Deputy Director General IICT
KN of the MIAR RK, associate professor, PhD
_____ Mamyrbayev O.Zh.
«__24__» _____ 2023 y.

APPROVED
Director of the A&T Institute
_____ A. Toygozhinova
«__26__» _____ 2023 y.

CATALOG OF DISCIPLINES OF THE OPTIONAL COMPONENT

EDUCATIONAL PROGRAM **6B06116 - Information systems**

Degree to be conferred: bachelor **Period of study: 4 years old** **Year of admission: 2023 y.**

Модуль	Cycle	Component	Name of the discipline	General labor intensity		Semester	Learning Outcomes	Brief description of the discipline	Prerequisites	Postrequisites
				in academic hours	in academic credits					
1	2	3	4	5	6	7	8	9	10	11
Module 3 Ecology and life safety	ООД	KB1	Ecology and life safety	150	5	3	PO12	The study of the basic environmental concepts, environmental problems and approaches to their solution, sources and types of environmental pollution by enterprises, the principles of standardizing the quality of atmospheric air and water, the main provisions of legislation in various fields, natural and man-made emergencies, their causes, methods of prevention and protection . Teaching methods - case-study analysis, group discussions	Basic school knowledge on ecology	Occupational Safety and Health
Module 1 General education disciplines		KB2	Scientific research methods				PO12	Obtaining theoretical and applied knowledge by students on the methods of scientific research of problems in the field under study, training of specialists with the skills of cognitive activity in the field of science, the formation of deep ideas about the content of scientific activity, its methods and forms of knowledge. Active learning methods - Group, scientific discussion, debate, project method	Socio-Political Knowledge Module	Training practice, Production practice 1, Production practice 2, Final certification

Module 2 Economic and managerial competencies		KB3	Fundamentals of Economics and Entrepreneurship				PO12	Formation of analytical thinking skills in the implementation of conclusions on economic issues; the ability to independently draw conclusions on the basis of the studied material; navigate in any economic situations, apply theoretical economic knowledge in practice, realize their abilities, both in a personal and professional direction. Active learning methods - business and role-playing games	Socio-Political Knowledge Module	Managerial economics, Time management
Module 1 General education disciplines		KB4	Fundamentals of law and anti-corruption culture				PO12	Improving the public and individual legal awareness and legal culture of students, as well as the formation of a system of knowledge and civil position to combat corruption as an anti-social phenomenon. As a result of studying the course, the student must master the fundamental concepts of law, the constitutional structure of the state power of the Republic of Kazakhstan, the rights and freedoms of citizens enshrined in the Constitution, the mechanism and protection of the legitimate interests of a person in case of their violation. Active learning methods - case studies, brainstorming	Socio-Political Knowledge Module	Managerial economics, Time management
Module 8 Administration of information systems and networks	БД	KB5	Fundamentals of computer networks and telecommunications (Cisco +Huawei)	180	6	4	PO3	PO3 Students ' mastering the principles of building and functioning of local, regional, global computer networks and mobile telecommunications, as well as obtaining practical skills in the following areas: working with their information resources, working with Cisco and Huawei networks, SD-WAN and SDN. Active learning methods - "simulator" training methods, i.e. aimed at the formation of special knowledge, skills: situational tasks, error detection method, project method, case method, open and closed tests	Information and communication technologies, Fundamentals of computer modeling	Cybersecurity, Reliability of information systems
		KB6	Fundamentals of cloud infrastructure				PO3	Mastering the technology of creating a cloud service, work With existing cloud services, students will learn how to use cloud computing and be ready to apply cloud computing technology to solving IT process optimization problems. The discipline uses interactive teaching methods, computational and analytical method, case task method, game methods	Information and communication technologies, Fundamentals of computer modeling	Big Data Storage and Processing, Introduction to SQL for BigQuery and Cloud SQL
Module 3 IT competencies		KB7	Системы управления роботами	180	6	5	PO4, PO8	Mastering the basics of robotics, designing robots based on the Arduino complex and programming in the Arduino IDE development environment. The teaching methods are:	Engineering Mathematics, Applied	Artificial intelligence

