Institute of Automation and Information Technology
Department of "Cybersecurity, information processing and Storage"

EDUCATIONAL PROGRAM
6B06106 – Information systems

Code and classification of the field of education: **6B06 Information and communication technologies.**
Code and classification of training directions: **6B061 Information and communication technologies**
Group of educational programs: **057 – Information technology**
Level based on NQF: 6
Level based on IQF: 6
Study period: 4
Amount of credits: 240

Almaty 2025

Educational program 6B06106 «Information systems» was approved at a meeting of the Academic Council of KazNTU named after K.I.Satpayev.

Protocol No _10__ of «__06__» __03___2025.

Reviewed and recommended for approval at a meeting of the Educational and Methodological Council of Kazntu named after K.I.Satpayev.

Protocol No. _3__ of «_20__» ___12___2024.

The educational program 6B06106 «Information systems" was developed by the academic committee in the direc

	Last name first name patronymic	Post	Place of work	Signature
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List of abbreviations and designations

IS Information systems
ITP individual training plan
EP Educational program
NQF National qualifications framework
IQF Industry qualifications framework

1.Description of the educational program

The professional activity of graduates of the program is focused on the development and maintenance of information systems, namely the management of the development process. Information systems specialists will be trained according to the educational program "Information Systems". The content of the disciplines of the educational program has been developed taking into account the relevant educational programs of the world's leading universities and the international classifier of professional activity in the field of "Information Systems". Graduates of the educational program "Information Systems" are focused on the organization, design and development of systems. The program is designed to implement the principles of the democratic nature of education management, expand the boundaries of academic freedom and authority of educational institutions, which will ensure the training of qualified, highly motivated personnel for innovative and knowledge-intensive sectors of the economy within the framework of the ESG and the Sustainable Development Goals (SDGs).

The educational program ensures the application of an individual approach to students, the transformation of professional competencies from professional standards and qualifications standards into learning outcomes. Student–centered learning is provided - the principle of education, which involves shifting the emphasis in the educational process from teaching (as the main role of the teaching staff in the "translation" of knowledge) to teaching (as an active educational activity of the student).

The educational program provides training for specialists in the field of information systems in the following areas:

– development, implementation and operation of information retrieval systems;

– development, implementation and operation of information and analytical systems;

– development, implementation and operation of information management systems;

– development, implementation and operation of information and organizational systems.

The educational program was developed based on the analysis of labor functions, information systems specialists, stated in professional standards and the Atlas of Professions.

Representatives of Kazakhstani companies and associations, specialists in the field of software system development and support participated in the development of the educational program.

The tasks and content of the OP are given in section 9 "Description of disciplines".

In case of successful completion of the full bachelor's degree course, the graduate is awarded a bachelor's degree in information and communication technologies in the educational program "Information Systems".

2. The purpose and objectives of the educational program

Purpose of the EP:

High-quality training of specialists in the field of information systems, including software, hardware, information, legal and management support for the development and maintenance of information systems.

EP tasks:

- training of a competitive generation of information systems specialists for the labor market, proactive, able to work in a team, with high personal and professional competencies (SDG 4, 17).

- integration of educational and scientific activities; (SDG 4).

- Establishing partnerships with leading universities in the near and far abroad in order to improve the quality of education for sustainable development (SDGs 4, 17);

- expanding relations with customers of educational services and employers in order to determine the quality requirements for training specialists, conducting courses, seminars, master classes, internships, and production practices (SDG 4)

The content of the educational program "Information Systems" is implemented in accordance with the credit technology of education and is carried out in the state and Russian languages.

The educational program will make it possible to implement the principles of the Bologna process. Based on the students' choice and independent planning of the sequence of subjects, they independently form an individual study plan (IEP) for each semester according to the Working Curriculum and the Catalog of elective subjects. The volume of mathematical, natural science, basic and language subjects has been increased in the educational program.

Students complete internships in banking structures, government and departmental structures, in companies such as National Information Technologies JSC, the PARK of INNOVATIVE TECHNOLOGIES Special Economic Zone (SEZ PIT), Pacifica LLP, an integrator in the field of information systems, Galaktika LLP, Vella IT LLP, etc.

Under the academic mobility program, the best students have the opportunity to study at leading foreign universities in the relevant specialty.

The field of professional activity of the bachelor is public and private enterprises and organizations that develop, implement and use organizational, programmatic methods and means of information systems in all spheres of human activity that operate with information.

The subjects of the bachelor's professional activity are: mathematical, informational, technical, organizational support in the field of information systems.

Types of work activity:
- design and engineering;
- production and technological;
- experimental research;
- organizational and managerial;
- operational;
- scientific.

Objects of professional activity:
The objects of professional activity of graduates are:
- Computer information processing and management systems;
- Automated control systems;
- Information systems software.

3. Requirements for assessment of learning outcomes of the educational program

Mandatory standard requirements for graduation from a university and awarding an academic bachelor's degree: mastering at least 240 academic credits of theoretical studies and defending the final qualification (thesis or state examination in the specialty).

In the process of mastering the Information Systems educational program, a Bachelor of Engineering and Technology must possess the key competencies described in Section 4.11. The key competencies must reflect the results of the educational program described in Section 4.12.

