
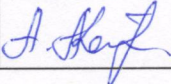




The code and name of the educational program: “6B06103 Big data analytics”

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**List of abbreviations and designations**

BD	Cycle of Basic Disciplines
BC	Basic Competence
BM	Basic module
UC	University component
HE	Higher Education
SCES	State Compulsory Education Standard
ATT	Additional types of training
EQF	European Qualifications Framework
ETF	European Training Foundation
KSA	Knowledge, skills, abilities
FC	Final Certification
CC	Component by choice
ISCED	International Standard Classification of Education
NQF	National Qualifications Framework
NQS	National Qualifications System
GHM	General Humanitarian Module
RC	Required component
GED	General Education Module
CGED	Cycle of general educational disciplines
EP	Educational program
GPM	General professional module
SQF	Sectoral Qualifications Framework
GEC	General Education Competence
MD	Cycle of major disciplines
PP	Professional Practice
PS	Professional standard
PE	postgraduate Education
PC	Professional Competence
PM	Professional module
LO	Learning Outcome
QMS	Quality Management System

## **1. Description of the educational program**

The presented educational program is aimed at training the synthetic profession of "data scientist". Data scientists must have skills and knowledge from several diverse areas: computer science and programming, mathematical methods, as well as business administration and management. Such synthetic specialties are always in high demand, but also difficult to master. The key methods of data analysis today are machine learning, data mining, process mining, visual analytics, time series analysis and others. By analyzing big data, you can create new services and products, optimize your business, and, consequently, make money on it. Big Data technology allows you to reduce costs on IT infrastructure and software, reduce labor costs due to more efficient methods of data integration, management, analysis, and decision-making; ensure an increase in income and profit through new or more efficient ways of doing business. That is, at the present stage, the same technologies represent a qualitatively new value for the enterprise.

## **2. The purpose and objectives of the educational program**

The purpose of the EP is to train scientific and pedagogical personnel in the field of ICT and managers, analytical specialists in demand in IT companies and large manufacturing enterprises, where it is necessary to regularly analyze large volumes of data, who are able to build processes for optimal data collection, operational data processing, data analysis, optimization of business processes, forecasting consumer behavior, analysis of statistical indicators, risk analysis, development of business solutions, etc. to improve the efficiency of the company. The main skill of data scientists is to see logical connections in the system of collected information and based on this, develop certain business solutions and models. This can lead to new scientific discoveries, increased efficiency of the company, new opportunities for generating income, improving customer service, etc.

### **Tasks of the EP:**

1. developing the ability to contribute to the development of new areas of computer science through original scientific research;
2. in-depth theoretical and practical training in a chosen field of science.
3. Providing highly qualified specialists in the field of big data analysis in private and public companies.
4. providing students with a wide range of competencies in the field of big data analysis based on the results of the educational program, necessary to start working as a junior data analyst ( Junior Data Analyst ) in various companies, including small enterprises of up to 10 people, and ending with large national and private organizations employing more than 1000 people.
5. development in students of flexible (soft) qualities required to develop in them the leadership and patriotic sides necessary for their formation as successful and goal-oriented leaders in their industry.
6. The uniqueness and distinctive feature of the educational program lies in the introduction of disciplines on working with big data, as well as special courses, into the educational program.

### 3. Passport of the educational program

No.	Name	Description
1.	Code and classification of the field of education	6B06 Information and Communication Technologies
2.	Code and classification of the training area	6B061 Information and Communication Technologies
3.	Group educational programs	B057 Information technologies
4.	Name educational programs	6B06103 Big Data Analytics
5.	The purpose of the educational program	Training of scientific and pedagogical personnel, managers and analysts in the field of ICT, capable of collecting, processing and analyzing large volumes of data to develop effective business solutions, optimize processes and increase the competitiveness of companies.
6.	Type of Educational Program	new
7.	National Qualifications Framework Level	Level 6 (bachelor's degree): - applies professional knowledge and skills in non-standard situations; - uses complex methods of data analysis and evaluation; - responsible for project management and decision-making in the professional sphere; - has the skills of independent learning and teamwork.
8.	Sectoral Qualifications Framework Level	Level 6 (bachelor's degree): - Development of storage systems and analysis of big data (Big Data Engineer) - Data Analyst - Machine learning specialist (ML Specialist) - BI analyst / Data Scientist
9.	Distinctive features of the program	-
10.	Partner University	-
11.	Awarded academic degree	Bachelor's degree in Information and Communication Technologies in the educational program "6B06103 Big Data Analytics"
12.	Duration of study	4 years
13.	Volume of loans	240
14.	Language of instruction	English
15.	Atlas of new professions	1. Development of systems for processing and storing big data 2. Development of artificial intelligence technologies
16.	Regional standard	Not provided
17.	Availability of an appendix to the license for the direction of personnel training	Available
18.	License number for the training area	KZ81LAM00001263
19.	Availability of program accreditation	ASIIN
20.	Formed learning outcomes	- analyze complex data to generate actionable insights. - effectively use advanced big data technologies. - contribute to strategic decision-making processes.