	БД							solving problems, conducting thematic colloquiums, brainstorming seminars	Physics Fundamentals of Computer Modeling, Fundamentals of Algorithmization and Programming	
		КВ8	Тестирование программного обеспечения				PO4, PO7	Formation of knowledge and skills on issues of software quality control - verification and testing of software products. Active teaching methods: case methods; business role-playing games, group work	Engineering mathematics, Fundamentals of computer modeling, Fundamentals of computer networks and Telecommunications (Cisco +Huawei)/ Fundamentals of Cloud Infrastructure, Digital Electronics/Digital Devices and Microprocessors	Computer-aided design Systems in Telecommunications, Introduction to MongoDB, Machine Learning A-Z: Python & R in Data Science
Module 6 General engineering competencies	БД	КВ9	Computer graphics and design	180	6	6	PO9	Developing knowledge and skills in creating graphic objects, special effects, animation, audio accompaniment or other visual images for use in computer games, movies, music videos, videos,etc. Media and advertising. Active learning methods: case studies, business role-playing games,small group work.	ICT	WEB programming
		КВ10	Basics of AutoCAD				PO9	Formation skills of working with the graphic editor Autodesk Autocad, the ability to create architectural 2D, 3D images of objects, knowledge of the principles of modeling architectural objects in Autodesk AutoCAD. Active learning methods are used, such as small group work and brainstorming.	ICT	WEB programming
Module 6 General	БД	КВ11	Optimization methods	180	6	7	PO11	The study of the theoretical foundations of modern concepts and models of optimization and mathematical modeling, the	Engineering mathematics	Decision theory, Big Data

engineering competencies								application of algorithms of numerical methods and basic tools in the field of optimization methods to solve current engineering and economic problems. Methods of active learning are used - the method of working in small groups, "brainstorming".		storage and processing, Production practice 2
		KB12	graph theory				PO11	The study of structures and data processing models of automata represented by graph structures, preparation for conscious use, both the construction of graph models, and methods for their implementation and use. Active learning methods are used - the method of working in small groups, "brainstorming".	Engineering mathematics	Production practice 2
Module 6 General engineering competencies	БД	KB13	Circuit design	180	6	3	RO1	Formation of students' knowledge and skills in the field of construction and functioning, ongoing physical processes, methods for analyzing the simplest electronic devices, as well as the synthesis of more complex devices based on them.	applied Physics	Theory of electrical circuits
		KB14	Digital signal processing				RO1	Elucidation of the role and importance of digital signal processing in the reception and transmission of information, the features and advantages of digital representation of signals, the study of digital transformation algorithms, the implementation of digital processing in telecommunications, information-measuring and radio-physical systems and its application in various fields of science, technology and production.	Applied physics , ICT	Theory of electrical circuits, Fundamentals of computer networks and telecommunications (Cisco + Huawei)
Module 7 Database design and administration	БД	KB15	Object Oriented Programming	180	6	4	PO3	Studying the basics of the classical theory of object-oriented programming, including: the evolution of programming technologies from algorithmic to OOP, the basic principles of object-oriented construction of software systems (Abstraction, Encapsulation, Hierarchy, Modularity, Typing, Parallelism, Persistence), the concepts of classes, objects , relationships between them, as well as a multi-level OMG model. studying the means of object-oriented and generalized programming of the C ++ language, the means of the STL standard library. Within the framework of the discipline, active learning methods are used - presentations based on modern multimedia tools, a method of working in small groups.	ICT, Fundamentals of algorithmization and programming	Java Programming , Big Data Storage and Processing , MongoDB
		KB16	Linux				RO7	Formation of the ability of future students to work with the	ICT	Databases in IS

			operating systems					structures and mechanisms of various operating systems, as well as in the Linux operating system. Within the framework of the discipline, the following aspects of Linux are considered: functions and architectural requirements for the OS, general principles of resource management, file system architecture, memory management, input management, data management system. In practical exercises, Linux (Ubuntu) OS is used. Within the framework of the discipline, active learning methods are used - "brainstorming", thematic discussion.		
Module 5 Programming and data processing	ПД	КВ17	Java Programming	180	6	5	RO8	Formation of a system of concepts, knowledge, skills and abilities in the field of modern programming, which includes methods for designing, analyzing and creating software products in the Java language, based on the use of object-oriented methodology. Within the framework of the discipline, active learning methods are used - presentations based on modern multimedia tools, the method of working in small groups, practical analysis of the results.	ICT, Fundamentals of algorithmization and programming	WEB-programming , Storage and processing of big data
		КВ18	Python Programming				RO8	Formation of students to create modern cross-platform applications in Python using the universal PyQt5 graphics platform, interaction with the Internet, office documents, databases, graphics, multimedia and printing. Within the framework of the discipline, active learning methods are used - laboratory experiments, the method of working in small groups, "brainstorming".	ICT, Fundamentals of algorithmization and programming	Artificial intelligence , Big data storage and processing , Machine Learning A - Z : Python & R in Data Science
Module 5 Programming and data processing	ПД	КВ19	Storage and processing of big data	270	9	8	RO9	Providing students with the necessary knowledge and skills to work with big data based on relational and non-relational databases. Studying the basic concepts related to big data, its storage and processing, the basic principles of working with relational databases and building database architecture, mastering basic knowledge of the SQL query language and data visualization, studying the main types of data processing, introduction to modern big data processing languages . To master the discipline, software is used: Windows, Microsoft Office, AnacondaNavigator, Dbeaver, Superset, Internet access. Within the framework of the discipline, active learning methods are used - the method of	ICT, Fundamentals of algorithmization and programming, Object-oriented programming , Databases in information	Field trip 2, Final certification

