



**CATALOG OF ELECTIVE DISCIPLINES**

**EDUCATIONAL PROGRAM**

**6B07140 – Cybersecurity of digital systems**

**Education level: Bachelor's degree**

**Study period: 4 years**

**Year of admission: 2023**

Module	Cycle	Component	Name of the discipline	Total labor intensity		Semester	Learning outcomes	Brief description of the discipline	Prerequisites	Post-requirements	Department
				in academic hours	in academic credits						
Module 1 - General education competencies	General education discipline	Component of choice	Fundamentals of law and anti-corruption culture	150	5	3	Learning outcomes 2	Increase of public and individual legal awareness and legal culture of students, as well as the formation of a knowledge system and a civic position on combating corruption as an antisocial phenomenon. As a result of studying the course, students should 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 legitimate human interests in case of their violation.	Sociology, Political Science, Psychology, Cultural Studies, History of Kazakhstan	Final certification	Social and Humanitarian Disciplines and Physical Education
	General education discipline	Component of choice	Fundamentals of Economics and Entrepreneurship				Learning outcomes 2	Formation of analytical thinking skills on economic issues, be able to independently draw conclusions based on the studied material, navigate in any economic situations, apply theoretical economic knowledge in practice, realize their abilities, both in personal and professional direction.	Sociology, Political Science, Psychology, Cultural Studies, History of Kazakhstan	Final certification	Transport Logistics and Management
	General education discipline	Component of choice	Methods of scientific research				Learning outcomes 7	Obtaining theoretical and applied knowledge by students on the methods of scientific research of problems in the studied area, training specialists with cognitive skills in the field of science, forming deep ideas about the content of scientific activity, its methods and forms of knowledge.	Sociology, Political Science, Psychology, Cultural Studies, History of Kazakhstan	Final certification	Social and Humanitarian Disciplines and Physical Education
Module 2 - Environmental Competencies	ООД	Component of choice	Ecology and life safety				Learning outcomes 2	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 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.	Ecology and life safety	Final certification	Cars, road equipment and life safety
Module 3 - Economic and managerial competencies	Basic disciplines	Component of choice	Managerial Economics (Minor)	90	3	5	Learning outcomes 2	Formation of the conceptual apparatus and development of skills of economic analysis using modern models and patterns of economic science, consideration of economic problems and tasks facing the head of the company. The study of this discipline will	Fundamentals of Economics and Entrepreneurship	Final certification	Transport Logistics and Management



