кредитной технологии обучения», утвержденные приказом Министра образования и науки Республики Казахстан от 22 ноября 2007 г. № 566.

A: INFORMATION FOR ADMINISTRATION			
1	**Module code**	M FA14	
2	**Module name**	**MODULE OF FINAL CERTIFICATION** 1) NZD Writing and defending a thesis (project) or preparing and passing a comprehensive exam	
3	**Module developers**	Kodanova Sh.K., Iskakova S.SH.	
4	**The faculty-module owner**	Faculty of information technology	
5	**Other faculty involved in the module implementation** **Module mustering duration**	Faculty	% of participating
		Information technologies	100
6		8 semester	
7	**Language of teaching and assessment**	russian, kazakh, english	
8	**Number of academic credits**	12 credits	
9	**Module prerequisites**	Theoretical foundations of electrical engineering-1,2, Electronics and digital design, Information and communication technologies, Elements and devices of automation, Introduction to the theory of signals, Introduction to linear and nonlinear control systems, Introduction to microcontrollers and microprocessor systems, Elective disciplines-1-6	
B. DETAILED INFORMATION ABOUT TRAINING AND TEACHING			
10	**Module description**		

The module includes the degree of professional readiness to perform a certain type of work through the identification of common (key) professional competencies, through a value attitude to the chosen profession, assessed through a system of individual educational achievements, including:

- academic achievements in terms of mastering training courses, subjects;
- qualification as a system of acquired competencies, i.e. readiness to implement the main types of professional activity in terms of mastering training courses, subjects and professional modules. The assessment of graduates' qualifications is carried out with the participation of employers.
- work with professionally-oriented information (provides graduates with readiness to independently search, analyze and create the necessary information);

- organization of professional communications (provides graduates with readiness for constructive interaction in social and professional relations);
- solving professional problems (provides graduates with readiness to change the conditions of professional activity and society);
- designing a professional career (provides graduates with readiness for socio-professional adaptation in the profession and society);
- implementation of social and professional self-development (provides graduates with readiness for self-development and self-realization as a citizen and professional). Assessment of the level of development of general (key) competencies is ensured by the adequacy of the content, technologies and forms of the state final certification.

11	**Module aims**
A1	determination of the compliance of university graduates with the requirements of the state general education standard of education of the State Educational Institution of the Republic of Kazakhstan 3.08. and the qualification characteristics of this specialty;
A 2	systematize, consolidate, expand theoretical and practical knowledge on the use of computer information technologies in the design of information processing systems;
A 3	to develop and improve the skills of independent work, to master the methodology of substantiating design solutions for building an information base, technology for collecting, processing and issuing information, designing software and conducting scientific research;
A 4	to determine the level of readiness of students for independent activity in the conditions of modern production, the progress of computer technology and information technology, a high degree of informatization of society.
A 5	substantiation of the relevance and significance of the solved problem of information support of the design object in a given subject area;
A 6	precise formulation of the topic, goals and objectives of the diploma design;

12	**Learning results**	
Code	*EP Description*	Aim codes
CC-87	Able to master computer information technologies, analyze the features of the organization system design.	A1
CC-88	Able to identify the level of informatization of the object under consideration and to determine the tasks of its development to improve the efficiency of the object;	A2
CC-89	To know the exact wording of the topic, goals and objectives of the diploma design; Knows the pre-project survey of the object, including the collection of initial information about its activities, analysis of the data obtained with an assessment of the effectiveness of production and financial activities;	A3
CC-90	Able to substantiate the relevance and significance of the solved problem of information support of the design object in a given subject area;	A4

13	**Teaching methods**
	The overall Learning results of the internship will be achieved through the following training activities: 1)Verbal: oral presentation (story, explanation, lecture), conversation, independent work teachingstudents with literature, written instruction; 2) Visual: demonstration of visual aids, independent observations of students, Industrial excursions; 3) Practical: exercises for performing techniques, operations, complex work, independent work For the effective conduct of pre-graduate practice, individual consultations with the head of the practice are actively used, collection of scientific literature on the subject of the assignment on pre-graduate practice; discussion of materials of pre-graduate practice, demonstration of presentations on the results of scientific research.

