AGREED	APPROVED
Chairman of the Educational and Methodological Council of JSC «International Information Technology University»	By the Chairman of the Board - Rector of the JSC «International Information Technology University»

_____ **Mustafina A.K.**   _____ **Issakhov A.A.**

«12» December 2024 Protocol of the EMC № 3   «28» February 2025 Protocol of the AC № 10

EDUCATIONAL PROGRAM

6B06101 Computer Science

Code and classification of the field of education: 6B06 Information and communication technologies

Code and classification of training area: 6B061 Information and communication technologies

Group of educational programs: B057 Information technologies

ISCED level: 6

NQR level: 6

ORC level: 6

Academic Degree Awarded: Bachelor in Information and Communication technologies in the educational program «6B06101 Computer science»

Duration of study: 4 years

Number of credits: 240

AGREED	AGREED
by Director REDPRINT LLP (Digital Agency NIDGE)	Deputy Director for Research of the Institute of Ionosphere

_____ M.M. Ryskeldi   _____ B.A. Iskakov

«__» _____ 2025.   «__» _____ 2025.

Almaty, 2025

The code and name of the educational program: **6B06101 Computer Science**

№	Developers of the Educational Program (Position, Academic Degree, Scientific Degree, Full Name)	Date	Signature	Note
1	Associate Professor of the Department Mathematical and Computer Modeling, PhD Omarov B.S.			
2	Associate Professor of the Department Mathematical and Computer Modeling, PhD Abdikalikova Z.T.			
3	Associate Professor of the Department Mathematical and Computer Modeling, PhD Ydyrys A.Zh.			
4	Senior Lecturer of the Department Mathematical and Computer Modeling, Master Olzhayev O.M.			

Contents

List of abbreviations and acronyms

BD	Cycle of basic disciplines
BC	Basic competency
BM	Basic module
UC	University component
HE	Higher education
NMS	National Mandatory Standards of Higher and Post-Graduate Education
ATT	Additional types of training
EQF	European qualifications framework
EFE	European foundation for education
KSA	Knowledge, Skills and Abilities
FA	Final attestation
EC	Elective component
ISCED	International Standard Classification of Education
NQF	National qualifications framework
NQS	National qualifications system
GHM	General humanitarian module
RC	Required component
GEM	General education module
GED	Cycle of general education disciplines
EP	Educational program
GPM	General professional module
SQF	Sectoral qualifications framework
GEC	General education competency
MD	Cycle of major disciplines
PI	Professional internship
PS	Professional standard
PE	Postgraduate education
PC	Professional competency
PM	Professional module
LO	Learning outcome
QMS	Quality Management System

1. Description of the educational program

Computer Science is a scientific field that studies the laws, methods, and techniques of acquiring, storing, transmitting, and processing information in various areas of human activity using computing technologies and telecommunication systems.

The "Computer Science" educational program is aimed at training qualified specialists with theoretical knowledge and practical skills in the field of informatics and information technologies. The program covers a wide range of topics, including data structures and algorithms, programming, databases, operating systems, computer networks, artificial intelligence, machine learning, and software development.

During the course of study, students acquire competencies that enable them to analyze, design, and implement software solutions, work with large volumes of data, and apply modern tools and technologies in various applied fields. The program also develops critical thinking, teamwork, and IT project management skills.

At the same time, students are given the opportunity to take additional courses of their choice as free electives (minors) these may include subjects from any other academic discipline.

Graduates of the program are in demand in IT companies, research centers, government and private organizations, where they can work as programmers, analysts, data engineers, and software developers.

2. Aim and objectives of the educational program

The purpose of the EP - to train highly qualified specialists equipped with deep theoretical knowledge and practical skills in the field of computer science. Graduates will be capable of developing efficient algorithms, designing software systems, applying modern technologies in artificial intelligence, machine learning, and big data, as well as adapting to the rapidly changing demands of the digital economy.

The main objectives of the educational program "Computer Science" are:
1. To train specialists with fundamental knowledge in computer science, algorithms, programming, computer architecture, and databases.
2. To develop skills in designing, developing, and analyzing software, including web, mobile, and cloud technologies.
3. To teach the application of modern methods of artificial intelligence, machine learning, and data analysis for solving practical problems.
4. To enhance abilities to work in teams, manage projects, and apply IT solutions across various subject areas.
5. To foster professional ethics, creative thinking, and the ability for lifelong learning in the context of rapidly evolving technologies.

3. Passport of the educational program

№	Name	Description
1.	Education area code and classification	6B06 Information and communication technologies
2.	Training direction code and classification	6B061 Information and communication technologies
3.	Group of academic programs	B057 Information technologies
4.	Name of the educational program	6B06101 Computer Science
5.	Aim of the educational program	Training of highly qualified specialists with deep theoretical knowledge and practical skills in the field of computer science, capable of developing efficient algorithms, creating software systems, applying modern technologies of artificial intelligence, machine learning, and big data, as

		well as adapting to the rapidly changing demands of the digital economy.
6.	Type of the educational program	Acting EP
7.	Level according to the National Classifications Framework	6
8.	Level according to the Sectoral Qualifications Framework	6
9.	Distinctive features of the program	No
10.	Partner University	No
11.	Academic degree awarded	Bachelor
12.	Duration of study	4 years
13.	Volume of credits	240
14.	Language of education	English
15.	Atlas of new professions	Blockchain specialist IoT- specialist
16.	Regional standard	No
17.	Availability of an attachment to the training license	Yes
18.	License number for the training area	KZ81LAM00001263
19.	Availability of program accreditation	yes
20.	Generated learning outcomes	LO1: To argue the choice of basic standards, principles and design patterns, methods, tools and programming languages, including the choice of methods and means of building information security systems of modern ICT LO2: Analyze the market of software and hardware, information products and services for the creation and modification of information systems LO3: Design and develop ergonomic user interfaces LO4: Participate in the management of the technical support of the information system during its operation LO5: Use the methods of research of large data sets LO6: Show communication skills, initiative and psychological readiness for work, including when working in a team and make management and technical decisions LO7: To carry out a comprehensive analysis and analytically summarize the results of research using modern science and technology, the skills of independent data collection, study, analysis and synthesis LO8: Design database, software and information system architect LO9: Apply mathematical models and methods of various processes LO10: Be able to install information systems software and be able to download a database LO11: Able to apply the acquired knowledge in the chosen additional educational program. LO12: Demonstrate the ability to conduct interdisciplinary scientific research using basic knowledge from the fields of economics and law, ecology and life safety. The ability to apply entrepreneurial qualities to the tasks of calculating the profitability of scientific projects. The ability to build

		personal and interpersonal relationships in compliance with an anti-corruption culture.

4. Professional Standards (PS), profession cards, labor functions

№	Name of the PS	Profession card	Labor functions
1	Software Maintenance	Approval year:2022 CCEA: Information and Communication Profession: Software Maintenance Specialist NQF Level: 6	Monitoring of the software product and error detection Participation in software modernization
2	Software Development	Approval year:2022 CCEA: Information and Communication Profession: Software Design Engineer NQF Level: 6	Preparation of the software development process Integration of software modules and components Software design Software requirements analysis Software programming and testing
3	Software Testing	Approval year:2022 CCEA: Information and Communication Profession: Software Engineer NQF Level: 6	Writing code and developing software programs Creating algorithms and designing flowcharts based on software specifications

5. List of the EP competencies

GC1: Know: social and ethical values based on public opinion, traditions, customs, social norms and focus on them in their professional activities; traditions and culture of the peoples of Kazakhstan; human and civil rights and freedoms; the basics of the legal system and legislation of Kazakhstan; trends in social development of society; the basics of physical culture and the principles of a healthy lifestyle.

GC2: Have an idea: about ethical and spiritual values; about sociological approaches to the individual, the main laws and forms of regulation of social behavior; about the essence of power and political life, political relations and processes, the role of political systems in the life of society and various social groups; about the role of consciousness and self-awareness in the behavior, communication and activities of people, the formation and formation of personality.

GC3: Possess: ethical and legal norms of behavior; a system of practical knowledge and skills that ensure the acquisition, development, improvement and activation of psychophysical abilities and qualities, the acquisition, preservation and promotion of health, the ability to work in a team, correctly defend their point of view, offer new solutions.

GC4: Ability to write and communicate verbally in the state language and the language of international communication; ability to logically correctly, argumentatively and clearly build oral and written speech; readiness to use one of the foreign languages.

GC5: Ability to use modern information technologies, manage information using business applications; use network computer technologies, databases and application packages in their subject area.

BC1: Ability to actually use the state language, the language of international communication and a foreign language in professional activities.

BC2: Ability to understand the basics of economic knowledge, scientific ideas about Finance, Economics.

BC3: Ability to professionally operate modern equipment, devices, network components, computer systems (in accordance with the program goals), as well as to use safety rules, industrial sanitation, fire safety and labor protection standards.

BC4: Ability to have skills in using algorithms and programs for calculating business process parameters.