		- lead projects that stimulate innovation and development .
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#### 4. Professional standards (PS), profession cards, labor functions

№	Name of PS	Job title	Job functions
1	Development of big data processing and storage systems	Machine Learning Specialist	Design and implementation of systems using machine learning
2	Development of artificial intelligence applications	Application Programmer	Development and software implementation of an artificial intelligence system

#### 5. List of competencies of the EP

List of competencies of the educational program:

GEC1: Know: social and ethical values based on public opinion, traditions, customs, social norms and be guided by them in their professional activities; traditions and culture of the peoples of Kazakhstan; human and civil rights and freedoms; fundamentals of the legal system and legislation of Kazakhstan; trends in the social development of society; fundamentals of physical culture and principles of a healthy lifestyle.

GEC2: Have an idea of: ethical and spiritual values; sociological approaches to personality, basic patterns and forms of regulation of social behavior; 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; the role of consciousness and self-awareness in the behavior, communication and activities of people, the formation and development of personality.

GEC3: To 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, maintenance and strengthening of health, the ability to work in a team, correctly defend one's point of view, and propose new solutions.

GEC4: Ability to communicate in written and oral form in the state language and the language of interethnic communication; ability to construct oral and written speech logically, reasonably and clearly; readiness to use one of the foreign languages

GEC5: Ability to use modern information technologies, manage information using business application programs; use network computer technologies, databases and application software packages in your subject area

BK1: Ability to actually use the state language, the language of interethnic communication and a foreign language in professional activities.

BK2: Ability to understand the basics of economic knowledge, scientific concepts of finance and economics.

BK3: Ability to professionally operate modern equipment, devices, network components, computer systems (in accordance with the objectives of the program), as well as use safety regulations, industrial sanitation, fire safety and labor protection standards.

BK4: Ability to possess skills in using algorithms and programs to calculate business process parameters.

BK5: Ability to use basic principles and methods to solve management problems, ability to create project documentation in a computer graphics software environment for various types of projects.

BK6: Ability to be competent in selecting mathematical modeling methods for solving specific engineering problems, including the willingness to identify the natural scientific essence of problems arising in the course of professional activity, and the ability to use the appropriate physical and mathematical apparatus to solve it.

BK7: Ability to design the architecture of information system components, including the human-machine interface of hardware and software systems, select operating systems and information protection methods.

BK8: Ability to develop information and software support for an information system based on modern development methods and tools.

PC1: Ability to collect, process and analyze big data using the organization's existing methodological and technological infrastructure;

PC2: Ability to manage the stages of the life cycle of the methodological and technological infrastructure for big data analysis in an organization;

PC3: Ability to manage the development of products, services and solutions based on big data;

PC4: Ability to use modern programming environments to design and implement databases.

PC5: Ability to apply elements of probability theory and mathematical statistics underlying data science models and methods, and to correctly select machine learning methods to solve practical problems.

PC6: Ability to develop and implement new methods and technologies for big data research.

### 6. List of learning outcomes of the LO

LO1: Justify the choice of basic standards, principles and design patterns, methods, tools and programming languages, including the choice of methods and means for constructing information security systems for modern ICT

LO2: Apply mathematical models and methods to various processes

LO3: Design database, software and information systems architectures

LO4: Design and develop ergonomic user interfaces

LO5: Develop and/or use software, hardware, information, mathematical, functional support for information systems, including algorithms and methods of information security

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

LO7: Use methods for researching large data sets.

LO8: Extract the necessary information from all possible sources, including real-time information flows

LO9: Solve applied problems of data processing and analysis to identify hidden dependencies in them

LO10: Conduct a comprehensive analysis and analytically summarize the results of scientific research using modern achievements of science and technology, skills of independent data collection, study, analysis and generalization.