14	**Training methods and technologies**
	At the pre-graduate practice, research methods of teaching are actively used, related to the independent replenishment of knowledge. The overall Learning results will be achieved through the following training activities: -summing up the exam results (after the last student's answer on the examination ticket, the commission begins to discuss the results of the state exam in the conference room). - announcement of the exam results to graduates, -preparation of analysis based on the results; -registration of protocols.

15	Evaluation methods (evaluation criteria)
	A grade "A" (excellent) is given if the student during the complex exam has shown excellent knowledge of all programmatic issues of the discipline, as well as on SRO topics, showed independence in the study of theoretical and applied issues in the main program of the discipline being studied. Assessment "A-" (excellent) presupposes excellent knowledge of basic laws and processes, concepts, the ability to generalize theoretical issues of the discipline. The grade "B +" (good) is given if the student has shown good and excellent knowledge of the discipline. The grade "B" (good) is given if the student has shown good knowledge of issues that reveal the main content of a specific topic of the discipline. The mark "B -" (good) is given to the student if he is well-versed in theoretical and applied issues of the discipline, both in the classroom and in the topics of IWS. The mark "C +" (satisfactory) is given to the student in the event that he owns conceptual questions in all types of classroom studies and self-regulatory organizations, can reveal the content of individual modules of the discipline. The mark "C" (satisfactory) is given to the student in the event that he is familiar with the questions of a conceptual nature in all types of classroom studies and IWS, can reveal the content of individual modules of the discipline. The mark "C-" (satisfactory) is given to the student if the student knows only general concepts and can only explain certain patterns and their understanding within the framework of a specific topic. The mark "D +" (satisfactory) is given to the student if he knows only general concepts and can only explain certain patterns and their understanding within the framework of a particular topic. The mark "D-" (satisfactory) is given to the student if he possesses the minimum amount of knowledge. The mark "F" (unsatisfactory) is given when the student practically does not possess the minimum theoretical and practical material. The mark "FX" (unsatisfactory) is given when the theoretical content of the course is partially mastered by the student, the necessary practical skills have not been formed, and most of the classroom assignments provided for by the training program have not been completed. Final control - passing a comprehensive exam on tickets orally.
16	**Literature**

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5. «Правила проведения текущего контроля успеваемости, промежуточной и итоговой аттестации обучающихся», утвержденный приказом Министра образования и науки Республики Казахстан от 18 марта 2008г. № 125;
6. «Правила организации учебного процесса по кредитной технологии обучения», утвержденные приказом Министра образования и науки Республики Казахстан от 22 ноября 2007 г. № 566.

6. INFORMATION ABOUT DISCIPLINES

No.	Name of the discipline	Brief description of the discipline (30-50 words)	Number of credits	RO
Cycle of general education disciplines University Component/Elective Component				
1	Fundamentals of law and anti-corruption activities	The course studies the concepts of the state, law, as well as the basics of the constitutional law of the Republic of Kazakhstan. Law enforcement agencies and the court. Public administration. Fundamentals of administrative law. Fundamentals of civil and family law. Fundamentals of financial law. Labor law and social security law. Legal framework, principles, national strategy, organizational framework, criminal law and criminal procedure means of combating corruption by law enforcement agencies. Anti-corruption consciousness and culture: content, role and functions. National foundations of anti-corruption culture. Public control as a mechanism for combating corruption.	5	RO1
	Leadership	The content of the discipline characterizes the theoretical aspects of leadership and motivation. Reveals the roles of a leader in a modern company. The power and influence of a leader. Leader concept. Particular attention is paid to the issues of professionalism and personal qualities of the leader. As a result, students acquire team building and leadership skills.		
	Environmental Science and Society	The course is aimed at the formation of representations of the inseparable unity of all components of the environment. Analysis and forecast of the state of the environment in connection with the anthropogenic load. Training in providing measures and methods of safety, maintaining health in the process of life and in the event of an emergency of a man-made and natural nature.		
	Legal basis of professional activity	Financial law, as an academic discipline, makes it possible to study the regulatory potential of financial law as a branch of law that "serves" economic relations of a competitive type; to consider the current legal aspects of finance, the principles, methods and forms of state regulation of finance, the functioning of finance and various factors influencing the financial system in a competitive economy is the goal of disclosing the content of financial law.		
Cycle of basic disciplines University component				
2	Mathematical analysis 1	The course begins with an examination of the most important concept of continuous mathematics - from the limit. The understanding of the limit is fundamental in all continuous and "infinite" mathematics; all differential and integral calculus of functions of one var-	5	RO 3