BC5: Ability to use the main provisions and methods for solving management tasks, the ability to perform project documentation in a computer graphics software environment for various types of projects.

BC6: Ability to be competent in the choice of mathematical modeling methods for solving specific engineering problems, including the readiness to identify the natural science essence of problems that arise in the course of professional activity, and the ability to attract the appropriate physical and mathematical apparatus for its solution.

BC7: Ability to design architectures of information system components, including the human-machine interface of hardware and software complexes, to choose operating systems and methods of information protection.

BC8: Ability to develop information and software for an information system based on modern development methods and tools.

PC1: Ability to carry out a description of applied processes and information support for solving applied problems.

PC2: Ability to manage the lifecycle stages of the methodological and technological infrastructure for big data analysis in an organization.

PC3: Ability to participate in the management of information system development projects at the stages of the life cycle.

PC4: Ability to use modern programming environments for database design and implementation.

PC5: Ability to analyze the market of software and hardware, information products and services for creating and modifying information systems.

PC6: Ability to develop, implement and adapt application software.

PC7: Ability to apply the acquired knowledge in the selected additional educational program

6. List of learning outcomes of the EP

LO1: To argue the choice of basic standards, principles and design patterns, methods, tools and programming languages, including the choice of methods and means of building information security systems of modern ICT

LO2: Analyze the market of software and hardware, information products and services for the creation and modification of information systems

LO3: Design and develop ergonomic user interfaces

LO4: Participate in the management of the technical support of the information system during its operation

LO5: Use the methods of research of large data sets

LO6: Show communication skills, initiative and psychological readiness for work, including when working in a team and make management and technical decisions

LO7: To carry out a comprehensive analysis and analytically summarize the results of research using modern science and technology, the skills of independent data collection, study, analysis and synthesis

LO8: Design database, software and information system architect

LO9: Apply mathematical models and methods of various processes

LO10: Be able to install information systems software and be able to download a database

LO11: Able to apply the acquired knowledge in the chosen additional educational program.

LO12: Demonstrate the ability to conduct interdisciplinary scientific research using basic knowledge from the fields of economics and law, ecology and life safety. The ability to apply entrepreneurial qualities to the tasks of calculating the profitability of scientific projects. The ability to build personal and interpersonal relationships in compliance with an anti-corruption culture.

7. Matrix for correlating the learning outcomes of the EP with the formed competencies (V)

	LO1	LO2	LO3	LO4	LO5	LO6	LO7	LO8	LO9	LO10	LO11	LO12
BC1	V					V						
BC2						V						V
BC3	V		V					V				
BC4		V						V	V			
BC5			V					V				
BC6		V							V			
BC7	V									V		
BC8	V		V					V				
PC1				V	V					V		
PC2			V		V					V	V	
PC3		V				V	V					
PC4				V			V	V				
PC5		V		V			V					
PC6			V					V		V		
PC7											V	

8. The relationship of LO with labor functions

№	LO	Labor functions
1.	LO1	Preparation of the software development process Software requirements analysis Technical support of software
2.	LO2	Preparation of the software development process Software requirements analysis
3.	LO3	Software requirements analysis Technical support of software
4.	LO4	Participation in software modernization Preparation of the software development process Software design Writing code and developing software programs Technical support of software Preparation for software maintenance
5.	LO5	Writing code and developing software programs
6.	LO6	Software user support
7.	LO7	Monitoring of the software product and error detection Software requirements analysis Software programming and testing Creating algorithms and designing flowcharts based on software specifications
8.	LO8	Participation in software modernization Creating algorithms and designing flowcharts based on software specifications Writing code and developing software programs
9.	LO9	Software design Creating algorithms and designing flowcharts based on software specifications
10.	LO10	Software requirements analysis Preparation of the software development process Software design

		Software programming and testing	
		Integration of software modules and components	
11.	LO11	Software requirements analysis	
		Software programming and testing	
		Preparation of the software development process	
12.	LO12	Software requirements analysis	
		Preparation of the software development process	

9. Table showing interconnection of competencies, learning outcomes, assessment methods and criteria

Competencies of an EP graduate	Competencies expressed in the expected learning outcomes	Assessment criteria	Name of the assessment method
General educational competencies			
GC1 GC2 GC3	LO12	Knows the basic concepts in the area under study	Abstract
		Reproduces and explains the basic concepts in the area under study	Report, message
		Knows the basic concepts in the area under study	Test
GC5	LO1	Uses knowledge in practice in the area under study	Project
		Solves complex problems based on acquired knowledge	Multi-level tasks and assignments
GC4	LO6	Can construct oral speech in a reasoned and clear manner	Round table, discussion, polemics, dispute, debate
		Can construct oral speech logically and clearly	Interview
		Can construct written speech logically and clearly	Essay
Basic competencies			
BC2 BC6	LO9	Knows the basic concepts of the area under study	Test
	LO2	Knows the basic concepts of the area under study	Case study
	LO6	Knows how to apply mathematical methods to solve various problems	Workbook
	LO10	Knows the basic concepts of the area under study	Case study
	LO12	Knows basic concepts from the fields of economics and law, ecology and life safety	Creative task
BC3 BC4 BC5 BC7 BC8	LO1	Applies the acquired knowledge to solve practical problems	Project
	LO9	Solves complex problems based on the acquired knowledge	Multi-level tasks and assignments
	LO8	Applies the acquired knowledge to solve practical problems	Project
	LO3	Applies the acquired knowledge to solve practical problems	Project
	LO2	Applies the acquired knowledge	Laboratory work
	LO10	Applies the acquired knowledge to solve practical problems	Case study
BC1	LO1	Ability to present his ideas in a reasoned manner	Colloquium
	LO6	Ability to clearly express himself in writing	Abstract
Professional competencies			

PC2 PC3 PC4 PC6	LO9	Apply acquired knowledge to solve practical problems	Calculation and graphic work
	LO8	Apply acquired knowledge to solve practical problems	Project
	LO3	Apply acquired knowledge to solve practical problems	Project
	LO2	Apply acquired knowledge to solve practical problems	Project
	LO6	Apply acquired knowledge	Colloquium
	LO5	Apply acquired knowledge	Laboratory work
	LO10	Apply acquired knowledge to solve practical problems	Кейс-задача
	LO4	Apply acquired knowledge to solve practical problems	Project
	LO7	Solves complex problems based on the acquired knowledge	Multi-level tasks and assignments
PC1 PC5	LO2	Can formulate conclusions when solving practical problems	Laboratory work
	LO5	Can extract the necessary information	Colloquium
	LO10	Can formulate conclusions when solving practical problems	Laboratory work
	LO4	Can extract the necessary information	Colloquium
	LO7	Can formulate conclusions when solving practical problems	Laboratory work
PC8	LO11	Can apply the acquired knowledge in the selected additional educational program	Project

10. Information about the modules of the educational program

Module code and name	Volume (labor intensity) of the module	Learning outcomes	Module code and name	Volume (labor intensity) of the module
GENERAL EDUCATION MODULES				
OOM6001 Module of social and cultural development	18	Has an understanding of the principles and patterns of historical development of society, the historical periodization of Kazakhstan's history, the place of Kazakhstan's history in world history and the history of Eurasia. Is capable of independently conducting comprehensive and critical analysis of historical and contemporary sources, drawing conclusions and supporting them with arguments.	Oral interview, testing, report, midterm and endterm, semester papers	History of Kazakhstan
		Has an understanding of the subject, functions, main branches, and directions of philosophy; the place and role of philosophy in society and human life; the main stages of development of world and Kazakh philosophical thought. Is able to use specialized philosophical terminology and the conceptual-categorical apparatus of philosophy; - creatively and critically work with original philosophical texts; - logically express their thoughts on studied philosophical issues; - analyze the features of the genesis and development of philosophical knowledge; formulate and argue their own worldview positions.	Oral interview, testing, report, midterm and endterm, semester papers	Philosophy
		Has an understanding of the subject, functions, main branches, and directions of sociology; is familiar with key approaches in the sociology of organizations both at the level of theoretical concepts and models, as well as at the level of empirical research; and is acquainted with basic methods and techniques of organizational research. Is capable of: - navigating various sociological approaches to the analysis of organizations and the literature related to each approach; - acquiring skills in critical analysis of these approaches (understanding their advantages and limitations); - obtaining basic analytical skills in sociological research of organizations; having an understanding of key methods of organizational research and their limitations.	Oral interview, testing, report, midterm and endterm, semester papers	Sociology-Political science