4. Passport of the educational program

4.1. General information

№	Field name	Note
1	Code and classification of the field of education	6B06 - Information and communication technologies
2	Code and classification of training areas	6B061 Information and communication technologies
3	Group of educational programs	B057 Information technologies
4	Name of the educational program	6B06106- Information systems
5	Brief description of the educational program	The professional activity of graduates of the program is focused on the development and maintenance of information systems, namely the management of the development process.
6	Purpose of the EP	Qualitative training of specialists in the field of information systems, including software, hardware, information, legal and managerial support for the development and maintenance of information systems.
7	Type of EP	New EP
8	The level of the NRK	6
9	ORC Level	6
10	Distinctive features of the EP	No
11	List of competencies of the educational program:	Fluent monolingual oral, written and communication skills, special mathematical thinking using induction and deduction, generalization and concretization, analysis and synthesis, classification and systematization, abstraction and analogy; understanding basic hypotheses, laws, methods, formulation of conclusions and error estimation
12	Learning outcomes of the educational program:	PO1. Make management and technical decisions, demonstrate communication skills, initiative and psychological preparedness for work, including when working in a team with people with special needs. Analyze data and develop innovative solutions for startups and sustainable information systems. Synthesize the knowledge gained and evaluate the effectiveness of their projects in the context of real business situations. PO2. Apply knowledge of the basic principles and knowledge of mathematics, mechanics, and physics. Conduct proof of mathematical statements, solve mathematical problems and

		problems. Use the conceptual apparatus and methods of discrete mathematics to analyze mathematical models when solving problems of professional activity. PO3. Compose algorithms for solving problems, develop software using modern programming languages of various levels, organize the necessary data structures, use well-known application software packages. PO4. Analyze large volumes of data and apply statistical methods to extract meaningful information. Design and evaluate distributed data processing systems for effective data management and analysis, including using artificial intelligence. PO5. Apply methods of computer and mathematical modeling, selection of optimal solutions, analysis and interpretation of data of various volumes and structures. PO6. Prepare technical specifications for the development of information systems for various purposes and various architectures using modern IT project management methods, as well as management principles within the framework of ESG and Sustainable Development Goals. Develop an information model of the subject area for designing information support for systems. PO7. Design network infrastructure and hardware for information systems. Perform typical tasks of design, deployment and technical support of local and global networks; administer networks in modern operating systems. PO8. Design and develop ergonomic user interfaces for applications and websites. Synthesize data and create visualizations and reports that effectively communicate information and support decision making. PO9. Have written and oral communication skills in the state and foreign languages, establish professional contacts and develop professional communication for partnership in the interests of sustainable development.

		Analyze scientific sources and synthesize data for research. PO10. Choose methods and means of building information security systems of modern ICT. PO11. Perform WEB layout, develop WEB and cross-platform mobile applications using modern technologies PO12. Describe basic financial and anti-corruption concepts. Apply principles of budgeting, anti-corruption legislation, financial planning and sustainable development. Analyze the financial, legal and ethical risks associated with corrupt practices. Analyze the relationship between environmental and economic factors, as well as assess the impact of business activities on the environment and life safety for responsible consumption production PO13. Use modern management systems to build databases in information systems, present data using various models, and manage database objects. Use methods for constructing various models of data types of information processing algorithms to rationally use the opportunities provided by algorithmization techniques. PO14. Use virtualization and containerization technologies to deploy and manage IT infrastructure. Ensure security and high availability of virtualized and containerized environments.
13	Form of training	Full-time
14	Duration of training	4 years old
15	Volume of loans	240
16	Languages of instruction	Kazakh, Russian, English
17	Academic degree awarded	Bachelor's Degree in Information and Communication Technology
18	Developer(s) and authors:	Serbin V.V., Satybaldiyeva R.Zh.

4.2. Relationship between the achievability of the formed learning outcomes based on educational program and academic disciplines

№	Name of the discipline	Brief description of the discipline	Number of credits	Формируемые результаты обучения (коды)													
				PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PO 13	PO 14
	The cycle of general education subjects The university component																
1	Fundamentals of anti-corruption culture and law	Purpose: to increase the 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. Contents: improvement of socio-economic relations of the Kazakh society, psychological features of corrupt behavior, formation of an anti-corruption culture, legal responsibility for acts of corruption in various fields.	5	v											v		
2	Basics of Financial Literacy	Purpose: formation of financial literacy of students on the basis of building a direct link between the acquired knowledge and their practical application. Contents: using in practice all kinds of tools in the field of financial management, saving and increasing savings, competent budget planning, obtaining practical skills in calculating, paying taxes and correctly filling out tax reports, analyzing financial information, orienting in financial products to choose adequate investment strategies.	5	v											v		
3	Fundamentals of	Purpose: To develop basic knowledge of	5	v											v		

	economics and entrepreneurship	economic processes and skills in entrepreneurial activities. Content: The course aims to develop skills in analyzing economic concepts such as supply and demand, and market equilibrium. It includes the basics of creating and managing a business, developing business plans, risk assessment, and strategic decision-making.															
4	Ecology and life safety	Purpose: formation of ecological knowledge and consciousness, obtaining theoretical and practical knowledge on modern methods of rational use of natural resources and environmental protection. Contents: the study of the tasks of ecology as a science, the laws of the functioning of natural systems and aspects of environmental safety in working conditions, environmental monitoring and management in the field of its safety, ways to solve environmental problems; life safety in the technosphere, emergencies of a natural and man-made nature.	5	**v**												**v**		
	The cycle of basic disciplines The university component																
5	Database administration	The purpose of this discipline is responsible for the development of database requirements, its design, implementation, effective use and maintenance, including the management of database user accounts	4				**v**		**v**							**v**	