		iable is based on it, which is essentially the content of the course. Following the limit, the student studies the theory of differential and integral calculus of functions of one variable with numerous applications in various fields of knowledge.		
3	Mathematical Analysis 2	The course is a continuation of the course Mathematical Analysis 1. A third of the course is devoted to the study of sequences and series, and in fact it is a continuation of work with functions of one variable. The student acquires skills in constructing new functions using the concept of a series and studies their smoothness and integrability. The remaining two thirds of the course are devoted to the development of the principles of differential and integral calculus of functions of many variables, starting with the concept of a limit and ending with applications of the theory to solving optimization problems.	5	RO3
4	Discrete Structures	The Discrete Structures (Discrete Mathematics) course is a fundamental course in mathematics education for any IT student. The main topics of the course: introduction to set theory and construction of set algebra: Algebra of logics and algebra of circuits, general Boolean algebra, mathematical induction, combinatorics, introduction to graph theory, theory of languages and automata.	5	RO3
5	Linear algebra	The course of Linear Algebra, together with the courses of Mathematical Analysis and Discrete Structures, forms the necessary mathematical foundation in the education of an IT student, and even wider than any technical program (specialty). The standard topics of the course are vectors and operations on them. Matrix calculus. Systems of linear equations. Introduction to the general theory of vector spaces and linear mappings. At the end of the course, a number of applications of linear algebra in economics, computer graphics, and machine learning are offered.	5	RO 3
6	Differential Equations	Since any mathematical model of physical, biological, sociological and other processes considered in time is described, as a rule, by differential equations, the role of the course as a research tool becomes obvious. The course includes such topics as theorems on the existence and uniqueness of a solution to a differential equation, methods for solving certain classes of differential equations, the Laplace method, using Matlab to obtain approximate ones, elements of stability theory, equations.	5	RO 3
7	Mathematical analysis of a complex variable	The course is one of the core mathematics courses in engineering programs. Complex analysis methods are used to study topics in the field of theoretical foundations of electrical engineering, signal theory, electronics,	5	RO 3

		etc. The course includes the study of differential and integral calculus of functions of a complex variable, analytical functions, series, residue theory, Laplace transform, etc.		
8	Statistics	The course of statistics (or in some programs is called the course of probability theory and statistics) is one of the fundamental courses in any university education in any program, including humanities programs. The first half of the course is devoted to an elementary introduction to the fundamentals of probability theory. The second half discusses the main tools for statistical data processing and the use of various tests: t-Test, F-test, s-Signature, etc. in statistical models. The course is one of the fundamental and has numerous applications, in particular, in machine learning.	5	RO 3
9	Physics 1	The Physics 1 course is practically the main course in the block of courses in the natural sciences. The purpose of the course is to present the main topics of general physics at the university level, that is, using the tools of differential and integral calculus - this is its main difference from the school course of physics, which is physics "on average". Through the prism of mathematical analysis, the student masters the chapters of mechanics (kinematics and dynamics), studies the basic principles of thermodynamics, the theory of electricity and magnetism, which will be used in subsequent courses in electronics, signal theory and many others.	5	RO 1
10	Physics 2	The course is a continuation of the Physics 1 course and is a presentation of the properties of waves and oscillations, topics from optics and quantum mechanics using methods of mathematical analysis. The course is of interest not only as one of the main courses of the block of natural sciences, but also because of the creation in the near future of a new generation of technology (quantum computers).	5	RO 1
11	Programming Principles I	The course teaches students programming based on the Python language. The course begins with an introduction to the basics of procedural-oriented programming. The basic structures of the language are introduced. The student learns how to use Python libraries for programming tasks from a wide variety of fields. The use of Python in machine learning is demonstrated as motivating examples.	6	RO 5
12	Programming Principles II	The course introduces the student to the basics of the C ++ language, which is today the fundamental language of object-oriented programming. The course examines the lexemes of the language, constants, data types, language expressions and instructions used in the language; local and global variables and	6	RO 5