		Has an understanding of the subject, functions, and main branches of political science; should grasp the fundamental concepts of politics and political science, the development of major political theories and concepts, and assimilate the contributions made by various thinkers to the conceptual understanding of key issues in politics, society, the state, and power. Is capable of understanding the basics of scientific political analysis at both theoretical and applied levels, as well as the potential of political analysis and forecasting methods for making optimal managerial decisions. Applies theoretical knowledge in real political practice at the levels of analysis, expertise, consulting, and management.		
		Has an understanding of the subject, functions, main branches, and directions of psychology; the place and role of psychology in the life of society and the individual. Is capable of forming fundamental knowledge, skills, and competencies necessary for professional activity; — fostering ecological, physical, ethical, legal culture, and culture of thinking; — language training; — fostering universal human and socio-personal values. Has an understanding of the subject as logically complete elements of the discipline's content, providing a basis for defining the course topics and the material to be assessed. The structuring of this educational content is also a necessary condition for the functioning of the rating system. Furthermore, such structuring helps students form a general understanding of the development of world culture and to systematize their knowledge. Is capable of giving students an understanding of the main problems of cultural theory; identifying objective patterns in global and national cultural processes; clarifying the genesis, functioning, and development of culture as a specifically human way of life, which historically reveals itself as a process of cultural heritage; considering cultural aspects of various spheres of social life; identifying the features of cultural life in different world regions, historical epochs, and cultural-historical types.	Oral interview, testing, report, midterm and endterm, semester papers	Cultural studies-Psychology
OOM6002 Language and ICT skills development module	25	Is capable of describing – the basic rules of reading; word-formation models; contextual meanings of polysemous words; terms and lexical constructions of the sublanguage corresponding to the profile of the studied specialty; the most frequent specific grammatical phenomena.	Oral interview, testing, report, midterm and endterm, semester papers	Foreign language

		Understands statements in a foreign language, features of the compositional and semantic organization of a scientific text; the main techniques for extracting the key information from a microtext.		
		Identify linguistic forms expressing various types of information in scientific texts to solve tasks of academic and professional communication; principles of composing texts in main academic-scientific and scientific-professional genres.	Oral survey, testing, report, midterm control, semester work	Kazakh (Russian) language
		Knows: - The main directions of ICT development; - The basics of using information resources for information search and storage; - The architecture and components of computer systems; - The main goals and tasks of information security. Can: - Work in any operating system and with databases; - Apply methods and tools for information protection; - Work with spreadsheets, consolidate data, and build charts. Has skills in: - Processing vector and raster images; - Creating multimedia presentations; - Data visualization; - Using various forms of e-learning to expand professional knowledge; Working with cloud services and e-technologies.	Oral interview, testing, report, midterm and endterm, calculation and graphic works	Information and Communication Technologies
OOM6003 Module of physical culture	8	Knows the main tasks of physical education of students, Can pass control exercises and standards.	Test	Physical Culture
OOM6004 Module of personal and social development	5	Have an understanding of the principles and patterns of economic relations. To be familiar with basic financial terms such as income, expenditure, assets, liabilities, capital and current expenditures, investments, loans, and savings.	Oral questioning, report, midterm exam	Foundation of economics and financial literacy
		Have the ability for independent theoretical and practical judgments and conclusions. Be able to objectively evaluate scientific information, the freedom of scientific inquiry, and the aspiration to apply scientific knowledge in educational activities, including for completing a diploma project (work).		Research metodology
		Have an understanding of the principles of law and anti-corruption culture.		Fundamentals of law and anti-corruption culture
		Knows the fundamentals of ensuring personal and public safety in emergency situations. Can apply methods of prevention and protection		Fundamentals safety of life activity

		against hazardous and harmful factors in everyday and professional activities.		
		Understands the interrelationship between human activities and the state of the environment. Can apply the principles of sustainable development when making environmentally sound decisions.		Ecology and sustainable development
		Have an understanding of IT competencies and entrepreneurial skills.		Startups and entrepreneurship
		Understands the fundamental principles of inclusive education, the legislative and ethical foundations of inclusion, and can apply strategies to adapt the educational process for learners with special educational needs. Is capable of developing an inclusive environment and collaborating with various stakeholders in the educational process, taking into account the individual characteristics of learners.		Inclusive education
BASIC MODULE				
BM6511 Physics and mathematics module (CS)	30	**Able to** apply methods for solving differential and integral calculus of functions of several variables in applied problems; apply methods for solving differential equations in solving applied problems; obtain approximate values of solutions using power series and Fourier series expansion with a given accuracy; determine the optimal methods for solving practical problems.	Oral interview, testing, report, midterm control, calculation and graphic works	Mathematical analysis
		Knows: vectors and vector spaces, their main properties, operations (addition, scalar multiplication), and the concept of linear independence. Matrix operations such as addition, multiplication, transposition, inversion, and determinant calculation. Equations of lines and planes in space, their mutual positions, as well as the use of parametric and canonical representations. Able to: solve systems of linear equations using various methods, analyze the existence and number of solutions; write equations of different curves — circles, ellipses, parabolas, hyperbolas — and analyze their geometric properties.		Algebra and geometry
		Develop logical and abstract thinking for solving complex mathematical problems. Able to apply methods of discrete mathematics and logic for modeling, analyzing, and optimizing processes in various fields such as computer science, cryptography, information processing, and artificial intelligence.	Oral interview, testing, report, midterm control, calculation and graphic works	Discrete mathematics
		Knows the relationship between mathematics and computer science, operating systems in an interdisciplinary training program that covers the section modern statistical methods and economic theory.		Mathematical statistics for programmers

		Knows and understands kinematics; dynamics; circular motion and gravity; energy; momentum; simple harmonic vibrations; torque and rotational motion; electric charge and electric force; DC Circuits; thermodynamics and mechanical waves, field and potential; electrical circuits; induction of magnetism and electromagnetism; geometric and physical optics; and quantum, atomic and nuclear physics and sound.	Oral interview, testing, report, midterm control, calculation and graphic works	Physics
		Knows and uses in modeling the Basics of error theory, systems of linear algebraic equations, Nonlinear equations and systems of nonlinear equations, Interpolation and best approximations, Differentiation and integration of functions, Ordinary differential equations, Equations of mathematical physics.		Computational mathematics
BM6512 Computer Modeling Module (CS)	31	**Know:** organize the necessary data structures depending on the requirements of the task; **Be able to:** develop block diagrams of various algorithms; **Have skills:** develop programs in C ++ using the language tools.	Oral interview, testing, report, midterm control, calculation and graphic works	Introduction to programming
		Be able to develop sorting algorithms such as bubble sorting, merge sorting, quick sorting, etc **Have** the basics of OOP concepts, theory, methods and technologies of C ++, data structures and algorithms; application of algorithms and modern trends in technologies of a large company		Object-oriented programming
		Able to know: basic algorithms to solve biological processes of different nature; **Can** use software language tools to solve biological problems and be able to perform data analysis and identify trends. **Have** skills in: implementing algorithms and data structures, as well as using programming language functions using modern software tools		Algorithms and data structures
		Know: basic methods of numerical research of biological processes of various nature. **Be able to: i**nterpret the results of numerical analysis of biological data, identify trends, make forecasts; **have:** implementations of numerical methods using modern software tools.	Oral interview, testing, report, midterm control, calculation and graphic works	Database theory
		Designs the structure of a web site as an information system. Knows the technology of creating a web site using client-side and server-side programming tools; the technology of hosting, supporting and maintaining a web site on the server.		Web-technology
		Able to collect and analyze information related to the professional field. Able to work with educational, methodological and regulatory documents. Prepare practice reports in accordance with established requirements.	Report	Teaching practice

BM6514 Professional Language Training Module (DS)	6	Identify linguistic forms used to express various types of information in scientific texts to solve tasks related to academic and professional communication; principles of composing texts in key educational-scientific and scientific-professional genres.	Oral interview, testing, report, midterm control, semester papers	Business correspondence in the state language
		Able to characterize — basic reading rules; word-formation models; contextual meanings of polysemous words; terms and lexical constructions of the sublanguage corresponding to the profile of the studied specialty; the most frequent specific grammatical phenomena. Understand statements in a foreign language, features of the compositional-semantic organization of scientific texts; main techniques for extracting the core information of a microtext.		Professionally oriented foreign language
BM6513 Machine Learning Module (CS)	33	Have an idea: about comparative analysis in genomics of ideological and methodological criteria for understanding the structural subsections of the new science-structural genomics, proteomics and transcriptomics.	Oral interview, testing, report, midterm control, calculation and graphic works	Data analysis and visualization in Power BI
		Be proficient in the basic concepts and methods of economic systems research. Know the state and main directions of development of mathematical models of economic systems at various levels. Have the skills necessary for independent work on the design and implementation of economic analysis models and modeling algorithms; system thinking.		Operation research
		Knows the basic technologies for building modern databases and DBMS; distributed and parallel DBMS technology; Has skills in working with databases and data warehouses; with OLAP technologies; creating applications in the client-server architecture»; Uses the PL/SQL procedural language to create applications that manipulate data on the DB server side.	Oral interview, testing, report, midterm control, calculation and graphic works	Programming in PL/SQL
		Know learning algorithms and classifier families, algorithmic approaches to learning.		Algorithmic aspects of machine learning
		Knows methods of designing a web site as a static information system; methods of designing a web site as a dynamic information system; theory of using graphics on web pages; methods of processing and editing digital images; client-side software used to create web pages; server-side software used to create web pages; software for creating databases; software for creating a virtual server; basic principles of configuration of a real web server; software tools used for hosting and maintaining web pages; methods for optimizing a web site for promotion on the Internet.	Oral interview, testing, report, midterm control, calculation and graphic works	Advanced WEB technologies

