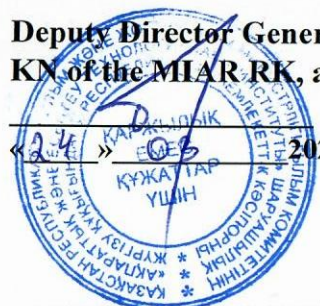


Deputy Director General ICT  
 KN of the MIAR RK, associate professor, PhD  
 Mamyrbayev O.Zh.



2023 y.



APPROVED  
 Director of the A&T Institute  
 A. Toygozhinova

2023 y.

CATALOG OF UNIVERSITY COMPONENT DISCIPLINES

ABOUT THE EDUCATIONAL PROGRAM

6B06118 Software Engineering

Degree to be conferred: bachelor

Period of study: 4 years old

Year of admission: 2023 y.

Модуль	Cycle	Component	cycle Name of the discipline	Total labor		intensity of the semester	Learning outcomes	Brief description	Cycle	Component
				requirements in academic hours	in academic credits					
1	1	2	3	4	5	6	7	1	2	3
Module 4 Ecology and life safety	OOD	KV1	Ecology and life safety	Railways 150	5	3	RO2	Study of basic environmental concepts, environmental problems and approaches to their solution, sources and types of environmental pollution by enterprises, principles of regulating 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, group discussions	Basic school knowledge on ecology	Labor protection

Module 1 General education disciplines		KV2	Methods of scientific research				PO11	Students ' acquisition of theoretical and applied knowledge on methods of scientific research of problems in the field under study, training of specialists with cognitive skills in the field of science, formation of deep ideas about the content of scientific research activities, their methods and forms of knowledge. Methods of active learning-Group, scientific discussion, dispute, project method	Module of socio-political knowledge	Training practice, Production practice 1, Production practice 2, Final certification
Module 2 Economic and managerial competencies		KV3	Fundamentals of economics and entrepreneursh ip	150	5	3	RO2	Formation of analytical thinking skills when making conclusions on economic issues; ability to independently draw conclusions based on the material being studied; to navigate in the field of economic development. in any economic situation, apply theoretical economic knowledge in practical activities, realize their abilities, both in personal and professional areas. Active learning methods-business and role-playing games	Socio- political knowledge module	Managerial Economics, Time Management
Module 1 General education disciplines		KV4	Fundamentals of Law and Anti- corruption culture				RO12	Improving students ' social and individual legal awareness and legal culture, as well as forming a system of knowledge and civic position on combating corruption as an anti-social phenomenon. As a result of studying the course, the student should master the fundamental concepts of law, the constitutional structure of state power of the Republic of Kazakhstan, the rights and freedoms of citizens enshrined in the Constitution, the mechanism and protection of legitimate interests of a person in case of their violation. Methods of active learning-analysis of specific situations, brainstorming	Module of socio-political knowledge	Management economics, Time management
Module 8 Administratio n of information systems and networks		KV5	Fundamentals of computer networks and telecommunic ations (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 communicatio n technologies, Fundamentals of computer modeling	Cybersecurity, Reliability of information systems

	DB	KV6	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
		KV7	Robot control systems				PO3, PO6	Mastering the basics of robotics, designing robots based on the Arduino complex and programming in the Arduino IDE development environment. Methods of training are: problem solving, conducting thematic colloquiums, brainstorming seminars	Engineering Mathematics, Applied Physics Fundamentals of Computer Modeling, Fundamentals of Algorithmization and Programming	Artificial intelligence
Module 3 IT competencies	Database	KV8	Software testing	180	6	5	PO3	Formation of knowledge and skills on software quality control-verification and testing of software products. Active learning methods: case studies; 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	DB	KV9	Computer Graphics and Design	180	6	5	PO4	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.	IKT	WEB programming
		KV10	Basics of AutoCAD	180	6	7	PO7	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.	IKT	WEB programming
Module 9 Application Development	DB	KV10	Fundamentals of mobile applications	180	6	6	PO7	Studying the architecture of mobile devices, their operating systems, and platforms for mobile development. Forming an idea of the Ideandroidstudio mobile application development platform and modern environment, as well as the use of the SQLite DBMS. Within the framework of the discipline, active learning methods are used - the method of working in small groups, "brainstorming".	Engineering mathematics	Decision theory, Big Data storage and processing, Production practice 2
				180	6	3				
		KV11	Parallelism in algorithms and programming				RO1	Acquisition of knowledge and skills on the basics of parallel programming and parallel data processing using computer tools. Ability to program and create software products using	Engineering mathematics	Production practice 2

								parallel algorithms in programming languages that support parallelization, as well as using MPI, OpenMP, and PVM technologies. exam		
Module 6 General engineering competencies	DB	KV12	Circuitry	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.	Engineering mathematics	Theory of electrical circuits
		KV13	Digital signal				process ing	PO1 Elucidation of the role and significance of digital signal processing in information reception and transmission, features and advantages of digital signal representation, study of digital transformation algorithms, implementation of digital processing in telecommunications, information-measuring and radiophysical systems and its application in various fields of science, technology and production.	Engineering mathematics	Theory of electrical circuits
Module 7 Database design and Administration	PD	KV14	Object-oriented programming	180	6	4	PO3	Study of the basics of the classical theory of object-oriented programming, including: ways of evolution of programming technologies from algorithmic to OOP, basic principles of object-oriented construction of software systems (Abstraction, Encapsulation, Hierarchy, Modularity, Typing, Concurrency, Persistence), concepts classes, objects, and relationships between them, as well as the multi-level OMG model. study of object-oriented and generalized programming tools of the C++ language, tools of the STL standard library. The discipline uses active learning methods - presentations based on modern multimedia tools, the method of working in small groups.	Applied Physics, ICT	Knowledge bases and expert systems, Analysis and design of software applications
		KV15	Linux Operating Systems				PO7	Formation of future students ' ability to work with the structures and mechanisms of various operating systems, as well as in the Linux operating system. The discipline covers the following aspects of Linux: OS functions and architectural requirements, general principles of resource management, file system architecture, memory management, input management, and data management system. Practical classes use the Linux (Ubuntu) operating system. Within the	ICT	Database Basics