		memory allocation; file classification and function libraries for accessing files, etc.		
13	Ethics, the art of communication and entrepreneurship - a dialogue platform	The course includes weekly meetings with well-known representatives of the business world, statesmen, representatives of culture and science. The purpose of the course is to expand the horizons of the graduate, to provide him with the opportunity to link together ideas about the modern economy and social relations. At the end of the course, the student submits a report-questionnaire based on the results of at least 12 meetings and his understanding of a successful member of society, ready to make responsible decisions.	4	RO 1
14	Theoretical foundations of electrical engineering 1	This course covers the following topics:Linear electrical circuits of direct current.Basic definitions of linear and nonlinear electrical circuits. Voltage across the circuit. Kirchhoff's laws. Drawing up equations for calculating currents using Kirchhoff's laws. The principle of imposition and the method of imposition. Input and mutual conductivities, input impedance. Linear relations in electrical circuits. Two node method. Convert star to triangle and triangle to star.Equivalent Generator Method.Energy transfer fromactive two-terminal load.Mean and effective values of harmonic functions.	5	RO 1, RO 2
15	Theoretical foundations of electrical engineering 2	This course covers the following topics: Determination of the coefficients of the quadripole. Methods for connecting quadripoles. Characteristic parameters of a symmetrical quadripole. Basic concepts and definitions of electrical filters. Symmetric reactive filters. Differential equations of a chain with distributed parameters. Transient processes in a line with distributed parameters. Theory of nonlinear circuits. Nonlinear DC circuits. Nonlinear magnetic circuits of constant flux. Basic concepts and laws of the magnetic circuit. Core transformer and its equivalent circuit. Electric field laws in integral and differential forms. Methods for calculating direct current electric fields. Variable electromagnetic field. Maxwell's basic equations and their physical meaning. The Umov-Poynting theorem for the electromagnetic field.	5	RO 1, RO 2
16	Electronics and digital design	The course is designed for students to master basic knowledge and skills in the field of electronics and circuitry of analog, digital and microprocessor devices. Includes topics: number systems, logic elements, algebra of logic, combinational circuits, memory elements, serial circuits, logic element structures at the transistor level, programmable logic, microcomputer, conversion.	5	RO 2, RO 3

17	Elements and devices of automation	The concept and classification of automation elements. Functional nodes based on integrated amplifiers; with resistive connections, with frequency-dependent feedback; with non-linear elements in input and output circuits and feedbacks. Functional converters based on operational amplifiers. Hydraulic and pneumatic actuators. Matching, setting and comparing elements. Phase detector. DAC and ADC. Measurement of non-electric quantities. Resistance sensors. Inductive and capacitive sensors. Light flux meters, pressure meters, liquid level meters, torque meters. Industrial series of logic elements, design features and performance characteristics of integrated circuits. Adder. Counters. Registers.	5	RO 2, RO 3
18	Introduction to Signal Theory	The course provides methods for the analytical description of regular and random oscillations, the impact of these oscillations on linear devices with constant and variable parameters and on non-linear elements is considered. The generalized autocorrelation functions of signals, the description of circuits using the methods of graph theory and the matrix method for compiling equations of complex circuits, and the theory of synthesis are considered.	5	RO 1, RO 6
Cycle of major disciplines Selectable Component				
19	Robot design	This course introduces the concept of parameterization in robotics. Basic information about the design of robots and robotic systems. Principles of designing robots. Computer-aided design systems. Modeling and analysis of robots. Development of a mathematical description of the robot. Using the solidworks package to develop a 3D robot model. Synthesis of controls based on simplified models of robots. Implementation of the stages of designing a robotic system	5	RO2,RO6, RO9
	Machine learning	Types of machine learning tasks Subject and tasks of machine learning and data analysis. Metric classifiers General view of the metric classifier. Algorithm K nearest neighbors. Algorithms for selecting standards. Clustering algorithms Clustering algorithms with a fixed number of clusters. Density clustering algorithms. Hierarchical clustering. Linear classifiers Perceptron and separating hyperplane. Transition to a higher-dimensional space. Support vector machine. Linear regression. Polynomial regression. Bias and dispersion. Ridge regression.		RO5, RO9, RO10
20	Robotics in production	Content: The basis of automated production systems, especially flexible production. Industrial robots, including sensors and sensor systems. Mechanical design, drive, accuracy	5	RO2,RO6