		Know: procedural dialects of the SQL language and SQL stored components: views, rules, triggers, stored procedures and functions and learn how to create them, taking into account the differences in the definition and use of data stored components in different DBMS: PostgreSQL, MS SQL Server, Oracle SQL.		Advanced database theory
PROFESSIONAL MODULES				
PM6507 Programming Module (CS)	19	Be able to develop Windows applications using a database on ADO.NET and LINQ	Oral interview, testing, report, midterm control, calculation and graphic works	Application develop-ment in ASP.NET
		Know the connection and configuration of Spring, the specifics of data access		Development of Web applications in на Java Spring
		Know: Python programming language for working with genomic data; Unix operating system and commands for working in this environment; scripting languages and methods for writing program codes on them. **Has** the skills to develop programs for analysis of genes and genomes, using other additional packages such as Biopython, R, Bioconductor and Galaxy.		Programming in Python
		Be able to build IoT systems		Programming on Internet of Things (IOT)
PM6508 Algorithms and analysis module (CS)	14	Know algorithms in the form of a design process that begins with problems encountered across the entire range of computing applications. Use a good understanding of algorithm design methods and the end result is the development of effective solutions to such problems.	Oral interview, testing, report, midterm control, calculation and graphic works	Algorithm design and analysis
		Knows and uses in modeling Nonlinear equations and systems of nonlinear equations, Interpolation and best approximations, Differentiation and integration of functions, Ordinary differential equations, Equations of mathematical physics.		Numerical methods of analysis and algebra
		Able to use MS Excel and solves practical cases for honing and mastering the material.		Design and administra-tion in MS EXCEL
PM6501 Practical Module	13	Knows the organizational structure and complex of technical means of the information and analytical center (IAC) of the organization. Able to identify the main problems solved by the IAC. Know the mathematical support of the selected task (set of tasks or subsystem) and the software of the selected task (set of tasks or subsystem), organizational and legal support of the selected task (set of tasks or subsystem). systematization and analysis of factual materials necessary for writing a course work, scientific report and internship report.	Report	Industrial practice
				Pregraduation practice

PM6504 Module of Minor disciplines	15	Able to apply the acquired knowledge according to the selected additional educational program.	Oral questioning, testing, report, midterm control	Minor 1, 2, 3
PM6509 Parallel and mobile programming Module (CS)	15	Able to identify patterns, identify anomalies, test hypotheses and verify assumptions using summary statistics and graphical representations.	Oral interview, testing, report, midterm control, calculation and graphic works	Exploratory data analysis
		Master the key methods and approaches used in artificial intelligence and be able to apply them to solve real-world problems. Ability to develop and implement machine learning models, neural networks, computer vision systems and natural language processing. Have practical skills in working with the tools and technologies needed to create applied AI applications.		Applied Applications of Artificial Intelligence
		Understanding the principles of designing user-friendly and effective user interfaces. Ability to take into account the cognitive characteristics of users, analyze interactions and develop interfaces with an emphasis on convenience and accessibility. The acquired knowledge is applied in the creation of human-oriented software products.	Oral interview, testing, report, midterm control, calculation and graphic works	Human-computer interaction
		Mastering methods of developing programs that effectively use multiprocessor and multi-core computing systems. Ability to develop parallel algorithms, use multithreading and task parallelization technologies. The acquired skills allow optimizing computing performance in resource-intensive applications.		Parallel programming
		Understanding the fundamentals of cloud computing and AWS architecture. Mastering key AWS services such as EC2, S3, RDS, IAM, and being able to use them to deploy and manage cloud solutions. The knowledge gained forms the basis for further study of cloud technologies and preparation for certification.		Amazon Web Services Foundations (AWS Foundations)
		Mastering the basics of Swift programming and using the Xcode environment to create mobile applications. Ability to design interfaces using UIKit or SwiftUI, as well as implement functionality taking into account the requirements of the iOS platform. The acquired skills allow you to develop modern, user-oriented mobile applications.	Oral interview, testing, report, midterm control, calculation and graphic works	Development of mobile applications on iOS
		Mastering the basics of programming in Kotlin (or Java) and using the Android Studio environment. Ability to develop interfaces, interact with databases and external services, and take into account the features of the life cycle of Android applications. The knowledge gained allows you to create full-featured and convenient mobile applications for the Android platform.		Development of mobile applications on Android

11. Information about the disciplines of the educational program

№	Discipline Code and Name	Brief description of the discipline (30-50 words)	Labor intensity of discipline in credits	Learning outcomes formed (codes)	Prerequisites	Postrequisites
Cycle of general education disciplines (GED) **Required component (RC)**						
1.	History of Kazakhstan	This course consists of teaching the modern history of the country to understand the role and significance of the events in the historical context.	5	LO12	-	-
2.	Philosophy	This course consists of teaching philosophy to form a conscious attitude to the environment.	5	LO12	-	-
3.	Foreign language	This course consists of learning a foreign language for the formation of communication skills in a foreign language.	10	LO6	-	
4.	Kazakh (Russian) language	This Russian/Kazakh language course consists of teaching Kazakh / Russian language for the formation of communication skills in the state and Russian languages.	10	LO6	-	-
5.	Information and communication technologies	The course provides an overview in various ICT fields, allowing students to gain basic knowledge on the application of modern ICT in their scientific and practical work, for self-study and other purposes.	5	LO1 LO9	-	-
6.	Sociology-Political science	This course consists of teaching sociology to understand society and social development. The course provides students with knowledge about the political sphere of society, the relationship and mutual influence of politics and management	4	LO12	-	-
7.	Culturology-Psychology	The course forms the necessary knowledge of cultural studies, develops an understanding of the uniqueness of cultures. The course introduces various concepts, basic concepts, laws of management psychology	4	LO12	-	-
8.	Physical culture	The course provides a solution to the main problems of physical education of students, provides for the delivery of control exercises and standards.	8	LO12	-	-
Cycle of general education disciplines (GED) **University component (UC) and (or) Elective component (EC)**						
9.	Elective course #1 (CGS)		5			
10.	Foundation of economics and financial literacy	This course provides an integrated introduction to economics and legal foundations relevant to entrepreneurial decision-making and everyday personal finance. Students will understand basic economic principles, and navigate legal systems affecting individuals and businesses		LO12		

		and learn how to manage personal finances. Topics include economic behavior, legal research, business budgeting, taxation, investment and case analysis. The course is open to non-economics majors interested in how economic, legal and financial systems shape our lives.				
11.	Startups and entrepreneurship	This course provides an introduction to what a business is, how it works and how to run it. Students will define ownership and processes used in manufacturing and marketing, finance, personnel, and management in business operations.		LO12		
12.	Fundamentals of law and anti-corruption culture	The course outlines the legal, economic, and social foundations of fighting corruption. Throughout the course, students will gain practical knowledge in identifying the peculiarities of state policies, applying international experiences in combating corruption, mastering skills in conflict resolution, and detecting corruption activities using professional ethics and methods. After successful completion of the course, students will gain the following competencies: 1. Understand the measures of legal responsibility for participation in corruption violations. 2. Determine the conflict of interests in the activities of organizations leading to corruption. 3. Analyze the work of organizations using various research methods.		LO12		
13.	Inclusive education	The philosophy, history and methodology of an inclusive approach. Documents governing the development of an inclusive process in higher professional education. Educational needs of students with disabilities and disabilities. Methods and forms of organization of the educational process at a university for students with disabilities. Development of adapted educational programs, curricula and educational paths for students with disabilities and disabilities. Psychological and pedagogical support of students with disabilities and disabilities at the university.		LO11 LO6		
14.	Ecology and sustainable development	The course reveals the role of ecology in solving modern economic, social and political problems, as well as the emergence of global environmental problems as a result of human production activities and the responsibility of the world community for them. A very important aspect is also international cooperation to		LO12		