		and protection against unauthorized access. An equally important function of the database administrator is to maintain the integrity of the database															
6	Algorithmization and Programming	Goal: Mastering the basics of algorithmization and programming for solving typical problems using modern programming languages. Contents: Basic concepts of algorithmization, structured programming, basic algorithms and data structures, syntax and semantics of the selected programming language, methods for debugging and testing software, development and analysis of algorithms, examples of solving real problems.	5			v			v								
7	Algortihms and Data Structures	The course covers the main approaches to the analysis and design of algorithms and data structures. The course covers topics such as worst-case asymptotic estimation of algorithm complexity, efficient algorithms for sorting and choosing order statistics, data structures (binary search trees, heaps, hash tables), algorithm design techniques (divide and conquer, dynamic programming, greedy strategy), basic algorithms on graphs (shortest paths, topological sorting, connected components, minimum spanning trees).	5				v		v								

8	Database and SQL language	The course "Databases and SQL Language" focuses on teaching students the skills of data extraction using the SQL language. Students learn various types of queries, including table joins, conditional operators, aggregate functions, and many other concepts to get the information they need from databases. Special attention is paid to query optimization to improve the efficiency of data search and processing. Upon completion of the course, students will master the data management skills necessary to solve a wide range of tasks in the field of analytics and software development.	6						v							v	
9	Web programming	The course is devoted to the study of programming sections focused on the development of web applications. Objectives of the discipline: familiarization with the principles and methods of web page layout and layout, study of modern web application development environments, acquisition of programming skills on the client side and on the server side, obtaining theoretical and practical skills in creating web applications.	5			v								v			
10	Discrete Mathematics	The discipline deals with coding theory, set theory, graph theory, mathematical logic. Namely, the foundations of coding theory, set theory, graph theory; theory of logic algebra; mathematical	5		v			v									

		apparatus for the synthesis and analysis of digital devices, transform Boolean functions, synthesizing minimal combinational circuits; performing coding.															
11	Integration of information systems	The purpose of the course "Integration of information Systems" is to teach students the basics of combining various information systems into a single structure. Students will learn about integration strategies, technical aspects of system collaboration, and data exchange methods. The main focus is on developing skills in requirements analysis, design and implementation of integration solutions.	5			v			v								
12	Computer Networks	The program of the training course is aimed at familiarizing students with the basics of organization, construction, architecture and principles of functioning of computer networks. The course focuses on the application of skills to the organization of real networks and examines the communication tools, protocols and standards of networks. As a result of mastering the discipline, students will learn how to configure and configure communication tools, select firewalls, and operate computer networks.	5							v							v

13	Mathematics I	Purpose: to introduce students to the fundamental concepts of linear algebra, analytical geometry and mathematical analysis. To form the ability to solve typical and applied problems of the discipline. Contents_ Elements of linear algebra, vector algebra and analytical geometry. Introduction to the analysis. Differential calculus of a function of one variable. The study of functions using derivatives. Functions of several variables. Partial derivatives. The extremum of a function of two variables.	5		v			v									
14	Mathematics II	Purpose: To teach students integration methods. To teach you how to choose the right method for finding the primitive. To teach how to apply a certain integral to solve practical problems. Contents_ integral calculus of the function of one and two variables, series theory. Indefinite integrals, methods of their calculation. Certain integrals and applications of certain integrals. Improper integrals. Theory of numerical and functional series, Taylor and Maclaurin series, application of series to approximate calculations_	5			v			v								
15	Object oriented programming	The course covers topics such as: the paradigm of object-oriented programming; classes and objects; principles of creating scalable software using a high-level method for designing	5			v			v								

		business environment concepts in a programming language; programming languages C++, Java and C#; principles of abstractions, encapsulation, inheritance, polymorphism; software design patterns; practical skills in creating software products.															
16	Operating systems	The purpose of studying the discipline is to acquire the primary skills necessary for studying system programming and operating system administration, including the skills of configuring and analyzing operating systems. Special attention will be paid to the three main subsystems of operating systems: process management (processes, threads, CPU scheduling, synchronization and deadlocks), memory management (segmentation, pagination, paging), file systems and operating system support for	5							v			v				v
17	Fundamentals of information systems	In the process of studying the discipline, much attention is paid to the basic concepts of information, data, systems, classification of systems, tasks to be solved, the principles of construction and operation of information systems and the classification of information systems. The methods of representation, transformation, processing and transformation of continuous and digital information in systems are considered. The course also examines the relevant organizational resources (human,	4						v								

		technical, financial, etc.) that provide and disseminate information.															
18	Basics of cybersecurity	Objective: to study the key aspects of protecting information systems and networks from various types of threats, including attacks on software, malware, phishing, insider threats and others. Contents: Introduction. Principles of cybersecurity. Data encryption. Access control. Security audit. Developing security policies and responding to incidents. Legal and ethical aspects in the field of cybersecurity regulating the use of information technologies.	5							v			v				v
19	Statistics and data analysis	Applied statistics is a methodological discipline that is the center of statistics. When applying the methods of applied statistics to specific fields of knowledge and branches of the national economy, scientific and practical disciplines such as "statistics in industry", "statistics in medicine", "statistics in psychology", etc. are obtained. From this point of view, econometrics is "statistical methods in economics." Mathematical statistics plays the role of a mathematical foundation for applied statistics.	4				v	v									
20	IT Project Management	The purpose of mastering the discipline is to form professional competencies for students of effective project management, including using project management information systems. The course covers the following issues: basic	6	v					v								