		and repeatability of industrial robots. Use of industrial robots. Design of industrial robots. Software programming tools for off-grid simulation of industrial robots. Integrated into the production system.		
	Robotization of operations in industry	Contents: The main activities of the robot control system, robot production control and quality control. This course covers the basic manufacturing operations that can be automated using industrial robots. The functions and characteristics of various components of industrial robots are considered.		RO2,RO6,RO 9
21	Robot control with PLC	This course focuses on industrial robot software for small controllers using the IEC 61131-3 standard programming language. The elements of a building automation system using robotic arms and standard control procedures are considered. The topics of creating a safety chain in robot control and its implementation in software are discussed.	5	RO5,RO9
	Introduction to Industrial IC Design	The purpose of this discipline is to study modern methods for designing and calculating industrial microcircuits by solving design problems. The equipment and components of electrical equipment, microelectronics and calculation methods for designing connecting circuits are considered.		RO9,RO10
22	Operating systems and security issues	Statistical analysis of threats to available operating systems; security models of major operating systems; management of AAA, syslog, SQLSERVER; access control methods (SACL/DACL); configuration of the built-in protection systems of the operating system; improving security testing, installing cloud computing tools and platforms; principles of organization and software in the operating system.	5	RO1,RO5,
	Real time operating systems	Students will be able to: understand the design and operation of technical equipment and the principles of factory automation and software; design and operation of automated software systems; develop skills in the use of computer control systems; add Codesys to analyze, design, replicate and implement production systems in real time.		RO4,RO9
23	Mobile development based on iOS	The iOS App Development course covers all the core topics needed to create and publish apps and will equip students with the skills they need to build great apps on their own using tools, SDKs, and the latest feature sets. This course covers the following topics: basic knowledge of the coordination language, the basic Cocoa Touch system, creating user interviews for iPhone and iPad, creating and using tabs, using basic data, table view, animation, hardware, iAd advertising, in-app purchases	5	RO1,RO5, RO10
	Digital communication technologies	A digital communication system is a system that transmits sources (audio, video, data,		RO6,RO7