		ensure sustainable development. Various areas of practical application of ecology are also considered - natural resources and environmental pollution.				
15.	Research metodology	The course is devoted to the study of activities aimed at developing students " ability to independent theoretical and practical judgments and conclusions, skills of objective evaluation of scientific information, freedom of scientific research and the desire to apply scientific knowledge in educational activities, including for the diploma project (work).		LO12 LO7		
16.	Fundamentals safety of life activity	Studying ways of safe human interaction with the environment (industrial, domestic, urban, natural), sustainable operation of business facilities (organizations) in emergency situations, issues of protection from negative factors, prevention and elimination of the consequences of natural and man-made emergencies and the use of modern means defeat.		LO12		
	Cycle of basic disciplines (BD) **University component (UC)**					
17.	Discrete mathematics	The course is devoted to the study of discrete objects and elements of logic. It provides for the study of discrete objects, the solution of combinatorial problems, the study of types of maps and binary relations, the reduction of formulas of the algebra of propositions to normal forms, the application of the algebra of logic to the theory of switching circuits. The ability to analyze and synthesize, mathematical maturity is developing.	6	LO9	-	Database theory
18.	Mathematical analysis	The purpose of the course is to familiarize students with important branches of calculus and its applications in computer science. During the educational process, students should familiarize themselves and be able to apply mathematical methods and tools to solve various applied problems. Moreover, they study fundamental methods of studying infinitesimal variables using analysis, which is based on the theory of differential and integral calculations.	6	LO9	-	Operation research
19.	Algebra and geometry	Studying the elements of linear algebra and analytic geometry using real life and various science examples.	4	LO9	-	Mathematical statistics for programmers
20.	Physics	The study of the laws, principles, postulates and equations of mechanics, molecular physics and	4	LO12		

		thermodynamics, electricity and magnetism, the use of the equations of physics to solve specific physical problems, the use of physics methods for research, analysis and laboratory work in order to verify the operation and implementation of the laws of physics in nature and technology.				
21.	Teaching practice	The practice includes detailing the finishing blocks of a generalized scheme, identifying the necessary classes and methods, defining sets of logically interconnected data (data streams), introducing various additional tools to ensure clarity and increase the level of service of the designed program, developing a generalized algorithm scheme, developing and debugging a program implementing the designed model.	2	LO9 LO6 LO5	Introduction to Programming	Algorithms and data structures
22.	Object-oriented programming	This course will provide the skills to develop console or windows applications using Java programming language using object-oriented programming concepts. Topics of the course include the OOP paradigm, Java programming, file processing, exceptions, structures, collections, object-oriented programming concepts.	7	LO8	Introduction to programming	Algorithms and data structures
23.	Introduction to Programming	To study the methodological basis of program development and practical programming skills. The main objectives of studying the discipline are the following: Study of the basics of algorithmization of tasks; Learning the basics of classification of programming languages; Study of data types and classification of C ++operators; Development of programs using subroutines, standard modules, programming style, programming quality indicators, methods of debugging and testing programs, the basics of object-oriented programming.	6	LO8	-	Object-oriented programming
24.	Algorithms and data structures	The course is designed to study algorithms and development programs for solving various problems. To do this, the software structure, the principles for constructing algorithms and programs, methods for solving, algorithms, programming, debugging and implementing programs using a programming language are considered.	6	LO8	Object-oriented programming	
25.	WEB technology	This course teaches the basics of website development using HTML, Cascading Style Sheets (CSS), JavaScript, and JQuery. Teaches you how to use the PHP programming language, master MySQL database basics, and develop secure server-side client web applications.	5	LO8 LO10		Advanced WEB technology

26.	Database theory	The course explains what a database system is, and then proceeds to most of the training material for learning relational database systems - databases designed according to a relational (or tabular) model. Then, from data abstraction, the course moves on to transaction management with additional materials to improve query performance. Finally, modern trends in database system design have emerged, which also define the latest developments in the broader history of data storage technologies.	5	LO8 LO10	Discrete mathematics	Advanced database theory
Cycle of basic disciplines (BD) **Elective component (EC)**						
27.	Business correspondence in the state language	Business correspondence in the state language is a very important subject for students, because given discipline teaches the preparation, execution of documents in the state language, forms practical skills and ability to independently compose, translate documents into Kazakh language.	2	LO6 LO12	Kazakh (Russian) language	Diploma project
28.	Professionally oriented foreign language	A course of Professional English focuses on such topics of professional interest as Future trends in IT, Computer as a friend, Computer as a foe, Minimizing the negative impacts, Magnetic storage, Optical storage, Flash memory, the Programming languages, Web design, Graphics and design, etc. It is designed to raise the students' language awareness, improve their speech skills and communication competences in Professional English.	4	LO6 LO12	Forieng language	
29.	Mathematical statistics for programmers	The student must demonstrate the ability and willingness to: Formulate the data processing tasks of social, demographic, economic and other research. Apply the methods of mathematical statistics to solve the formulated problems.Recognize the level of value of the results obtained, as well as the areas in which it is possible to try them on.	5	LO9	Algebra and geometry	
30.	PL/SQL programming	The objectives of mastering the discipline are to form a clear understanding of the place and role of modern database management systems in students, master the theoretical foundations of modeling and information processing, understand the development trends of the industry and the direction of promising research, study by students the principles of building and developing information retrieval systems.	5	LO10 LO8	Database theory	
31.	Computational mathematics	The course includes: Fundamentals of the theory of errors, Systems of linear algebraic equations, Nonlinear equations and systems of nonlinear	5	LO9	Algebra and geometry	Numerical methods of analysis

		equations, Interpolation and best approximations, Differentiation and integration of functions, Ordinary differential equations, Equations of mathematical physics.				and algebra
32.	Advanced WEB technology	The course includes methods of designing a web site as a static information system; methods of designing a web site as a dynamic information system; theory of using graphics on web pages; methods of processing and editing digital images; client-side software used to create web pages; server-side software used to create web pages; software for creating databases; software for creating a virtual server; basic principles of configuration of a real web server; software tools used for the placement and maintenance of web pages; methods of optimizing a web site for promotion on the Internet.	5	LO1 LO2 LO3	WEB technology	
33.	Operation research	Goals - mastering the basic concepts and methods of research of economic systems; study of the current state and main directions of development of mathematical models of economic systems at various levels; acquisition of skills necessary for independent work on the design and implementation of economic analysis of models and modeling algorithms in practice; development of a systemic type of thinking.	6	LO9 LO2	Mathematical analysis	
34.	Data analysis and visualization in Power BI	An analyst is a specialist who studies and models a specific area. Power BI is an analytics system that combines data from various information sources, transforms them, and presents them in a visual form that is convenient for analysis. BI technologies allow you to process large unstructured amounts of data for decision-making. Power BI is a suite of Microsoft software services that work together to transform the company"s unrelated data sources into holistic, interactive reports. In this case, the source can be databases, Excel files, data from cloud sources and the Internet, text files, and so on. This tool helps you monitor the situation and get immediate answers to your questions using detailed dashboards available on each device.	5	LO2 LO3 LO5	Design and administration in MS EXCEL	Exploratory data analysis
35.	Advanced database theory	The purpose of the discipline "Advanced database theory" is the development of students ' professional skills in the design of relational database models, the General principles of construction and functional features of the main database management systems	6	LO8 LO10	Database theory	

		(DBMS), presented on the software market, the construction of information systems based on the architecture of "client-server" using database management systems, features of the language SQL.				
36.	Algorithmic aspects of machine learning	The course focuses on specific learning algorithms and families of classifiers, as well as theoretical issues of learnability, the study of algorithmic approaches to learning, the choice of families of decision rules adequate to the task and mathematical features of the description of initial information.	6	LO1	Programming in Python, Algorithms and data structures	
Cycle of major disciplines (MD) **University component (UC)**						
37.	Industrial practice	The practice includes the study of the organizational structure and the complex of technical means of the information and analytical center (IAC) of the organization. Identification of the main tasks solved by the IAC. The study of the information support of the selected task (a set of tasks or a subsystem). The study of the mathematical support of the selected task (a set of tasks or a subsystem). The study of the software of the selected task (a set of tasks or a subsystem). The study of the organizational and legal support of the selected task (a set of tasks or a subsystem). systematization and analysis of factual materials necessary for writing a term paper, a scientific report and an internship report.	4	LO8 LO2	Introduction to Programming	-
38.	Professional Internship	The practice includes the study of the organizational structure and the complex of technical means of the information and analytical center (IAC) of the organization. Identification of the main tasks solved by the IAC. The study of the information support of the selected task (a set of tasks or a subsystem). The study of the mathematical support of the selected task (a set of tasks or a subsystem). The study of the software of the selected task (a set of tasks or a subsystem). The study of the organizational and legal support of the selected task (a set of tasks or a subsystem). systematization and analysis of factual materials necessary for writing a term paper, a scientific report and an internship report.	4	LO8 LO2	Programming in Python	-
39.	Pregraduation practice	The practice includes the consolidation of theoretical knowledge in the academic disciplines of the specialty; mastering practical skills, technology of work in the specialty directly at the workplace	5	LO8 LO2	-	-