		methods and tools of computer-aided design; modern standards and methods of project management; principles of standardization in the field of project management; purpose, functions and examples of project data management systems.															
21	Physics	Purpose:To form ideas about the modern physical picture of the world and scientific worldview, the ability to use knowledge of fundamental laws, theories of classical and modern physics. Contents_ physical fundamentals of mechanics, fundamentals of molecular physics and thermodynamics, electricity and magnetism, vibrations and waves, optics and fundamentals of quantum physics.	5		v					v							
	The selection component																
22	Business process analysis	The purpose of studying the discipline is to analyze business processes "as is" (as is) based on BPMN and UML notations, including a description of business processes, digitization of process benefits, processing and analysis of data used in the process using the example of real business processes; identification of bottlenecks of business processes based on data mapping in order to development of recommendations on reengineering, improvement and optimization of business processes.	5						v	v							
23	Information	The aim of the course is to develop students' systematic knowledge in the	5						v							v	

	systems architecture	field of computer architecture and information systems (IS) architectures. The content of the discipline includes the classification of IS architecture, the principles of IS construction, models and resources of information systems, the main constituent elements of information systems that are of fundamental importance for the system as a whole. During the study of the course, students will use the tools for developing the architecture of information systems and tools for developing information systems															
24	Databases and web service development	The discipline "Databases and Web Services Development" focuses on the interaction of databases with web services. Students learn how to design databases for data storage, as well as how to integrate these databases into web services for data exchange with client applications. The course includes the study of concepts of working with databases through the API of web services, methods of data access and query processing. Upon completion of the course, students will have the skills to develop and integrate web services with databases to ensure effective interaction between various application components.	5											v		v	
25	Design Thinking	Purpose: To provide students with knowledge and skills in design thinking for solving complex problems,	4	v								v					

		innovative design and developing creative ideas. Content: learning the basic concepts of design thinking, including problem definition, user needs research, idea generation, prototyping and testing solutions.															
26	Inclusive education	The purpose of the discipline: to give students an idea of the foreign and domestic learning experience based on an ideology that excludes any discrimination; on the development and implementation of conditions that ensure equal treatment of all people and the need for special conditions with special educational needs; to introduce the principles of inclusive education; with the organization of inclusive education in educational institutions.	5	**v**													
27	Communication skills	The course is designed to raise the students' language competence to required standards of academics and future professional needs in the business world. The course is focused on developing advanced writing, and speaking skills integrated with Business English content. The students will also work as a team on a semester project which will aim to simulate a business environment. The project may include creating and running a mock company or a business case study.	4	**v**								**v**					
28	Mathematics III	Purpose: To teach students integration methods. To teach you how to choose the right method for finding the	5		**v**			**v**				v					

		primitive.The discipline is a continuation of Mathematics II. The course includes sections: ordinary differential equations and elements of probability theory and mathematical statistics. Differential equations with separable variables, homogeneous, in full differentials, linear inhomogeneous differential equations with constant coefficients, systems of linear differential equations with constant coefficients, finding the probability of events, calculating the numerical characteristics of random variables, using statistical methods for processing experimental data are studied.														
29	Optimization methods and operations research	The purpose of teaching the discipline "Optimization Methods and Operations Research" is to study the basics of system analysis, operations research and decision-making using models and methods including linear, integer and quadratic programming, dual evaluation, optimization models of production and resource allocation, network optimization, game theory. The tasks of studying the discipline As a result of studying the discipline, students must: 1) to know the state of the subject, its methodology, importance for practice, and development prospects; 2) be able to build a model of a system or an operation performed by it, set a research task, apply mathematical methods and	5		v			v									

		computational tools to obtain the desired results, analyze the specified results; 3) have the skills to study some operation as a whole, as well as to quantify the optimal solution of the operation management problem.															
30	Business Process Modeling	The purpose of the course is to develop students' skills and abilities to model and analyze business processes in order to solve applied problems. The content of the discipline includes questions about the system, process-oriented approach to business management, methodologies and models, tools for modeling and analyzing business processes and managing complex systems.	5					v	v								
31	Continuous integration and deployment of CI/CD	The purpose of the course "Continuous Integration and Deployment of CI/CD" is to teach students modern methods and tools for automating software development, testing and deployment processes. Students will learn the principles of building continuous integration and deployment of CI/CD pipelines, as well as methods and tools for automating code testing. The main focus is on developing skills with tools such as Jenkins, GitLab CI, Travis CI and others.	5			v			v								
32	Fundamentals of Artificial Intelligence	Purpose: to familiarize students with the basic concepts, methods and technologies in the field of artificial intelligence: machine learning, computer vision, natural language processing, etc.	5				v	v									