							allow students to obtain and develop knowledge in the field of analytical studies of economic, technological and technical parameters of the enterprise, as well as will allow them to master the skills of applying special methods of economic justification of management decisions and assessing their consequences.			nt
			Time Management (Minor)				Learning outcomes 9 Formation of students' general ideas about the essence and types of time management, principles and methods of time resource management for more successful implementation of professional activities.	Fundamentals of Economics and Entrepreneurship	Final certification	Transport Logistics and Management
Module 4 - Profile Competencies	Basic disciplines	Component of choice	Operational basics of automation and telemechanics	270	9	5	Learning outcomes 1 Familiarization of students with railway automation and telemechanics systems, their use in the transportation process to ensure the safety of train traffic; the effectiveness of the systems used for different types of roads with different traffic intensity. Within the framework of the discipline, field classes are provided to the branch of the department and guest lectures by top managers.	Fundamentals of Electrical engineering	Regulatory framework for cybersecurity in the field of SSB	Automation and control
			Railway automation devices				Learning outcomes 1 The discipline is aimed at studying the purpose, classification and principle of operation of devices and systems of railway automation and telemechanics, outlines the main characteristics and procedure for maintenance of devices and alarm systems, centralization and blocking.	Fundamentals of Electrical engineering	Regulatory framework for cybersecurity in the field of SSB	Automation and control
	Basic disciplines	Component of choice	Theories and methods of examination of circuit solutions of JAT	180	6	8	Learning outcomes 7 The discipline is aimed at studying the principles of development and updating of standard materials for the design of devices and systems of railway automation and telemechanics, manuals for the operation of relay and microprocessor systems. The methods of detecting failures and malfunctions in the alarm and communication facilities according to standard circuit solutions of automation and telemechanics are considered.	Cybersecurity of electronic technical documentation of railway automation and telemechanics	Final certification	Automation and control
			Examination of innovation proposals in the field of SCB				Learning outcomes 9 The discipline is aimed at the formation of professional knowledge about rationalization activities in the field of signaling, centralization and blocking. The study of the principle and procedure of the organization of rationalization activities, submission, consideration, use, determination of the effectiveness of the rationalization proposal. The technologies of evaluating the effectiveness of circuit solutions to improve the operation of automation and telemechanics devices are considered.	Cybersecurity of electronic technical documentation of railway automation and telemechanics	Final certification	Automation and control
	Basic disciplines	Component of choice	Cyber threats and cyber attacks in uninterruptible power supply systems	180	6	7	Learning outcomes 8 The discipline is aimed at studying the basics of cyber threats and cyber attacks in the power supply systems of microprocessor devices of alarm systems, centralization and blocking of railway automation and telemechanics. Methods of providing diagnostics and remote monitoring of power supply devices of microprocessor systems by logging and archiving are considered.	Cybersecurity of the digital railway	Functional safety and reliability theory	Automation and control
			Cybersecurity of digital power supply installations				Learning outcomes 8 The discipline is aimed at studying the main methods of ensuring information security when using uninterruptible power supplies of microprocessor systems of railway automation and telemechanics – Ebilock-950, MPC-2, MPC-I, etc. The main methods of ensuring guaranteed power supply of the JAT devices are considered.	Cybersecurity of the digital railway	Functional safety and reliability theory	Automation and control
	Basic disciplines	Component of	Databases	180	6	5	Learning outcomes The discipline is aimed at studying the basic concepts, methods and means of building and using databases in	Computer and Industrial Networks / Wireless	Introduction to MongoDB (Minor) / Machine	Automation and



	choice					4	management systems, acquiring the necessary competencies for designing the logical structure of a database, choosing a DBMS, organizing interfaces for working with a database and preparing reporting forms.	Network technologies and network security	Learning A-Z: Python & R in Data Science (минор)	control
		Database management systems				Learning outcomes 4	The course focuses on the concepts needed to develop and implement a database management system. The course examines various modern data models, data security and integrity, as well as methods of parallel computing.	Computer and Industrial Networks / Wireless Network technologies and network security	Introduction to MongoDB (Minor) / Machine Learning A-Z: Python & R in Data Science (минор)	Automation and control
Basic disciplines	Component of choice	Computer and industrial networks	180	6	4	Learning outcomes 4	The discipline is aimed at studying hardware, principles of construction and administration of computer and industrial networks, standardization of network solutions, formation of skills in configuring network devices, configuration, layout and installation of network components in local and global networks.	Digital Electronics / Digital devices and microprocessors	Databases / Database Management Systems	Automation and control
		Wireless network technologies and network security				Learning outcomes 4	The discipline is aimed at studying methods of designing wireless corporate networks, technology for building high-performance channels of global networks, configuring complex network switching devices and methods for ensuring the security of wireless networks using software, hardware and hardware-software tools.	Digital Electronics / Digital devices and microprocessors	Databases / Database Management Systems	Automation and control
Basic disciplines	Component of choice	Fundamentals of information security	180	6	3	Learning outcomes 5, 6	The discipline is aimed at studying the theoretical foundations and methods of information protection, the mathematical structure of secret systems, consideration of the mathematical representation of information, methods of analyzing information characteristics and redundancy of language systems, the theoretical foundations of correction and restoration of information characteristics of arbitrary texts, the construction of information protection systems, the development of basic methods and means of information protection.	Information and communication technologies	Operating system security	Automation and control
		Introduction to Cybersecurity				Learning outcomes 5	The discipline is aimed at the formation of students' knowledge system in the field of cybersecurity basics, the study of types and sources of threats, the basic requirements of information security in the organization of remote service in organizations.	Information and communication technologies	Operating system security	Automation and control
Basic disciplines	Component of choice	Basics of Cloud Computing	180	6	3	Learning outcomes 4	The discipline is aimed at studying the architecture of "cloud" technologies, designing "cloud" services, as well as gaining skills in application development for the main existing "cloud" platforms. The main characteristics of "cloud" technologies, methods of assessing the benefits and risks associated with the use of "cloud" computing are considered.	Information and communication technologies	Object-oriented programming	Automation and control
		Operating systems				Learning outcomes 4	The discipline is aimed at studying the main devices and components of operating systems, familiarity with the implementation of processes, planning algorithms, memory management and file systems, mastering the methods of configuring operating systems and developing system software.	Information and communication technologies	Object-oriented programming	Automation and control
Basic disciplines	Component of choice	Digital electronics	180	6	3	Learning outcomes 1	Formation of students' understanding of digital electronics, the basics of digital circuitry, the principles of operation and design of digital devices. The course discusses the basic methods of description and synthesis of logic circuits, modern means of developing digital devices.	Information and communication technologies	Computer and Industrial Networks / Wireless Network technologies and network security	Automation and control
		Digital devices and microprocessors				Learning outcomes 1	It is focused on the study of the theoretical and practical foundations of the functioning of digital devices and microprocessors in order to create schematic diagrams of	Information and communication technologies	Computer and Industrial Networks / Wireless Network technologies and	Automation and control