								framework of the discipline, active learning methods are used - "brainstorming", thematic discussion.		
Module 7 Database design and Administration	.PD	KV16	Neural networks	180	6	5	PO8	Study of the basic principles of organizing information processes in neurocomputer systems, formation of logical thinking, formation of skills in developing and implementing software models of neurocomputer systems. Within the framework of the discipline, active learning methods are used - the method of working in small groups, laboratory experiments. Python programming language	KV18	is used KV18 Modern DBMS in corporate systems
		KV17	is used KV18 Modern DBMS in corporate systems				PO8	Studies the structure, evolution, classification of corporate DBMS, management concepts of corporate DBMS, basic concepts of corporate governance supported by modern corporate systems, the concept of CPR-planning of production capacity requirements, the concept of MPR - planning of materials requirements, the concept of EPR-enterprise resource planning, etc	KV19	Big data storage and processing
Module 5 Programming and data processing	PD	KV18	Big data storage and processing	270	9	8	PO9	Providing students with the necessary knowledge and skills to work with big data based on relational and non-relational databases. Study of basic concepts related to big data, its storage and processing, basic principles of working with relational databases and building a 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, the following 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 working in small groups, laboratory experiments.	ICT, Fundamentals of algorithmization and programming, Object-oriented programming, Databases in information systems, Optimization methods, Python programming, Java programming	Field trip 2, Final certification

									g, Fundamentals of cloud infrastructure	
		KV19	Programming in IC				PO10	Formation of students about programming on the basis of "IC:Enterprise", general concepts about the main objects that are part of application solutions, and their acquisition of initial practical skills in working in various versions 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 10 Modern technologies	PD	KV20	Introduction to Blockchaintechhnologies	180	6	7	RO10	Study of blockchain technology (distributed registry) with an emphasis on its mathematical and technical foundations, as well as applied aspects. Ability to model cryptographic primitives and the simplest blockchains in the Jupiter Notebook web application, be able to program and run simple smart contracts in the Solidity language. Active learning methods - small group work, laboratory experiments.	Engineering mathematics, ICT, Fundamentals of Algorithmization and programming, Fundamentals of Computer Modeling	Field trip 2, Final certification
		KV21	Industrial Software Engineering				PO11	Formation of students ' theoretical and practical basis for mastering modern engineering principles of creating reliable, high-quality software that meets the requirements of international standards. Methods of active learning are used - the method of working in small groups, brainstorming, and the case method.	ICT, Fundamentals of Algorithmization and Programming, Fundamentals of Computer	Field trip 2, Final certification

									Modeling, Robot Control Systems, Software testing	
Module 2 Economic and managerial competencies		KV22	Time management (Minor 2)	90	3 3 3	5 6	RO11	Study of blockchain technology (distributed registry) with an emphasis on its mathematical and technical foundations, as well as applied aspects. Ability to model cryptographic primitives and the simplest blockchains in the Jupiter Notebook web application, be able to program and run simple smart contracts in the Solidity language. Active learning methods - small group work, laboratory experiments.	Fundamentals of Economics and Entrepreneurship, Fundamentals of Law and Anti-Corruption Culture	final examination
		KV23	Introduction to MongoDB (Minor 1)				PO10	Formation of students' theoretical and practical basis for mastering modern engineering principles of creating reliable, high-quality software that meets the requirements of international standards. Methods of active learning are used - the method of working in small groups, brainstorming, and the case method.	Fundamentals of Economics and Entrepreneurship, Fundamentals of Law and Anti-Corruption Culture	final examination
Module 5 Programming and data processing		KV25	Introduction to MongoDB (Minor 1)	90		6 7	RO10	Formation of students' ability to process large amounts of data (MongoDB) to solve professional problems, effectively apply methods, technologies and tools big data analysis in professional activities. Active learning methods are used-group work	Fundamentals of computer networks and telecommunications (Cisco +Huawei)/ Basics of cloud infrastructure and Robot management systems/Softw	Final certification



									are Testing	
		KV26	Machine Learning A-Z: Python & R in Data Science (Minor 2)				PO10	Introduces students to the fields of Data Science and Machine Learning, which cover data visualization, data analysis, open source libraries and tools. Active learning methods are used - group workand	Fundamentals of computer networks and telecommunications (Cisco +Huawei)/ Basics of cloud infrastructure and Robot management systems/Software Testing	Final Certification
Module 7 Database design and Administration		KV27	Introduction to SQL for BigQuery and Cloud SQL (Minor 1)	90	3	7	PO10	Learning fundamental SQL sentences and executing structured queries in BigQuery and Cloud SQL, being able 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.	Fundamentals of algorithmization and programming, Fundamentals of computer modeling, Fundamentals of information systems, Databases in information systems b Databases in information systems	final examination
		of KV28	Microsoft Power BI				RO10	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	ICT	final examination

			(Minor 2)					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.		
<b>Total</b>			<b>1950</b>	<b>68</b>						

Head of the Department "ICT" \_\_\_\_\_



**D.T. Kasymova**