		Contents: general definition of artificial intelligence, intelligent agents, information retrieval and state space exploration, logical agents, architecture of artificial intelligence systems, expert systems, observational learning, statistical learning methods, probabilistic processing of linguistic information, semantic models, natural language processing systems.															
33	The basics of students' research work	The course is aimed at forming a comprehensive understanding of the specifics of scientific research; mastering research methods that are most relevant to the subject of research; acquiring skills and abilities of independent research activities. The course content includes the basic concepts and classification of science and scientific information: its sources and methods of processing; types and forms of educational research and research work of university students. The requirements for the technical design of scientific work are considered.	5	v								v					
34	Fundamentals of sustainable development and ESG projects in Kazakhstan	Purpose: the goal is for students to master the theoretical foundations and practical skills in the field of sustainable development and ESG, as well as to develop an understanding of the role of these aspects in the modern economic and social development of Kazakhstan. Contents: introduces the principles of sustainable development and the	5									v			v		

		implementation of ESG practices in Kazakhstan, includes the study of national and international standards, analysis of successful ESG projects and strategies for their implementation in enterprises and organizations.															
35	Legal regulation of intellectual property	Purpose: the goal is to form a holistic understanding of the system of legal regulation of intellectual property, including basic principles, mechanisms for protecting intellectual property rights and features of their implementation. Content: The discipline covers the basics of IP law, including copyright, patents, trademarks, and industrial designs. Students learn how to protect and manage intellectual property rights, and consider legal disputes and methods for resolving them.	5	v											v		
36	Development of IS prototype	The purpose of mastering the discipline is to gain practical skills in creating information systems based on the 1C platform:Enterprise 8, as well as master the query language and data layout mechanism at the initial level, acquire basic programming skills to solve accounting problems.	5						v	v							
37	Startups and technology entrepreneurship	The purpose of studying the discipline is the formation of theoretical knowledge and practical skills in the field of technological entrepreneurship and management of innovative projects, namely their development, implementation and implementation.	5	v								v					

		The course contains practical elements such as developing business models, conducting market research, implementing product development cycles, and raising seed capital.															
38	Design patterns	The purpose of studying the discipline is to study the main types of design patterns (generative, structural, behavioral); the most common patterns, their advantages and disadvantages, criteria for the applicability of patterns in specific situations.	5			v			v								
39	Query language and report development	The discipline is designed for students familiar with the object model of the embedded language of the 1C platform:Company. As a result, students should gain skills in working with a tabular model, as well as skills for working with analytical queries. Within the framework of the discipline, all the main mechanisms of the query language of the 1C	5								v						v	
40	Capstone project 2	The course is aimed at studying and forming students' understanding of the process of attracting investments and scaling a business; the formation of practical skills in the field of attracting investments in a startup. In the course of passing the discipline, students consider the following issues: search and identification of various sources of financing and selection of potential investors for business; applying to accelerators; preparation of investment	5	v					v			v						

		documentation; creating investment presentations; presentation of the project to a potential investor.															
41	Capstone project 1	The purpose of the course is to apply IT project management techniques, ways to transform ideas into a concrete solution and determine the most optimal approach to its implementation. The course participants will get a holistic view of the process, key techniques and tools necessary for the design, development and further development of their products and services.	5	v					v			v					
42	Devops engineering	The course is aimed at studying the methodology of building, configuring, deploying software and quickly releasing versions of a software product. The content of the discipline includes the organization of continuous integration processes, deployment and delivery of software within the framework of the DevOps paradigm. We study modern technologies for automating the development process - Docker, Docker-Compose, Jenkins. Examples of the use of technologies for projects of various specifics are considered.	5	v					v								
	The cycle of profile disciplines The university component																
43	Artificial intelligence and machine learning	The purpose of the discipline is to prepare students for the application of MO methods in various fields such as computer vision, natural language	6				v									v	v

		processing, recommendation systems, medicine and finance. The course provides an introduction to the basic concepts, methods and applications of artificial intelligence (AI) and machine learning (MO). During the course, students study various MO algorithms such as linear regression, the support vector machine, decision trees, neural networks, and data clustering. They are also introduced to the theory of data-based learning, data preprocessing techniques, model evaluation, and optimization techniques. The course includes both theoretical foundations and practical tasks, including working with real data and MO tools such as TensorFlow, scikit-learn and PyTorch.															
44	Fundamentals of cloud computing	The course is aimed at studying the theoretical foundations of cloud computing, the internal structure and practical implementation, and applied examples of using cloud computing and web services. During the study of the discipline, students will consider the main classes of cloud systems, the main standards in the field of cloud computing, web technologies and web services, the principles of using cloud computing to solve applied problems and build web services and cloud systems.	4									v					v
45	Development of	The purpose of mastering the discipline is to identify, analyze and formalize the	5						v							v	

	an IS business specification	functional and non-functional requirements of the customer in order to develop a business specification for creating an information system. The course deals with the development of an IP specification, the formulation of requirements, the analysis of requirements, the formalization of information system requirements															
46	Development of cross-platform mobile applications	The purpose of the discipline is to prepare students for the application of MO methods in various fields such as computer vision, natural language processing, recommendation systems, medicine and finance. The course provides an introduction to the basic concepts, methods and applications of artificial intelligence (AI) and machine learning (MO). During the course, students study various MO algorithms such as linear regression, the support vector machine, and trees. The aim of the course is to teach students how to create high-quality cross-platform mobile applications with minimal time and resources. During the course, students will learn how to create mobile applications that can run on different operating systems (for example, iOS and Android) using the same code. In addition, they study tools and technologies such as React Native, Flutter or Xamarin, which allow developers to create mobile applications	5			v					v			v			