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

### 7. Matrix of correlation of learning outcomes of the educational program with the formed competencies (V)

	LO1	LO2	LO3	LO4	LO5	LO6	LO7	LO8	LO9	LO10	LO11
<b>BK1</b>						V					
<b>BK2</b>						V		V			
<b>BK3</b>	V		V	V							V
<b>BK4</b>	V	V	V		V						
<b>BK5</b>			V	V							
<b>BK6</b>		V			V						
<b>BK7</b>	V							V			V
<b>BK8</b>	V		V	V	V						V
<b>PC1</b>	V						V	V	V		V
<b>PC2</b>							V		V		V
<b>PC3</b>					V						V
<b>PC4</b>	V		V		V		V	V			
<b>PC5</b>		V								V	

PC6							V	V		V	V
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### 8. Relationship of LO with labor functions

No.	Learning Outcome (LO)	Labor functions
1	<b>LO1:</b> Justify the choice of standards, principles, programming languages, including information security	Development and software implementation of an artificial intelligence system Design and implementation of systems using machine learning
2	<b>LO2:</b> Design the architecture of databases, software and information systems	Design and implementation of systems using machine learning
3	<b>LO5:</b> Develop and/or use software, hardware, information, mathematical, and functional support for information systems, including algorithms and methods of information security	Development and software implementation of an artificial intelligence system Design and implementation of systems using machine learning
4	<b>LO7:</b> Apply methods for exploring and analyzing large data sets	Development and software implementation of an artificial intelligence system Design and implementation of systems using machine learning
5	<b>LO9:</b> Solve applied problems in data processing and analysis	Development and software implementation of an artificial intelligence system Design and implementation of systems using machine learning

### 9. Table of relationships between competencies, learning outcomes, assessment methods and criteria

Graduate Competences	Competences expressed in expected learning outcomes	Assessment criteria	Assessment method
BC1	LO6	1. Demonstrate communication skills and psychological resilience 2. Work in a team 3. Make managerial decisions	Practical work, project defense
BC2	LO6, LO8	1. Apply communication skills in a professional environment 2. Extract necessary information from various sources	Practical work, project defense
BC3	LO1, LO3, LO4, LO11	1. Justify the choice of standards and development tools 2. Design information systems architecture 3. Develop user interfaces 4. Apply knowledge from additional programs	Practical work, project defense
BC4	LO1, LO2, LO3, LO5	1. Justify architectural decisions 2. Apply mathematical methods 3. Design IS architecture 4. Use information security methods	Practical work, project defense

BC5	LO3, LO4	1. Design software 2. Develop interfaces 3. Create user interface mock-ups	Practical work, project defense
BC6	LO2, LO5	1. Use mathematical methods in design 2. Implement information security algorithms and methods	Practical work, project defense
BC7	LO1, LO8, LO11	1. Justify choice of development tools 2. Extract information from various sources 3. Apply knowledge from additional educational programs	Practical work, project defense
BC8	LO1, LO3, LO4, LO5, LO11	1. Justify the choice of standards 2. Design architecture of software and information systems 3. Develop interfaces 4. Apply information security algorithms 5. Apply additional knowledge in professional activities	Practical work, project defense
PC1	LO1, LO7, LO8, LO9, LO11	1. Develop machine learning algorithms 2. Apply big data analysis methods 3. Extract data from various sources 4. Solve applied Data Science tasks 5. Apply interdisciplinary knowledge	Practical work, project defense
PC2	LO7, LO9, LO11	1. Apply big data analysis methods 2. Build data processing workflows 3. Apply knowledge from additional programs	Practical work, project defense
PC3	LO5, LO11	1. Develop software considering information security algorithms 2. Integrate solutions into existing infrastructure 3. Apply knowledge from additional programs	Practical work, project defense
PC4	LO1, LO3, LO5, LO7, LO8	1. Justify the choice of development tools 2. Design information systems architecture 3. Apply information security methods 4. Use big data analysis methods 5. Extract information from various sources	Practical work, project defense
PC5	LO2	1. Apply mathematical models and methods in information systems engineering 2. Analyze processes and data in information systems	Practical work, project defense
PC6	LO7, LO8, LO10, LO11	1. Apply big data analysis methods 2. Extract information from data streams 3. Conduct analytical review of research 4. Apply knowledge from additional educational programs	Practical work, project defense