		etc.). From one place to another, first converts them to a bitstream, and then converts them to a font that can be transferred over channels (wired, wireless, storage, NC). Typically, digital streams are used as an interface between sources and channels, regardless of what type of sources and channels are involved. This course describes the structural characteristics of digital communication systems. We have explained that the mathematical principle of the decay system is different from the terminal code when developing the source code. In each element, we show the code and some of the most widely used algorithms for converting time series waves to bits and vice versa. We introduced in detail the basics of information theory,		
24	Engineering graphics on AutoCad	This course provides an introduction to 2D Computer Graphics and 3D Graphics using Autocad. This knowledge relates to the implementation of technical drawings such as automotive design, electrical design, structural design, process design, and so on. Looking for a CAD Design Engineer.	5	RO2,RO9
	Introduction to Computer Vision	This course focuses on providing useful information from an image using basic computer vision algorithms such as object detection, motion measurement, and monitoring. At the end of this course, students will be better prepared for the next part of the courses such as advanced study, neuroscience, communications, and so on.		RO5,RO9
25	Routing and switching	Basic knowledge of the TCP/IP protocol layer. Basic principles of the Open Shortest Path Oriented Protocol (OSPF) and its implementation in routers. Implementation of Ethernet technology and propagation tree, VLAN, storage, technology and switch. Network security of technology and its implementation in control and switching devices. Basic WIRELESS technologies and processes, as well as the implementation of the Wi-Fi network. Basic network management principles such as SNMP. Fundamentals of WAN protocols such as PPP) and router implementation. Basic knowledge of Ipv6, basic principles and implementation of Icmpv6 and Dhcpv6.9. SDN, the basic principles of this implementation and IT solutions. The basic principles of software are designed for automation.	5	RO5,RO8
	Server engineering: setting up and configuring servers	This section focuses on Honeywell Experion PKS distribution control systems, including system design, server configuration, connecting Experion PKS to OPCs and Honeywell TPS servers, and using Experion PKS data in other applications.		RO5,RO6
26	Security of VEB and mobile applications	Web application threat vector, OWASP security audit and	5	RO8

		OWASP2010/2013/2017RC2 core requirements, identifying and resolving defects in current web platforms, and supporting mobile applications.		
	Security in telecommunication systems	Course content: Safety information and safety overview. Operating system and host security. Fundamentals of network security. Use of encryption and decryption. Security of operation and analysis.		RO8
27	Cyber Security Management: Enterprise, Country and International.	It covers the organization and management of information security services, legal aspects of information security, national and international data security standards, security policies and procedures.	5	RO8,RO10
	Cloud Application Development	It covers DevOps in the cloud business cases that can be delivered, tested, integrated, and distributed to organizations of all sizes. In this course, you'll learn how to set up a DevOps process in the cloud and learn more about DevOps solutions offered by Amazon Web Services, Microsoft Azure, and more.		RO 5, RO 6
28	SCADA systems and industrial networks	This course will introduce you to a decentralized SCADA control system. SCADA system architecture, SCADA and software vendors, SCADA system security, SCADA manager and work center, HMI and remote control, weaknesses, backup, SCADA disaster recovery management, real-time monitoring, n.c.	5	RO4,RO7
	Wireless communication systems and the Internet of things	Another set of topics is the use of wireless technologies as the main tools of the Internet of Things. Course content: A brief description of the wireless network. The basis of WLAN technology. WLAN example. Introduction to Wi-Fi technology and products How a wireless network works. Check your wireless access. Setting up access to a wireless network. Solve the wireless network problem. WiFi antenna. Browse wireless network locations. Another set of topics is the use of wireless technologies as the main tool of the Internet of things.		RO5,RO6
		Cycle of major disciplines **University component**		
29	Introduction to Linear and Nonlinear Control Systems	Students learn how to implement a flexible system using standard options, transfer functions, responses to repetitions, etc. Analysis and integration of a feedback management system using Laplace correction methods, frequent responses, etc. Use matlab to analyze, design, replicate and implement closed systems in real time, get results from the creation of nonlinear control systems using MATLAB and special methods; perform calculations to analyze the stability of non-linear systems and initialize controllers according to system quality requirements.	6	RO2,RO3
30	Automation of standard technological processes	Course Content: An introduction to automation system design issues, operating princi-	6	RO4,RO9

		ples and strategies, key system functions, large operational challenges, labor standards, and automated performance.		
31	Introduction to micro-controllers and micro-processor systems	The course will focus on the key features and performance parameters of microprocessors, as well as small software controls for use in robotic applications. Advantages and disadvantages of SMP and MMP systems. Multi-cell data processing system, for example, students learn the basics of small-scale control as well as complex programming. We work on real industrial facilities. Grafcet language; GEM; SFC structure; performance barrier language (FBD); SFC to FBD conversion	5	RO2,RO5
32	Theoretical mechanics	This course provides an introduction to 2D Computer Graphics and 3D Graphics using Autocad. This knowledge relates to the implementation of technical drawings such as automotive design, electrical design, structural design, process design, and so on. Looking for a CAD Design Engineer.	5	RO2,RO7