		using knowledge of web development or other programming languages such as JavaScript, Dart or C#. The course includes both theoretical foundations and practical tasks, including prototyping, user interface creation, data management and application testing.															
47	IT infrastructure	The purpose of studying the discipline: to form a system of knowledge about modern technologies, methods and tools used to manage the IT infrastructure of an enterprise and optimize the functioning of the IT department. The course covers all the main areas of activity of specialists who ensure the management and optimization of the functioning of the IT infrastructure of an enterprise and includes: the development of an enterprise architecture, modern concepts of audit (CobiT) and enterprise IT infrastructure management (ITIL, ITSM), methods for organizing the development and support of software and hardware security.	6						v	v							
48	UI/UX design	This course focuses on User Interface and User Experience design, two key components of a digital product. It is their interaction that shapes the user experience and influences the perception of the product. In this course, you will learn the tools and methodologies necessary to create a functional, user-friendly and attractive interface.	5						v		v						
49	Automation of	The purpose of mastering the discipline	5						v		v						

	business processes	is to automate business processes from idea to implementation. The course content includes the issues of developing the atomization of the business process based on the identification and analysis of the requirements of stakeholders, the specification of the automation of the business process, business process models, data mapping, requirements for the solution of the automated business process "TO BE"															
50	VBA Business Modeling	VBA Business Modeling teaches students how to create and analyze business models using the VBA programming language, including working with data and automating business processes in Excel.	5	v		v									v		
51	Data visualization and reporting	The purpose of the course is to develop the skills of graphical representation of data, to understand, explain and determine the laws of formation from this data. The content of the discipline examines the issues of data collection, processing, analysis and visualization for solving professional tasks using modern information and communication technologies. A set of methods that allow the use of visual representation for the study, analysis and communication of quantitative data is considered.	5												v	v	
52	IT audit and control	The course is aimed at studying the basic concepts and concepts of information systems audit. In the process of studying, students will consider the	5							v			v		v		

		stages and principles of conducting an IT audit with practical skills, the risks inherent in key IT processes and control procedures to reduce them (IT controls). They will also gain the necessary experience in drafting working documents and master the principles of evaluating the internal control system in IT.															
53	PL/SQL programming	The purpose of mastering the discipline is to study the procedural language Oracle PL/SQL. As a result, students will learn how to create, modify, delete stored PL/SQL objects, handle exceptions, use dynamic SQL, and work with object types and collections.	5			v											v	
54	Programming in T-SQL	Learning the basics of the T-SQL language and its application in Microsoft SQL Server. Students learn the language elements of T-SQL, as well as the creation of stored procedures and functions to work effectively with the database. The course also includes error handling, transaction creation and management.	5		v												v	
55	Emerging technologies in information systems	The purpose of teaching the discipline is to study emerging new technologies and explore their impact on business and social issues from a business and theory perspective. Students learn to understand the concepts of new technologies, which are defined and evaluated based on a range of business requirements based on various ethical and environmental	5						v							v	v	

		aspects, and sustainability perspectives. Technology is put into practice to provide suitable business opportunities.															
56	Development of IS for trade automation	The purpose of mastering the discipline is to gain skills in configuring operational accounting tasks on the 1C: Enterprise 8 platform. As a result, students should learn how to apply a scheme for solving operational tasks, use different ways to write data to registers and read from them, develop algorithms for reflecting documents in accounting, as well as develop analytical report	5						v	v					v		
57	Development of IS for accounting of finances	Get practical skills in configuring accounting tasks. As a result of the training, students will learn how to independently design a chart of accounts and an accounting register to solve problems of synthetic, multi-company, analytical, quantitative and currency accounting.	5						v		v				v		
58	System design	The purpose of the course "System Design" is to teach students the principles, methods and tools for designing complex information systems and architectural solutions. Students learn the basics of requirements analysis, business process modeling, and creating high-level architectural concepts. The focus is on developing systems thinking skills, the ability to take into account various aspects of design, such as performance, scalability, security and usability.	5	v				v									v

59	Virtualization and containerization systems	Virtualization and containerization systems	5				v										v
60	Distributed data processing systems	Hadoop және Apache Spark сияқты деректерді өңдеу құралдарын үйренеді. The aim of the course is to teach students the principles and tools used to process large amounts of data in a distributed environment. Students study the concepts of parallel computing, distributed systems architecture, and data processing tools such as Apache Hadoop and Apache Spark to efficiently analyze, process, and manage data in modern information systems.	5				v		v	v						v	
61	Digital transformation technologies	The purpose of mastering the training course is to form a comprehensive vision of the basics of digital transformation: from technological trends, new business models, data-based management, to the necessary transformation of the organizational structure, corporate culture and business processes of the enterprise. The course is dedicated to discussing changes in companies that occur under the influence of emerging new information technologies. The article considers the change in the business environment, the emergence of new models and scenarios in the modern environment, the impact of the evolution of digital technologies on the personnel	5							v						v	v

		of companies, the changing nature of competition.															