### 10. Information about the modules of the educational program

Module code and module name	Volume (labor intensity) of the module	Learning Outcomes	Criteria for assessing learning outcomes	The disciplines that form the module are: Code and Name
<b>GENERAL EDUCATION MODULES</b>				
OOM6002 Language and ICT Skills Development Module	25 credits	LO6 – Communication skills, teamwork LO8 – Extracting information from different sources LO11 – Application of knowledge from an additional program (for example, studying ICT in a foreign language)	Interacts effectively in a group, demonstrates soft skills . Initiates solutions, proLOses innovations. Expresses opinions in written and oral form in a reasoned manner. Demonstration of leadership qualities in project and team activities	LAN6001KR Kazakh (Russian) language LAN6001A Foreign Language ICT6001 Information and Communication Technologies LAN6002A Foreign Language LAN6002KR Kazakh (Russian) language
OOM6005 Social and Cultural Development Module	18 credits	LO6 – Psychological preparedness, soft skills LO10 – Analysis and generalization of research results LO11 – Application of interdisciplinary knowledge	Formulates the problem, goals and objectives of the research. Selects and applies methodology appropriate to the purLOse. Collects, organizes and interprets data. Justifies conclusions based on analysis taking into account scientific ethics.	SPS6007 Sociology political Science SPS6006 Cultural Studies- Psychology HK 6002 History of Kazakhstan SPS6001 Philosophy
OOM6003 Physical Education Module	8 credits	LO6 – Physical and psychological readiness for professional and social activities	Performs exercises and physical standards taking into account individual capabilities. Demonstrates knowledge of the basics of physical education and a healthy lifestyle. Assesses the impact of physical activity on health and performance. Demonstrates activity and resLOnsibility when participating in sLOrts and physical education events.	PhC6005 Physical Education PhC6006 Physical Education
OOM6004 Personal and Social Development Module	5 credits	LO6 – Making management and technical decisions LO8 – Extracting information from various sources	Demonstrates the application of additional knowledge in practice. Assesses the integration of this knowledge into the core profile.	JUR 6505 Ecology and Sustainable Development MGT6706 Startups and Entrepreneurship

		LO10 – Analysis and generalization of scientific and social information LO11 – Application of knowledge in socio-economic disciplines	Implements interdisciplinary approaches in project/research activities. Presents results with a clear connection to the completed program.	RM6001 Research Methodology JUR6413 Fundamentals of Life Safety LAW6007 Fundamentals of Law and Anti-Corruption Culture ECO6007 Fundamentals of Economics and Financial Literacy HUM6400 Inclusive Education
<b>BASIC MODULES</b>				
BM6109 Basics of Programming, Algorithms and Practice (BDA)	19 credits	LO1 – Justify the choice of standards, methods and programming languages LO5 – Develop and use software LO9 – Solve applied problems in data processing and analysis	Selects and justifies suitable algorithmic structures and programming languages. Develops working algorithms and programs that solve applied problems. Applies algorithmic methods to analyze and process data. Evaluates the efficiency and correctness of the written code. Fixes errors and optimizes code.	SFT6001 Introduction to Programming EP 6101 Educational Practice SFT 6002 Object Oriented Programming SFT6110 WEB programming
BM6101 Mathematics and Science	20 credits	LO2 – Apply mathematical models and methods LO9 – Solve applied problems in data analysis	Applies mathematical methods to solve applied problems in ICT. Selects adequate mathematical models for describing and analyzing processes. Provides reasons for the use of specific methods or formulas. Interprets the obtained mathematical results in the context of ICT tasks.	MAT6001_1 Algebra and Geometry PHY6001 Physics MAT6002 Mathematical Analysis MAT6003 Discrete Mathematics