		using a PC, modern software and modern office equipment; studying and analyzing the real situation in the static and dynamics of CAD in the short and long term in relation to the enterprise – based internship; evaluating the commercial results achieved implementation of automation in the short and long term, in relation to these specific enterprises; familiarization with CAD development techniques and technology, procedures for making and implementing automation decisions at specific enterprises; collecting material for graduation projects.				
Cycle of major disciplines (MD) **Elective component (EC)**						
40.	Algorithm Design and Analysis	"Design and analysis of algorithms" is a comprehensive course covering the full spectrum of modern algorithms: from the fastest algorithms and data structures to polynomial-time algorithms for seemingly intractable problems, from classical algorithms in graph theory to special algorithms for string matching, computational geometry, and number theory. The revised third edition notably adds a chapter on van Emde Boas trees, one of the most useful data structures, and on multithreaded algorithms, a topic of increasing importance	4	LO1 LO8	Introduction to programming	
41.	Numerical methods of analysis and algebra	The course includes: Fundamentals of the theory of errors, Systems of linear algebraic equations, Nonlinear equations and systems of nonlinear equations, Interpolation and best approximations, Differentiation and integration of functions, Ordinary differential equations, Equations of mathematical physics.	5	LO9	Computational mathematics	-
42.	Application development in ASP.NET	The objectives of mastering the discipline are to develop students' professional competencies in the field of modern information technologies. Obtaining theoretical and practical skills in creating, setting up and configuring a fully functional Web application using the ASP.NET platform.	5	LO8 LO10	Introduction to programming	
43.	Programming in Python	The goal of the course is to develop programming skills in the Python language. As a result of mastering the discipline, the student must: know the basic constructs and idioms of the Python programming language and be able to put together in practice an uncomplicated program to perform the stated analytical task. Have skills in	4	LO8	Introduction to programming	Algorithmic aspects of machine learning

		formalization and solving practical programming problems				
44.	Design and administration in MS EXCEL	This course will allow to become familiar with the Microsoft Excel as the most popular data processing software in business. It is designed to make a beginner to learn the basic functionality of Excel. This course is mostly considered as a general overview of MS Excel and includes practical cases for skills honing and material assimilation. Main topics of the course are: navigating Excel; expression entry and common excel functions; other excel functions; managing data; plotting, importing data and converting to other file types; Upon successful completion of this course, students will be able to: operate excel on a confident-user level; manage considerably large-scale data; embody personal data analysis skills though Excel functionality; adapt Excel sheets for different problems / cases / purposes.	5	LO8 LO11	ICT	Data analysis and visualizati on in Power BI
45.	Programming on Internet of Things (IOT)	"The student will know: - principles of organization and functioning of the 'Internet of Things' - the history of the emergence and development of the 'Internet of Things' - the main factors in the development of the 'Internet of Things' - existing technologies in the field of the 'Internet of Things' - the main trends and directions in the field of the 'Internet of Things'. And he will also be able to: - work with microcontrollers and main debug boards (Arduino and Raspberry Pi) - understand existing IoT technologies and apply them to specific scenarios - design complete IoT systems (including end devices, network connection, data exchange, cloud platforms, data analysis)."	5	LO10 LO8	Programmi ng in Python, OOP	
46.	Development of Web applications in Java Spring	The course is aimed at those students who are already familiar with the Java programming language and would like to deepen their knowledge and explore the advanced topics of this programming language. The course explains in detail the critical topics of Java and programming in general that are necessary for working in the industry. After completing this course, students will have an experience in Java Spring Framework such as Spring Core, MVC, Boot, Data JPA.	5	LO10 LO8	WEB technology	
47.	Elective course #2		5			
	Exploratory data analysis	Exploratory data analysis refers to the critical process of performing initial data studies to identify patterns, identify anomalies, test hypotheses,		LO5 LO7 LO8 LO9	Data analysis and visualizati	-

		and test assumptions using summary statistics and graphical representations.			on in Power BI	
	Applied Artificial Intelligence Applications	The goal of the course is to introduce students to a wide range of applied fields where artificial intelligence (AI) methods and technologies are utilized. The main objectives include training students in applying machine learning, deep learning, natural language processing, computer vision, and other AI approaches to solve specific practical problems.		LO1, LO8, LO9, LO10	Programmi ng in Python	
48.	Elective course #3		5			
49.	Amazon Web Services Foundations (AWS Foundations)	The course is designed for students who seek a general understanding of cloud computing concepts, regardless of specific technical roles. It provides a detailed overview of cloud concepts, AWS core services, security, architecture, pricing, and support.		LO8 LO10	ICT	
50.	Parallel programming	The use of parallel programming for organizing high-performance computing leads to a number of specific problems, moreover, the architecture of a parallel computing system involves different methods and means of solving them, and practical language implementations provide the programmer with specific tools for writing effective programs.		LO8	Introductio n to programmi ng	
51.	Human-computer interaction	The main objectives of the discipline regularities of technical and information processes that occur in the human-machine system; physiologi-cal, psychological and anthropometric characteristics of the human operator in the human-machine system; basic requirements for the organization of the interaction interface and the ways to implement them		LO3	ICT, Introductio n to programmi ng	
52.	Elective course #4		5			
	Development of mobile applications on Android	The course includes creating backend, frontend programming on IOS, creating the program interface and loading the program in the AppStore		LO8	Introductio n to programmi ng	
	Development of mobile applications on iOS	The student will learn the features of databases and information assurance applications in operation systems iOS; will utilize enterprise information systems to support information security applications; to have basic skills in database administration of enterprise information systems.		LO8	Introductio n to programmi ng	
53.	Minor 1	Additional educational program	5	LO10		Minor 2
54.	Minor 2	(minor) - a set of disciplines and (or)	5	LO10	Minor 1	Minor 3
55.	Minor 3	modules and other types of educational work, determined by students for study in order to form additional competencies	5	LO10	Minor 2	

12. Curriculum of the educational program (Platonus)

№	Module Code	Module Name in Three Languages (Kazakh / Russian / English)	Discipline code	Course Name in Three Languages (Kazakh / Russian / English)	Cycle (GED, BD, MD)	Component (RC, EC, UC)	Total Credits (ECTS)	Total Academic Hours	Number of contact hours				Number of hours		Assessment Method (Att. 1, Att. 2, Exam, Coursework/Project, Differentiated Pass/Fail, Thesis/Dissertation Defense)	Prerequisites (Course Code)
									Total contact hours	Lectures	Practical sessions	Laboratory sessions	Total SIS hours	including TSIS		
1	2	3	4	5	6	7	8	9	10	11	12	13	1	2	3	4
				1 course												
				1 semester												
1	OOM6002	Тіл және АКТ-дағдыларын дамыту / Развития языковых и ИКТ-навыков / Language and ICT skills development	LAN6001A	Шет тілі / Иностранный язык / Foreign language	GED	RC	5	150	45	0	45	0	105	15	PK1,PK2, экзамен	-
2	OOM6002	Тіл және АКТ-дағдыларын дамыту / Развития языковых и ИКТ-навыков / Language and ICT skills development	ICT6001	Ақпараттық-коммуникациялық техно-логиялар / Информационно-комму-никационные технологии / Information and Communication Technologies	GED	RC	5	150	45	15	0	30	105	15	PK1,PK2, экзамен	-
3	BM6511	Физика - математикалық модуль / Физико- математичес-кий модуль / Physics and Mathematics module (CS)	MAT6001	Алгебра және геометрия / Алгебра и геометрия / Algebra and Geometry	BD	UC	4	120	45	15	30	0	75	15	PK1,PK2, экзамен	-
4	BM6512	Компьютерлік модельдеу модулі/ Модуль компьютерного моделирования / Computer Modeling Module (CS)	SFT6001	Бағдарламалауға кіріспе / Введение в программирование / Introduction to Programming	BD	UC	6	180	60	15	15	30	120	15	PK1,PK2, экзамен	-
5	BM6512	Компьютерлік модельдеу модулі/ Модуль компьютерного моделирования / Computer Modeling Module (CS)	SFT6564	WEB технологиялары / WEB технологии / WEB technology	BD	UC	5	150	45	15	0	30	105	15	PK1,PK2, экзамен	-
6	BM6511	Физика - математикалық модуль / Физико- математичес-кий модуль / Physics and Mathematics module (CS)	MAT6003	Дискреттік математика / Дискретная математика / Discrete Mathematics	BD	UC	6	180	60	30	30	0	120	15	PK1,PK2, экзамен	-

