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

APPROVED
Director of the E&DT Institute
A. Toygozhinova
«13» 03 2026 y.

CATALOG OF DISCIPLINES OF THE UNIVERSITY COMPONENT

EDUCATIONAL PROGRAM **6B06116 - Information systems (by industry)**

Level of education: bachelor's **degree Duration of study: 3 years** **Year of admission: 2026**

Cycle	Component	Name of the discipline	General labor intensity		Semester	Learning Outcomes	Brief description of the discipline	Prerequisites	Post-requirements
			in academic hours	in academic credits					
1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
Natural science competency module									
BD	UC	Engineering Mathematics	150	5	1	LO1	The discipline "Engineering Mathematics" is designed to provide students with fundamental mathematical knowledge and skills necessary to solve applied problems in engineering and technical fields. The course covers the main sections of linear algebra, analytical geometry, differential and integral calculus of a function of one variable. The discipline studies mathematical methods used in the analysis, modeling and optimization of technical systems, which are key competencies for future engineers. Within the framework of the discipline, methods of interactive learning and the performance of computational and graphical work are used.	Basic school knowledge of mathematics	Probability theory and mathematical statistics, Discrete mathematics, Theory of electrical circuits
BD	UC	Probability	150	5	2	LO1	Formation of students" theoretical knowledge and practical	Engineering	The basics of

		theory and mathematical statistics					skills on the basics of probability theory and mathematical statistics as the main mathematical apparatus for building models of random phenomena, mastering methods of mathematical modeling and analysis of such phenomena. Have skills in using statistical methods to solve problems of parameter estimation and hypothesis testing.	Mathematics	artificial intelligence
BD	UC	Fundamentals of information systems	150	5	2	LO6, LO7, LO10	Studying the structure, hardware and software of information systems, the structure of the information process, methods of system analysis in setting and algorithmizing the tasks of an information system, building a conceptual model of information systems, their application and development tools in the process of solving situational problems of systems. Within the framework of the discipline, programs are used: the SQL language. Methods of active learning - computer modeling and practical analysis of the results, "brainstorming".	Fundamentals of algorithmization and programming	Programming in Python, Cloud Technologies, Innovative Design in IT, Databases, Cybersecurity, IT infrastructure, IP Project Management, Industrial practice 1
BD	UC	Discrete mathematics	120	4	2	LO1	The key concepts of discrete mathematics, including set theory, combinatorics, graphs and algorithms, are considered. Methods of logical inference, properties of finite automata and principles of algorithm construction are studied. The skills of analyzing discrete structures and solving problems related to graphs and combinatorial problems are being formed. The acquired knowledge is used to solve practical problems in computer science and other related fields.	Engineering Mathematics	Theory of electrical circuits, Industrial practice 1
Professional module									
BD	UC	Programming in Python	180	6	3	LO4, LO5	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".	Fundamentals of algorithmization and programming, Fundamentals of information systems	Cloud Technologies, AppStorm Mobile Application Development, VR/AR technology and development, Web

									programming, Full-Stack Web Application Development, Basics of the internet of things, Industrial practice 1
BD	UC	Fundamentals of algorithmization and programming	150	5	1	LO4	The discipline is aimed at developing knowledge, skills, and practical competencies in algorithm design, the use of fundamental data structures, and the development, testing, and debugging of programs for solving information processing tasks.	Basic school knowledge of computer science	Fundamentals of information systems, Programming in Python, The basics of artificial intelligence, Educational practice, AppStorm Mobile Application Development, Web programming, Databases, Cybersecurity, Full-Stack Web Application Development, Basics of the internet of things, Industrial practice 1
BD	UC	Cloud Technologies	150	5	4	LO5	The discipline “Cloud Technologies” is aimed at studying modern methods of data storage, processing, and transmission using cloud computing. The course covers the main models of cloud services (IaaS, PaaS, SaaS), the architecture of cloud platforms, virtualization, containerization, as well as issues of security and administration of cloud infrastructure.	Fundamentals of information systems, Programming in Python	Full-Stack Web Application Development, IT infrastructure, IP Project