7. MATRIX OF CORRELATION

oflearning results for the educational program as a whole with the formed competencies (learning results of the components)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
KK-1			+							
KK-2			+							
KK-3			+							
KK-4			+							
KK-5			+							
KK-6			+							
KK-7			+							
KK-8			+							
KK-9			+							
KK-10			+							
KK-11					+					
KK-12					+					
KK-13										+
KK-14									+	
KK-15									+	
KK-16									+	
KK-17									+	
KK-18									+	
KK-19									+	
KK-20									+	
KK-21									+	
KK-22	+									
KK-23	+								+	
KK-24	+								+	
KK-25	+								+	
KK-26	+								+	
KK-27	+									
KK-28	+									
KK-29	+									
KK-30	+									
KK-31	+						+			
KK-32	+						+			
KK-33	+						+			
KK-34	+						+			
KK-35					+		+			
KK-36					+		+			
KK-37					+		+			
KK-38					+		+			
KK-39						+				
KK-40						+				
KK-41						+				
KK-42						+				
KK-43		+	+			+		+		
KK-44		+	+			+		+		
KK-45		+	+			+		+		
KK-46		+	+			+		+		
KK-47		+	+			+				
KK-48		+	+			+				
KK-49		+	+			+				
KK-50		+	+			+				
KK-51		+		+		+				
KK-52		+		+		+				
KK-53		+		+		+				
KK-54		+		+		+				
KK-55									+	
KK-56									+	

КК-57									+	
КК-58									+	
КК-59						+			+	
КК-60						+			+	
КК-61						+			+	
КК-62						+			+	
КК-63					+					
КК-64					+					
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КК-67									+	
КК-68									+	
КК-69									+	
КК-70									+	
КК-71			+							
КК-72			+							
КК-73			+							
КК-74			+							
КК-75						+	+		+	
КК-76						+	+		+	
КК-77						+	+		+	
КК-78						+	+		+	
КК-79								+		
КК-80								+		
КК-81								+		
КК-82								+		
КК-83										+
КК-84										+
КК-85										+
КК-86										+
КК-87										+
КК-88										+
КК-89										+
КК-90										+

8. SUMMARY TABLE

Semester	GED RC	GED OC	BD UC	BD OC / Minor*	ПД ВК	PD OC	FA	Total	Duration (including session but without holidays)
1	15		16						
2	10		21						
3	9		20						
4	7		15			5			
5	5		10	5	6	5			
6	5			5	16	5			
7		5	10	5		10			
8				5	8	5	12		
Total	**51**	**5**	**92**	**20**	**30**	**30**	**12**	**240**	

9. ADMINISTRATION SHEET OF EP

EXPERTS:

Full name	Position	Signature and date

The educational program **is considered and recommended** for approval at the meetings of:

Council of the Faculty of information technology

protocol № 9 "24" 04 2021 y.

Chair of the faculty Council _____ c.t.s., Iskakova S.Sh.
(signature) (Ф.И.О)

Educational-methodical council of the university

protocol № 5 "29" 04 2021 y.

Chairman of the EMC of the university _____ PhD Kumalakov B.A.
(signature) (name)

9. ADMINISTRATION SHEET OF EP

EXPERTS:

Full name	Position	Signature and date
Shakatayeva Assel	Project Manager	
Shabdirov Daryn	c.ph.-m.s., professor	
Дробышев	Директор АО	
Касанов ИБ	Начальник ПО	

Educational program reviewed and recommended for approval at meetings of:

department «Information technologies»

protocol № 9 "24" 04 2021 y.

Dean of faculty IT ____________ Iskakova S. Sh.
(signature) (full name)

Educational-methodical council of university
protocol № 5 "29" 04 2021 y.

Chairman of EMC of university ____________ Kumalakov B.A.
(signature) (full name)