					Total for 1 semester:			31	930	300	90	120	90	630	90		
						2 semester										
7	OOM6002	Тіл және АКТ-дағдыларын дамыту / Развития языковых и ИКТ-навыков / Language and ICT skills development	LAN6002A	Шет тілі / Иностранный язык / Foreign language	GED	RC	5	150	45	0	45	0	105	15	РК1,РК2, экзамен	LAN6001A
8	OOM6001	Әлеуметтік-мәдени даму модулі / Модуль социально-культурного развития / Module of social and cultural development	SPS6007	Әлеуметтану-Саясаттану / Социология-Политология / Sociology-Political science	GED	RC	4	120	45	15	30	0	75	15	РК1,РК2, экзамен	-
9	OOM6003	Дене шынықтыру модулі / Модуль физической культуры / Physical training module	PhC6005	Дене шынықтыру / Физическая культура / Physical Culture	GED	RC	4	120	45	0	45	0	75	15	РК1,РК2, диф.зачет	-
10	BM6512	Компьютерлік модельдеу модулі/ Модуль компьютерного моделирования / Computer Modeling Module (CS)	EP6501	Оқыту практика / Учебная практика / Teaching practice	BD	UC	2	60	30	0	30	0	30	0	диф.зачет	-
11	BM6511	Физика - математикалық модуль / Физико- математичес-кий модуль / Physics and Mathematics module (CS)	PHY6001	Физика / Физика / Physics	BD	UC	4	120	45	15	0	30	75	15	РК1,РК2, экзамен	-
12	BM6511	Физика - математикалық модуль / Физико- математичес-кий модуль / Physics and Mathematics module (CS)	MAT6002	Математикалық талдау / Математический анализ / Mathematical analysis	BD	UC	6	180	60	30	30	0	120	15	РК1,РК2, экзамен	-
13	PM6507	Бағдарламалау модулі / Модуль программирования / Programming Module (CS)	SFT6516	Python бағдарламалау / Программирование на Python / Programming in Python	MD	EC	4	120	45	15	0	30	75	15	РК1,РК2, экзамен	SFT6001
				Total for 2 semester:			29	870	330	90	180	60	540	105		
				TOTAL FOR 1 COURSE:			60	1800	630	180	300	150	1170	195		
					2 course										
					3 semester										
14	OOM6002	Тіл және АКТ-дағдыларын дамыту / Развития языковых и ИКТ-навыков / Language and ICT skills development	LAN6001KR	Қазақ (орыс) тілі / Казахский (русский) язык / Kazakh (Russian) language	GED	RC	5	150	45	0	45	0	105	15	РК1,РК2, экзамен	-
15	OOM6001	Әлеуметтік-мәдени даму модулі / Модуль социально-культурного развития / Module of social & cultural development	SPS6006	Мәдениеттану-Психология / Культурология-Психология / Cultural studies-Psychology	GED	RC	4	120	45	15	30	0	75	15	РК1,РК2, экзамен	-

№																
16	OOM6001	Әлеуметтік-мәдени даму модулі/ Модуль социально-культурного развития/Module of social & cultural development	HK6002	Қазақстан тарихы / История Казахстана / History of Kazakhstan	GED	RC	5	150	45	15	30	0	105	15	РК1,РК2, экзамен	-
17	OOM6003	Дене шынықтыру модулі / Модуль физической культуры / Physical training module	PhC6006	Дене шынықтыру / Физическая культура / Physical Culture	GED	RC	4	120	45	0	45	0	75	15	РК1,РК2, диф.зачет	-
18	BM6512	Компьютерлік модельдеу модулі/ Модуль компьютерного моделирования / Computer Modeling Module (CS)	SFT6517	Объектті-бағдарланған программалау / Объектно-ориентированное программирование / Object-oriented programming	BD	UC	7	210	75	15	30	30	135	15	РК1,РК2, экзамен	SFT6001
19	PM6508	Алгоритмдер және талдау модулі / Модуль Алгоритмы и анализ / Algorithms and analysis module (CS)	SFT6535	MS EXCEL бағдарламасында жобалау және басқару / Проектирование и администрирование в MS EXCEL / Design and administration in MS EXCEL	MD	EC	5	150	45	0	45	0	105	15	РК1,РК2, экзамен	
				Total for 3 semester:			30	900	315	60	225	30	585	105		
				4 semester												
20	OOM6002	Тіл және АКТ-дағдыларын дамыту / Развития языковых и ИКТ-навыков / Language and ICT skills development	LAN6002KR	Қазақ (орыс) тілі / Казахский (русский) язык / Kazakh (Russian) language	GED	RC	5	150	45	0	45	0	105	15	РК1,РК2, экзамен	-
21	BM6512	Компьютерлік модельдеу модулі/ Модуль компьютерного моделирования / Computer Modeling Module (CS)	SFT6501	Алгоритмдер және деректер құрылымы / Алгоритмы и структуры данных / Algorithms and data structures	BD	UC	6	180	60	15	15	30	120	15	РК1,РК2, экзамен	SFT6517
22	BM6512	Компьютерлік модельдеу модулі/ Модуль компьютерного моделирования / Computer Modeling Module (CS)	SFT6507	Деректер қоры теориясы / Теория базы данных / Database theory	BD	UC	5	150	45	15	15	15	105	15	РК1,РК2, экзамен	
23	PM6501	Тәжірибе модулі / Модуль практик / The Practice module	PP6502	Өндірістік практика / Производ-ственная практика / Industrial practice	MD	UC	4	120	0	0	0	0	120	15	отчет	-
24	BM6511	Физика - математикалық модуль / Физико- математичес-кий модуль / Physics and Mathematics module (CS)	MAT6558	Программистерге арналған математи-калық статистика / Математическая статистика для программистов / Mathematical statistics for programmers	BD	EC	5	150	45	15	30	0	105	15	РК1,РК2, экзамен	
25	BM6511	Физика - математикалық модуль / Физико- математичес-кий модуль / Physics and Mathematics module (CS)	MAT6534	Есептеу математикасы / Вычислительная математика / Computational mathematics	BD	EC	5	150	45	15	15	15	105	15	РК1,РК2, экзамен	MAT6001
				Total for 4 semester:			30	900	240	60	120	60	660	90		
				TOTAL FOR 2 COURSE:			60	1800	555	120	345	90	1245	195		

					3 course											
					5 semester											
26	OOM60 04	Жеке және әлеуметтік даму модулі / Модуль личностного и общественного развития / Module of personal and social development	RM6001	Зерттеу әдістемесі / Методология исследования / Research metodology	GED	EC	5	150	45	15	30	0	105	15	PK1,PK2, экзамен	-
			JUR 6505	Экология және тұрақты даму / Экология и устойчивое развитие / Ecology and Sustainable Development												
			LAW6007	Заң және сыбайлас жемқорлыққа қарсы мәдениеттің негіздері / Основы права и антикоррупционной культуры / Fundamentals of law and anti-corruption culture												
			MGT6706	Стартаптар және кәсіпкерлік / Стартапы и предпринимательство / Startups and entrepreneurship												
			JUR6413	Тіршілік қауіпсіздігінің негіздері / Основы безопасности жизнедеятель-ности / Fundamentals of Life Safety												
			ECO6007	Экономика және қаржылық сауаттылық негіздері / Основы экономики и финансовой грамотности / Fundamentals of Economics and Financial Literacy												
			HUM6400	Инклюзивті білім беру / Инклюзивное образование / Inclusive education												
27	BM651 4	Кәсіби тілдік даярлық модулі/ Модуль профессиональных языковых подготовRC / Professional Language Training Module (CS)	LAN6002P A	Кәсіби бағытталған шет тілі / Профессионально-ориентированный иностранный язык / Professionally oriented foreign language	BD	EC	4	120	45	0	45	0	75	15	PK1,PK2, экзамен	-
28	BM651 4	Кәсіби тілдік даярлық модулі/ Модуль профессиональных языковых подготовRC / Professional Language Training Module (CS)	LAN6007K	Мемлекеттік тілде іс қағаздарын жүргізу / Делопроизводство на государственном языке / Business correspondence in the state language	BD	EC	2	60	30	0	30	0	30	15	PK1,PK2, экзамен	
29	PM650 7	Бағдарламалау модулі / Модуль программирования / Programming Module (CS)	SFT6542	Internet of Things (IOT) бағдарламалау / Программирование Internet of Things (IOT) / Programming on Internet of Things (IOT)	MD	EC	5	150	45	15	0	30	105	15	PK1,PK2, экзамен	SFT 651 6
30	PM650 7	Бағдарламалау модулі / Модуль программирования / Programming Module (CS)	SFT6566	Java spring-те Web қосымшаларын әзірлеу / Разработка Web приложений	MD	EC	5	150	45	15	0	30	105	15	PK1,PK2, экзамен	SFT 656 4