									Management, Industrial practice 2/ Pre-graduation practice
BD	UC	Occupational safety and health	150	5	5	LO12, LO13	Occupational Safety and Life Safety is a discipline that studies workplace safety requirements and methods of protecting human life and health. The course develops skills for preventing hazardous situations and acting correctly in emergency conditions.	Basic knowledge of life safety	Industrial practice 2/ Pre-graduation practice
BD	UC	Theory of electrical circuits	150	5	3	LO1	Theoretical and practical training of students in the field of the theory of electrical circuits to such an extent that they can choose the necessary electrical, electronic, electrical measuring devices, be able to properly operate them and, together with specialists, draw up technical specifications for the development of electrical parts of various installations and equipment in their professional activities. Within the framework of the discipline, interactive teaching methods, the calculation-analytical method, the case-task method, game methods are used.	Engineering Mathematics, Discrete mathematics	Basics of the internet of things
Information technology and artificial intelligence module									
BD	UC	3D modeling and visualization	90	3	1	LO3, LO4, LO10	The discipline "3D modeling and visualization" is devoted to the study of the basics of designing three-dimensional objects, scenes and their visualization using modern technologies and software. This course is aimed at developing students' knowledge and practical skills necessary to work in the field of digital content creation, architectural design, game development, virtual and augmented reality, as well as other creative industries	Basic school knowledge of computer science	Innovative Design in IT, Educational practice, VR/AR technology and development
BD	UC	Innovative Design in IT	90	3	3	LO4, LO8, LO9	The discipline “Innovative Design in IT” is aimed at developing skills in creating and implementing IT startups. The course covers the fundamentals of developing innovative ideas, designing digital products, teamwork, and presenting startup projects.	3D modeling and visualization, Fundamentals of information systems	IP Project Management
BD	UC	The basics of artificial intelligence	120	4	3	LO4, LO5, LO10	The discipline introduces students to the basic concepts, methods and applications of artificial intelligence. The purpose of the course is to provide students with basic knowledge about the possibilities and applications of artificial intelligence in the modern world and their significance for various fields of activity	Fundamentals of algorithmization and programming, Probability	AppStorm Mobile Application Development, Full-Stack Web

								theory and mathematical statistics	Application Development, Basics of the internet of things
Practice-oriented module									
BD	UC	Educational practice	60	2	2	LO1 – LO12	The Organization of Educational Practice Is Aimed at Ensuring Familiarization of Bachelors with the Main Areas, Objects, Areas of Professional Activity and Profiles of Training and Consolidation of Theoretical Material, as Well as Conducting Study Tours in the Branch of the Department for This Educational Program.	Fundamentals of algorithmization and programming, 3D modeling and visualization	Industrial practice 1
Professional module									
PD	UC	AppStorm Mobile Application Development	180	6	5	LO4, LO5, LO7	This course provides a comprehensive introduction to mobile application development. Students will learn to build applications for Android and iOS using programming languages such as Kotlin, Swift, and Dart. The course also covers cross-platform frameworks like Flutter and React Native. Through hands-on projects, students will gain practical experience in developing fully functional mobile apps.	Fundamentals of algorithmization and programming, Programming in Python, VR/AR technology and development	Industrial practice 2/ Pre-graduation practice
PD	UC	VR/AR technology and development	120	4	4	LO9, LO10	The discipline is aimed at studying the theoretical foundations and practical skills of developing virtual (VR) and augmented (AR) reality. During the course, students learn about the principles of VR/AR systems, their architecture, methods of user interaction, as well as tools and technologies used to create interactive applications. Students master the main software environments and frameworks for developing VR/AR applications, including Unity, Unreal Engine, ARKit, ARCore and Vuforia, as well as work with various hardware platforms such as virtual reality helmets, mobile AR devices and specialized controllers.	3D modeling and visualization, Programming in Python	AppStorm Mobile Application Development
PD	UC	Web programming	150	5	5	LO6, LO7	The discipline is designed to provide students with theoretical knowledge and practical skills in the field of modern web application development. The course covers the basics of the client and server side of web development, the	Fundamentals of algorithmization and	Industrial practice 2/ Pre-graduation practice