								working in small groups, laboratory experiments.	systems , Optimization methods , Python programming , Java programming , Fundamentals of cloud infrastructure	
		KB20	Programming in 1C				RO9	Formation of students about programming on the basis of "1C:Enterprise", general concepts about the main objects that make up applied solutions, and their acquisition of initial practical skills in working in various options and modes of the system. Within the framework of the discipline, active learning methods are used - the method of working in small groups, laboratory experiments.	ICT, Fundamentals of algorithmization and programming	Field trip 2, Final certification
Module 8 Reliability and automation of information systems	ПД	KB21	Reliability of information systems	180	6	7	RO10	Formation of students' knowledge on modern methods and means of assessing the reliability of information systems for their use in solving problems of improving the efficiency and safety of functioning. Methods of active learning - the method of working in small groups, laboratory experiments.	ICT, Cybersecurity	Field trip 2, Final certification
		KB22	Smart technologies and automation				RO10	Formation of knowledge and skills in creating, accumulating and processing information in a distributed system with the integrated use of smart technologies and its application in service automation to regulate indicators in real time. As a result of studying the discipline, the student will be able to: 1. discuss the Internet of things Iot; 2. analyze the use of smart technologies in automation to regulate indicators in real time; - evaluate the effectiveness of the practical application of smart technologies in various areas of life. Methods of active learning - the method of working in small groups, laboratory experiments.	ICT, Fundamentals of algorithmization and programming	Field trip 2, Final certification
Module 2 Economic and managerial competencies		KB23	Managerial Economics (Minor 1)	90	3	5	RO11	Formation of the conceptual apparatus and development of economic analysis skills using modern models and laws of economic science, consideration of economic problems and tasks facing the head of the company. The study of this discipline will allow students to gain and develop	Fundamentals of Economics and Entrepreneurship, Fundamentals	final examination

								knowledge in the field of analytical research of economic, technological and technical parameters of an enterprise, and will also allow them to master the skills of applying special methods of economic justification of management decisions and assessing their consequences. Active learning methods are applied - situational tasks, case method	of Law and Anti-Corruption Culture	
		KB24	Time Management (Minor 2)				RO11	Formation of students' general ideas about the essence and types of time management, principles and methods of time resource management for more successful professional activities. Active learning methods are applied - situational tasks, case method	Fundamentals of Economics and Entrepreneurship, Fundamentals of Law and Anti-Corruption Culture	final examination
Module 5 Professional programming languages		KB25	Introduction to MongoDB (Minor 1)		3	6	RO10	Formation of students' ability to process large amounts of data (MongoDB) to solve professional problems, effectively apply methods, technologies and tools for analyzing big data in professional activities. Active learning methods are applied - group work	Fundamentals of algorithmization and programming, Object-oriented programming	final examination
		KB26	Machine Learning AZ: Python & R in Data Science (Minor 2)				RO10	Familiarization of students with the Data area Science and Machine Learning , which cover data visualization, data analysis, libraries and open source tools. Active learning methods are applied - group work	Fundamentals of algorithmization and programming, Fundamentals of computer modeling , Python programming , Software testing	final examination
		KB27	Введение в SQL для	90		7	PO3, PO4,	Learning fundamental SQL sentences and executing structured queries in BigQuery and Cloud SQL, being able	Fundamentals of	final examination

Module 7 Database design and administration			BigQuery и Cloud SQL (Минор 1)				PO5, PO7	to define various components and hierarchies in the BigQuery console, run CREATE DATABASE, CREATE TABLE, DELETE, INSERT INTO and UNION queries in Cloud SQL. Active learning methods are used - brainstorming, work in small groups.	algorithmization and programming , Fundamentals of computer modeling , Fundamentals of information systems , Databases in information systems b Databases in information systems	
		KB28	Microsoft Power BI (Минор 2)				PO3, PO5	Formation of students' skills and knowledge to collect, analyze and structure data in order to build interactive dashboards, program at the modern level of development of the MDX multidimensional data analysis language , build models and algorithms for projects in current areas of BI technology , be able to analyze the essence of the subject field of the project and make decisions. Active learning methods are used - brainstorming, work in small groups.	ICT	final examination
Total				**1950**	**68**					

Head of the Department "ICT" _____ **D.T. Kasymova**