NON-PROFIT JOINT STOCK COMPANY
"KAZAKH NATIONAL RESEARCH TECHNICAL UNIVERSITY NAMED AFTER K.I. SATBAYEV"

SATBAYEV UNIVERSITY

«APPROVED»
Decision of the Academic Council
NPJSC«KazNRTU
named after K.Satbayev»
dated 06.03.2025 Minutes № 10

WORKING CURRICULUM

Academic year: 2025-2026 (Autumn, Spring)
Group of educational programs: B057 - "Information technologies"
Educational program: 6B06106 - "Information Systems"
The awarded academic degree: Bachelor of information and communications technologies
Form and duration of study: full time - 4 years

Discipline code	Name of disciplines	Block	Cycle	Total ECTS credits	Total hours	lek/lab/pr Contact hours	in hours SIS (including TSIS)	Form of control	Allocation of face-to-face training based on courses and semesters								Prerequisites
									1 course		2 course		3 course		4 course		
									1 sem	2 sem	3 sem	4 sem	5 sem	6 sem	7 sem	8 sem	
CYCLE OF GENERAL EDUCATION DISCIPLINES (GED)																	
M-1. Module of language training																	
LNG108	Foreign language		GED, RC	5	150	0/0/45	105	E	5								
LNG104	Kazakh (russian) language		GED, RC	5	150	0/0/45	105	E	5								
LNG108	Foreign language		GED, RC	5	150	0/0/45	105	E		5							
LNG104	Kazakh (russian) language		GED, RC	5	150	0/0/45	105	E		5							
M-2. Module of physical trafning																	
KFK101	Physical culture I		GED, RC	2	60	0/0/30	30	E	2								
KFK102	Physical culture II		GED, RC	2	60	0/0/30	30	E		2							
KFK103	Physical culture III		GED, RC	2	60	0/0/30	30	E			2						
KFK104	Physical culture IV		GED, RC	2	60	0/0/30	30	E				2					
M-3. Module of information technology																	
CSE677	Information and communication technology		GED, RC	5	150	30/15/0	105	E				5					
M-4. Module of socio-cultural development																	
HUM137	History of Kazakhstan		GED, RC	5	150	15/0/30	105	GE	5								
HUM120	Module of socio-political knowledge (sociology, political science)		GED, RC	3	90	15/0/15	60	E			3						
HUM134	Module of socio-political knowledge (cultural studies, psychology)		GED, RC	5	150	30/0/15	105	E				5					
HUM132	Philosophy		GED, RC	5	150	15/0/30	105	E					5				
M-5. Module of anti-corruption culture, ecology and life safety base																	
HUM136	Fundamentals of anti-corruption culture and law	1	GED, CCH	5	150	30/0/15	105	E			5						
MNG489	Fundamentals of economics and entrepreneurship	1	GED, CCH	5	150	30/0/15	105	E			5						
CHE656	Ecology and life safety	1	GED, CCH	5	150	30/0/15	105	E			5						
MNG564	Basics of Financial Literacy	1	GED, CCH	5	150	30/0/15	105	E			5						
CYCLE OF BASIC DISCIPLINES (BD)																	
M-6. Module of physical and mathematical training																	
MAT101	Mathematics I		BD, UC	5	150	15/0/30	105	E	5								
MAT102	Mathematics II		BD, UC	5	150	15/0/30	105	E		5							MAT101
PHY468	Physics		BD, UC	5	150	15/15/15	105	E		5							

CSE603	Discrete Mathematics		BD, UC	5	150	30/0/15	105	E			5						MAT102, CSE616
MAT103	Mathematics III	1	BD, CCH	5	150	15/0/30	105	E			5						MAT102
SEC525	Optimization methods and operations research	1	BD, CCH	5	150	15/0/30	105	E			5						
SEC517	Statistics and data analysis		BD, UC	4	120	15/15/15	75	E					4				
	M-7. Module of basic training																
CSE155	Algorithmization and Programming		BD, UC	5	150	15/15/15	105	E	5								
CSE678	Algorithms and Data Structures		BD, UC	5	150	15/15/15	105	E		5							
CSE565	Fundamentals of information systems		BD, UC	4	120	15/15/15	75	E		4							
AAP173	Practical training		BD, UC	2				R		2							
CSE127	Object oriented programming		BD, UC	5	150	15/15/15	105	E			5						CSE164, MAT101
SEC522	Database and SQL language		BD, UC	6	180	30/15/15	120	E			6						
SEC506	Web programming		BD, UC	5	150	15/15/15	105	E				5					
CSE681	Operating systems		BD, UC	5	150	15/15/15	105	E				5					CSE624
CSE122	Computer Networks		BD, UC	5	150	15/15/15	105	E				5					CSE677
SEC527	Database administration		BD, UC	4	120	15/15/15	75	E					4				
CSE524	Basics of cybersecurity		BD, UC	5	150	15/15/15	105	E					5				
SEC523	Databases and web service development	1	BD, CCH	5	150	15/15/15	105	E					5				
CSE831	Fundamentals of Artificial Intelligence	1	BD, CCH	5	150	15/0/30	105	E					5				
CSE879	Inclusive education	1	BD, CCH	5	150	15/30/0	105	E					5				
CSE571	Devops engineering	2	BD, CCH	5	150	15/15/15	105	E					5				
SEC507	Business process analysis	2	BD, CCH	5	150	15/15/15	105	E					5				
CSE581	Information systems architecture	2	BD, CCH	5	150	15/15/15	105	E					5				
SEC502	Development of IS prototype	2	BD, CCH	5	150	0/0/45	105	E					5				
SEC518	Integration of information systems		BD, UC	5	150	15/15/15	105	E						5			
SEC519	Continuous integration and deployment of CI/CD	1	BD, CCH	5	150	15/15/15	105	E						5			
CSE575	Business Process Modeling	1	BD, CCH	5	150	15/15/15	105	E						5			
SEC508	Design patterns	1	BD, CCH	5	150	15/15/15	105	E						5			
SEC503	Query language and report development	1	BD, CCH	5	150	0/0/45	105	E						5			
SEC533	IT Project Management		BD, UC	6	180	30/15/15	120	E							6		
SEC510	The basics of students' research work	1	BD, CCH	5	150	15/15/15	105	E							5		
CSE551	Capstone project 1	1	BD, CCH	5	150	0/0/45	105	E							5		
MNG563	Fundamentals of sustainable development and ESG projects in Kazakhstan	1	BD, CCH	5	150	30/0/15	105	E							5		
	M-8. Module of professional activity																
CSE830	Startups and technology entrepreneurship	1	BD, CCH	5	150	15/0/30	105	E								5	
SEC532	Capstone project 2	1	BD, CCH	5	150	0/0/45	105	E								5	
MNG562	Legal regulation of intellectual property	1	BD, CCH	5	150	30/0/15	105	E								5	
NSE428	Communication skills	2	BD, CCH	4	120	30/0/15	75	E								4	
MNG801	Design Thinking	2	BD, CCH	4	120	15/0/30	75	E								4	
	CYCLE OF PROFILE DISCIPLINES (PD)																
	M-8. Module of professional activity																
AAP102	Production practice 1		PD, UC	2				R				2					
SEC515	Development of cross-platform mobile applications		PD, UC	5	150	15/15/15	105	E						5			
CSE570	Fundamentals of cloud computing		PD, UC	4	120	15/15/15	75	E						4			
AAP183	Production practice II		PD, UC	3				R						3			