							architecture of web applications, the principles of interaction between the front-end and backend, as well as modern technologies and frameworks used in web programming.	programming, Programming in Python, Databases	
PD	UC	Databases	150	5	3	LO2, LO7	The discipline is aimed at developing knowledge and practical skills in database design, creation and administration, information storage, processing and security, SQL query development, and the use of database management systems for solving applied tasks.	Fundamentals of algorithmization and programming, Fundamentals of information systems	Web programming, Cybersecurity, Full-Stack Web Application Development, Industrial practice 1
Practice-oriented module									
PD	UC	Cybersecurity	180	6	4	LO2, LO6	To form an understanding of technologies for achieving information security in all areas of activity and master a systematic approach to solving the tasks set in the field of cybersecurity. Questions are included about the types of tools used to combat cyber threats, ensuring cyber security, as well as types of malware, types of attacks, protection systems, controls to achieve information security goals. Within the framework of the discipline, active learning methods are used - the method of working in small groups, "brainstorming".	Fundamentals of algorithmization and programming, Fundamentals of information systems, Databases	Industrial practice 2/ Pre-graduation practice
PD	UC	Full-Stack Web Application Development	180	6	5	LO5, LO7	The discipline forms knowledge and practical skills in developing web applications on both the client side (frontend) and server side (backend). The course covers the fundamentals of user interface design, database management, server-side logic development, API creation and integration, as well as web application deployment.	Fundamentals of algorithmization and programming, Programming in Python, Databases, Cloud Technologies	Industrial practice 2/ Pre-graduation practice
PD	UC	IT infrastructure	180	6	5	LO4, LO5	Teaching theory, methods and technologies in the field of development and management of IT infrastructure, management and development of IT infrastructure of various profiles and scales, as well as the formation of practical skills for the effective construction and modernization of IT infrastructure. The Tivoli management platform, computer system architecture, such as SOA, CORBASOA, CORBA,	Fundamentals of information systems, Cloud Technologies	Industrial practice 2/ Pre-graduation practice

							etc. are used. Active learning methods: interactive lectures, case studies, brainstorming.		
PD	UC	IP Project Management	180	6	5	LO4, LO10	To form professional competencies for effective IT project management, including the use of project management information systems. Used in Microsoft Project Labs. Active learning methods: project method, brainstorming.	Fundamentals of information systems, Innovative Design in IT, Cloud Technologies	Industrial practice 2/ Pre-graduation practice
PD	UC	Basics of the internet of things	120	4	4	LO3, LO5, LO8	Students" study of the general characteristics of the technological phenomenon of the Internet of Things (Internet of Things, IoT), the principles of design of socio-technical systems based on modern IoT technologies for automating various processes and routine operations, as well as the formation of students" clear understanding of the possibilities of using methods of automatic perception and context analysis of "smart" devices, collective data processing algorithms and action planning, obtaining practical skills of working with appropriate tools and programs for systems such as the "Internet of Things". Understanding embedded systems, using It connections (5G, LTE, NB-IOT, 3 Gloria, SigFox, WiFi, Bluetooth). Work on IoT platforms (IoT Architects) and the use of cloud technologies. The form of control is the delivery of an individual task. Guest lectures of top managers are provided within the discipline.	Fundamentals of algorithmization and programming, Programming in Python, Theory of electrical circuits	Industrial practice 2/ Pre-graduation practice
PD	UC	Industrial practice 1	300	10	4	LO1 – LO12	The Main Objectives of Industrial Practice Are: Consolidation of Theoretical Knowledge and Practical Skills in the Selected Educational Program in Production Conditions, Acquisition of Experience in Organizational Work, Obtaining a Working Specialty, Formation of Practical Skills and Competencies in the Process of Mastering the Bachelor's Program. It Is Carried Out in Practice Bases at Enterprises According to This Educational Program.	Fundamentals of algorithmization and programming, Fundamentals of information systems, Discrete mathematics, Programming in Python, Databases	Industrial practice 2/ Pre-graduation practice
PD	UC	Industrial practice 2/	300	10	6	LO1 – LO12	Examines the Consolidation and Enhancement of Theoretical Knowledge Acquired During the Study Process,	Industrial practice 1,	Final Assessment

		Pre-graduation practice					Collects Information for the Preparation of the Graduation Thesis, Studies Advanced Industrial Practices, and Gains Independent Work Experience by Applying Analysis, Comparison, Evaluation, and Design Skills in Energy-Sector Enterprises.	Cloud Technologies, Cybersecurity, Web programming, IT infrastructure, IP Project Management	
TOTAL			**3750**	**125**					