№				Наименование дисциплины												
				на Java Spring / Development of Web applications in Java Spring												
31	PM6504	Майнор пәндер модулі / Модуль Майнор дисциплин / The module of Minor disciplines	MIN601	Майнор 1 / Майнор 1 / Minor 1	MD	EC	5	150	45	15	15	15	105	15	РК1,РК2, экзамен	-
				Total for 5 semester:			26	780	255	60	120	75	525	90		
				6 semester												
32	OOM6001	Әлеуметтік-мәдени даму модулі / Модуль социально-культурного развития / Module of social and cultural development	SPS6001	Философия / Философия / Philosophy	GED	RC	5	150	45	15	30	0	105	15	РК1,РК2, экзамен	-
33	PM6501	Тәжірибе модулі / Модуль практик / The Practice module	IP6503	Өндірістік практика / Производственная практика / Professional Internship	MD	UC	4	120	0	0	0	0	120	15	отчет	
34	BM6513	Машиналық оқыту модулі/ BM6513 Модуль машинного обучения/ Machine Learning Module (CS)	SFT6548	PL/SQL тілінде бағдарламалау / Программирование на PL/SQL / PL/SQL programming	BD	EC	5	150	45	15	0	30	105	15	РК1,РК2, экзамен	SFT6507
35	BM6513	Машиналық оқыту модулі/ BM6513 Модуль машинного обучения/ Machine Learning Module (CS)	SFT6585	Power BI деректерді талдау және визуализациялау / Анализ и визуализация данных в Power BI / Data analysis and visualization in Power BI	BD	EC	5	150	45	0	45	0	105	15	РК1,РК2, экзамен	SFT6535
36	PM6508	Алгоритмдер және талдау модулі / Модуль Алгоритмы и анализ / Algorithms and analysis module (CS)	MAT6559	Анализ бен алгебраның сандық әдістері / Численные методы анализа и алгебры / Numerical methods of analysis and algebra	MD	EC	5	150	45	15	15	15	105	15	РК1,РК2, экзамен	MAT6534
37	PM6507	Бағдарламалау модулі / Модуль программирования / Programming Module (CS)	SFT6581	ASP.NET платформасында қосымшалар жасау / Разработка приложений на ASP.NET / Application development in ASP.NET	MD	EC	5	150	45	15	0	30	105	15	РК1,РК2, экзамен	SFT6001
38	PM6504	Майнор пәндер модулі / Модуль Майнор дисциплин / The module of Minor disciplines	MIN602	Майнор 2 / Майнор 2 / Minor 2	MD	EC	5	150	45	15	15	15	105	15	РК1,РК2, экзамен	MIN601
				Total for 6 semester:			34	1020	270	75	105	90	750	105		
				TOTAL FOR 3 COURSE:			60	1800	525	135	225	165	1275	195		

				4 course														
				7 semester														
39	BM6513	Машиналық оқыту модулі/ BM6513 Модуль машинного обучения/ Machine Learning Module (CS)	SFT6550	Жетілдірілген мәліметтер базасы / Продвинутые базы данных / Advanced database theory	BD	EC	6	180	60	15	15	30	120	15	PK1,PK2, экзамен	SFT 6507
40	BM6513	Машиналық оқыту модулі/ BM6513 Модуль машинного обучения/ Machine Learning Module (CS)	SFT6559	Жоғары деңгейлі WEB технологиялары / Продвинутые WEB технологии / Advanced WEB technology	BD	EC	5	150	45	15	0	30	105	15	PK1,PK2, экзамен	SFT 6564
41	BM6513	Машиналық оқыту модулі/ BM6513 Модуль машинного обучения/ Machine Learning Module (CS)	MAT6523	Операцияларды зерттеу / Исследование операции / Operation research	BD	EC	6	180	60	15	15	30	120	15	PK1,PK2, экзамен	MAT 6001
42	PM6508	Алгоритмдер және талдау модулі / Модуль Алгоритмы и анализ / Algorithms and analysis module (CS)	SFT6582	Алгоритмді жобалау және талдау / Дизайн и анализ алгоритмов / Algorithm Design and Analysis	MD	EC	4	120	45	15	0	30	75	15	PK1,PK2, экзамен	SFT 6001
43	PM6504	Майнор пәндер модулі / Модуль Майнор дисциплин / The module of Minor disciplines	MIN603	Майнор 3 / Майнор 3 / Minor 3	MD	EC	5	150	45	15	15	15	105	15	PK1,PK2, экзамен	MIN 602
44	PM6509	Параллельді және мобильді бағдарламалау модулі / Модуль параллельное и мобильное программирование / Parallel and mobile programming Module (CS)	SFT6526	Деректерді барлау талдауы / Исследовательский анализ данных / Exploratory data analysis	MD	EC	5	150	45	15	15	15	105	15	PK1,PK2, экзамен	SFT 6585
			HRD6501	Прикладные приложения искусственного интеллекта												SFT 6516
				Total for 7 semester:			31	930	300	90	60	150	630	90		
				8 semester												
45	PM6501	Тәжірибе модулі / Модуль практик / The Practice module	PP6504	Диплом алдындағы практика / Преддипломная практика / Pregraduation practice	MD	UC	5	150	0	0	0	0	150	15	отчет	
46	BM6513	Машиналық оқыту модулі/ BM6513 Модуль машинного обучения/ Machine Learning Module (CS)	SFT6560	Машиналық оқытудың алгоритмдік аспектілері / Алгоритмические аспекты машинного обучения / Algorithmic aspects of machine learning	BD	EC	6	180	60	15	15	30	120	15	PK1,PK2, экзамен	SFT 6501
47	PM6509	Параллельді және мобильді бағдарламалау модулі / Модуль параллельное и мобильное программирование / Parallel and	SFT6523	Amazon Web Services Foundations (AWS Foundations)	MD	EC	5	150	45	15	15	15	105	15	PK1,PK2, экзамен	SFT 6001
			SFT6543	Параллель бағдарламалау / Параллельное программирование / Parallel programming												

		mobile programming Module (CS)	SFT6533	Адамның компьютермен өзара әрекеттесуі / Взаимодействие человека с компьютером / Human-computer interaction											
48	PM6509	Параллельді және мобильді бағдарламалау модулі / Модуль параллельное и мобильное программирование / Parallel and mobile programming Module (CS)	SFT6525	Android-де мобильді қосымшаларды әзірлеу / Разработка мобильных приложений на Android / Development of mobile applications on Android	MD	EC	5	150	45	15	15	15	105	15	РК1,РК2, экзамен	SFT6001
			SFT6515	IOS-та мобильді қосымшаларды әзірлеу / Разработка мобильных приложений на iOS / Development of mobile applications on IOS												
49				Дипломдық жұмысты, дипломдық жобаны жазу және қорғау немесе кешенді емтиханды дайындау және тапсыру / Написание и защита дипломной работы, дипломного проекта или подготоUCа и сдача комплексного экзамена / Writing and defending a diploma thesis, diploma project or preparation and passing of a comprehensive exam			8	240	0	0	0	0	240	15	Защита ДП	
				Total for 8 semester:			29	870	150	45	45	60	720	75		
				TOTAL FOR 4 COURSE:			60	1800	450	135	105	210	1350	165		
				TOTAL:			240	7200	2160	570	975	615	5040	750		

Summary table of indicators of the amount of credits of the educational program in terms of cycles of disciplines and semesters of study

Cycle of disciplines / Semester	1 sem.	2 sem.	3 sem.	4 sem.	5 sem.	6 sem.	7 sem.	8 sem.	Total of credits ECTS	Note (Structure EP according to higher education NMS)
Cycle of general education disciplines (GED)	**10**	**13**	**18**	**5**	**5**	**5**	**-**	**-**	**56**	*** 56 cr.**
- including a required component (RC GED)	10	13	18	5	-	5	-	-	51	* 51 cr.
- including an optional component (OC GED)	-	-	-	-	5	-	-	-	5	* 5 cr.
Cycle of core disciplines (CD)	**21**	**12**	**7**	**21**	**6**	**10**	**17**	**6**	**100**	******
- including a university component (UC CD)	21	12	7	11	-	-	-	-	51	
- including an optional component (OC CD)	-	-	-	10	6	10	17	6	49	
Cycle of profiling disciplines (PD)		**4**	**5**	**4**	**15**	**19**	**14**	**15**	**76**	******
- including a university component (UC PD)		-	-	4	-	4	-	-	8	
- including an optional component (OC PD)		4	5	-	15	15	14	15	68	
Professional practice (PP)		*2*		*4*		*4*		*5*	*15*	
Additional types of training										
Final attestation (FA)								**8**	**8**	***No less than 8 cr.**
TOTAL credits for the educational program	**31**	**29**	**30**	**30**	**26**	**34**	**31**	**29**	**240**	**No less than 240 cr.**

** Cycle of core and major disciplines (CD, PD) At least 176 credits

13. Additional Educational Programs (Minor)

The name of the AEP (Minor), indicating the list of disciplines forming the Minor	Number of credits AEP / number of credits in the discipline	Description, Competencies generated by the AEP, learning outcomes
Data protection		Develops skills in information security, including cryptography, database protection, and web application defense.
SEC6206 Cryptographic methods of information protection	5	
SEC6211 Protecting Database Management Systems	5	
SEC6236 Protecting applications and scripts from modifications	5	
Accounting by ACCA		Develops competencies in international accounting, financial reporting, and auditing in accordance with ACCA standards.
ACC6701 Business technology (ACCA)	5	
ACC6702 Financial Accounting	5	
ACC6703 Management Accounting	5	
Management & Leadership		Develops managerial and leadership competencies, including personnel management and behavior in organizations.
MGT6701 Management	5	
MGT6707 Psychology of Management	5	
MGT6702 Organizational Behavior and Leadership	5	
IoT Security Technologies		Provides competencies in the field of IoT security, including IoT technologies, device protection, and biometric control methods.
HRD6202 IoT Technologies	5	
SEC6215 IoT Security	5	
SEC6235 Biometric access control systems	5	