CSE573	Virtualization and containerization systems	1	PD, CCH	5	150	15/15/15	105	E						5			
SEC511	Data visualization and reporting	1	PD, CCH	5	150	15/15/15	105	E						5			
SEC529	Distributed data processing systems	1	PD, CCH	5	150	15/15/15	105	E						5			
SEC501	Development of IS for trade automation	1	PD, CCH	5	150	0/0/45	105	E						5			
CSE594	IT audit and control	2	PD, CCH	5	150	30/0/15	105	E						5			
CSE596	Emerging technologies in information systems	2	PD, CCH	5	150	15/15/15	105	E						5			
SEC521	VBA Business Modeling	2	PD, CCH	5	150	15/15/15	105	E						5			
CSE569	IT infrastructure		PD, UC	6	180	30/15/15	120	E							6		
SEC528	Development of an IS business specification		PD, UC	5	150	15/15/15	105	E							5		
SEC520	System design	1	PD, CCH	5	150	15/15/15	105	E							5		
SEC512	Automation of business processes	1	PD, CCH	5	150	15/15/15	105	E							5		
CSE585	Digital transformation technologies	1	PD, CCH	5	150	15/0/30	105	E							5		
SEC504	Development of IS for accounting of finances	1	PD, CCH	5	150	0/0/45	105	E							5		
SEC505	PL/SQL programming	2	PD, CCH	5	150	0/0/45	105	E							5		
SEC524	Programming in T-SQL	2	PD, CCH	5	150	0/0/45	105	E							5		
SEC509	UI/UX design		PD, UC	5	150	15/15/15	105	E								5	
SEC514	Artificial intelligence and machine learning		PD, UC	6	180	30/15/15	120	E								6	
M-9. Module of final attestation																	
ECA105	Final examination		FA	8												8	
Additional type of training (ATT)																	
AAP500	Military training																
Total based on UNIVERSITY:									27	33	31	29	28	32	32	28	
									60		60		60		60		

Number of credits for the entire period of study

Cycle code	Cycles of disciplines	Credits			
		Required component (RC)	University component (UC)	Component of choice (CCH)	Total
GED	Cycle of general education disciplines	51	0	5	56
BD	Cycle of basic disciplines	0	86	34	120
PD	Cycle of profile disciplines	0	36	20	56
Total for theoretical training:		51	122	59	232
FA	Final attestation				8
TOTAL:					240

Decision of the Educational and Methodological Council of KazNRTU named after K.Satpayev. Minutes № 3 dated 20.12.2024

Decision of the Academic Council of the Institute. Minutes № 4 dated 22.11.2024

Signed:

Governing Board member - Vice-Rector for Academic Affairs — Uskenbayeva R. K.

Approved:

Vice Provost on academic development — Kalpeyeva Z. B.

Head of Department - Department of Educational Program Management and Academic-Methodological Work — Zhumagaliyeva A. S.

acting Director of Institute - Institute of Automation and Information Technologies — Chimbayev Y. T.

Department Chair - Cybersecurity, information processing and storage — Satybaldyeva R. Zh.

Representative of the Academic Committee from Employers ___Acknowledged___ — Mamyrbayev O. Z.

Note:

1. The module of basic training and professional activity of the department prescribes the names of the modules and their number.
2. Division into types of work at the discretion of the department
3. If necessary, the disciplines: Physics II, Mathematics III, General Chemistry of the department are included at the expense of credits of the component of the Department of DB, VC from the basic training module
4. The full academic load of one academic year should be 60 academic credits
5. The application of the catalog of elective subjects is the same as the Curriculum is divided into modules, with the inclusion of the Module "R&D"

Changes:

The discipline "Inclusive Education" has been added , R1, R4, R6, R9, R12 have been reformulated, taking into account the Sustainable Development Goals