							communication devices and infocommunication technology. Within the framework of the discipline, interactive teaching methods, computational and analytical method, and the method of case tasks are used.		network security	
Basic disciplines	Component of choice	Safety of automation and telemechanics devices and systems	180	6	7	Learning outcomes 5, 6	The discipline is aimed at studying the basic methods of ensuring the reliability of automation and telemechanics devices and systems. The principles of operation of various train traffic control systems, communication devices, the procedure for using devices under normal operating conditions and ensuring the safety of train traffic in case of violation of the normal operation of signaling devices, centralization and blocking are considered.	Cybersecurity of the digital railway	Cybersecurity of operational dispatch control systems	Automation and control
		Information security in the context of automated control systems in railway transport				Learning outcomes 5, 6	The discipline is aimed at the formation of professional knowledge in the field of building a comprehensive system of protection of digital, automated systems of railway transport, the study of current trends in international, domestic standards in the field of information security of automated control systems.	Cybersecurity of the digital railway	Cybersecurity of operational dispatch control systems	Automation and control
Basic disciplines	Component of choice	Introduction to MongoDB (Minor)	90	3	6	Learning outcomes 4	Formation of students' ability to process large amounts of data (MongoDB) to solve professional problems, effectively apply methods, technologies and tools of big data analysis in professional activities. Methods of active learning are used - group work.	Databases / Database Management Systems	Controller Programming (Minor) / Simulation in AnyLogic environment (Minor)	Automation and control
		Machine Learning A-Z: Python & R in Data Science (МИНОР)				Learning outcomes 3	The discipline is aimed at studying machine learning methods using Python. The main libraries and tools are considered, such as packages – Jupiter Notebook, NumPy, SciPy, matplotlib, libraries – scikit-learn, pandas, mglearn.	Databases / Database Management Systems	Controller Programming (Minor) / Simulation in AnyLogic environment (Minor)	Automation and control
Basic disciplines	Component of choice	Controller Programming (Minor)	90	3	7	Learning outcomes 3	The discipline is aimed at studying the main characteristics of programmable logic controllers, the hardware complex of modules, the features of the choice and development of configuration, as well as their network structures. The instrumental environment of program development and the basics of their recording, the solution of applied automation tasks based on PLC are considered.	Introduction to MongoDB (Minor) / Machine Learning A-Z: Python & R in Data Science (МИНОР)	Theories and methods of examination of circuit solutions of JAT	Automation and control
		Simulation modeling in AnyLogic environment (Minor)				Learning outcomes 3	The discipline is aimed at studying the methods of simulation modeling and their features in the modeling of transport processes. The main possibilities and means of simulation modeling, various models of discrete-event and dynamic systems, models of optimization experiment in the AnyLogic environment are considered.	Introduction to MongoDB (Minor) / Machine Learning A-Z: Python & R in Data Science (МИНОР)	Theories and methods of examination of circuit solutions of JAT	Automation and control

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AGREED:

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