<p>BM6107 Languages and Business Communication</p>	<p>10 credits</p>	<p>LO6 – Demonstrate communication skills, initiative and psychological preparedness                  LO8 – Extract information from various sources                  RO11 – Application of knowledge in the additional educational program</p>	<p>Expresses ideas effectively orally and in writing on professional topics.                  Participates in teamwork, demonstrating soft skills and leadership.                  Extracts and analyzes information from professional literature, media and other sources.                  Applies a foreign language or business communications in professional activities.</p>	<p>LAN6002DA English for STEM                  LAN6007K Office work in the state language                  LAN6003PA Professionally Oriented Foreign Language</p>
<p>BM6104 Web and User Interfaces</p>	<p>11 credits</p>	<p>LO3 – Design software and information systems architectures                  LO4 – Design and develop ergonomic user interfaces                  LO5 – Use software to develop interfaces</p>	<p>Designs the structure of web applications and interfaces considering usability.                  Develops mockups and prototypes of user interfaces.                  Uses modern technologies (HTML, CSS, JS, etc.) to create interfaces.                  Evaluates the convenience and ergonomics of the interfaces being developed.                  Considers security requirements when designing web interfaces.</p>	<p>SFT6101 Web Development Fundamentals                  SFT6107 Human-Computer Interaction</p>
<p>BM6110 Infrastructure and Enterprise Systems (BDA)</p>	<p>20 credits</p>	<p>LO1 – Justify the choice of standards and tools for building systems                  LO3 – Design information systems architectures                  LO5 – Use hardware and software                  LO7 – Use Big Data Mining Methods</p>	<p>Assesses the architecture of corporate information systems.                  Selects appropriate platforms, services, and technologies for building infrastructure.                  Configures and administers infrastructure components.                  Justifies the choice of tools for working with big data in the IT infrastructure.                  Assesses the performance and fault tolerance of systems.</p>	<p>NET6101 Computer Networks (Cisco)                  SFT6104 IT Infrastructure                  SFT6109 Enterprise Architecture                  PM6102 IT Product Management</p>

BM6111 Design and Operation of Computer Systems	8 credits	LO1 – Justify the choice of methods and tools LO3 – Design systems architecture LO5 – Use hardware and software LO6 – Make technical decisions	Analyzes the architecture of computer systems. Develops diagrams and descriptions of the functioning of system components. Selects appropriate software and hardware solutions for given requirements. Diagnoses and troubleshoots computer systems. Makes technical decisions to improve the efficiency of systems.	SFT6003 Operating systems IS6123 Systems Analysis and Design
BM6106 Information Security and Law	8 credits	LO1 – Select methods and means for building information security systems LO5 – Develop or use information security tools LO10 – Conduct analysis and summarize research results LO6 – Demonstrate psychological readiness to work under stressful conditions	Justifies the choice of methods and technologies for information protection. Applies legislation and regulatory framework in the field of information security. Analyzes security threats and assesses risks. Develops policies and procedures for ensuring information security. Competently documents the results of work in the field of information security and law. Participates in the investigation of information security incidents.	SEC6101 Information Security and Information Protection LAW6003 Legal Aspects of ICT
<b>PROFESSIONAL MODULES</b>				
PM6107 Algorithmic Thinking and Programming	15 credits	LO1 – Justify the choice of programming methods and languages LO5 – Develop and use software LO9 – Solve applied problems in data processing and analysis	Applies algorithmic thinking to solve various problems. Selects and justifies algorithms and programming languages for specific purposes. Develops software solutions for data processing. Optimizes algorithms in terms of time and resources. Analyzes the correctness and efficiency of program code.	IS6124 Algorithms and Data Structures SFT6116 Introduction to ACM ICPC Problem Solving (ACM-1) SFT6123 Basic Algorithms for Solving ACM ICPC Problems (ACM-2)
PM6101 Information Systems Fundamentals and Practical Training	18 credits	LO1 – Justify the choice of standards and tools LO3 – Design the architecture of information systems LO5 – Use software and hardware	Describes the architecture of information systems and their components. Selects appropriate software and hardware for the implementation of information systems.	PP6102 Industrial Internship SFT6102 Fundamentals of Information Systems PP6103 Industrial Internship PP 6104 Pre-graduate practice

		LO6 – Demonstrate communication skills and make technical decisions	Justifies the choice of technologies for solving applied problems. Participates in practical projects on the development and implementation of information systems. Demonstrates skills in working in a team on projects.	
PM6105 Big Data Analytics and Processing	20 credits	LO2 – Apply mathematical models and methods LO7 – Use Big Data Mining Methods LO9 – Solve applied problems in data analysis LO10 – Conduct an analytical review and generalization of research results	Applies Big Data analysis methods. Uses mathematical and statistical models to process data. Selects tools and platforms for working with large volumes of information. Reveals hidden dependencies in data and interprets the results of the analysis. Assesses the reliability and quality of data. Prepares reports and visualizations of analysis results.	SFT6132 Introduction to Python and Libraries for Data Science (BDA-1) SFT6134 Big Data Acquisition and Storage (BDA-2) SFT6135 Big Data Processing (BDA-3) SFT6159 Data Modeling (BDA-4)
PM6106 Cloud Technologies and Solution Architecture	10 credits	LO1 – Justify the choice of tools and technologies LO3 – Design information systems architectures LO5 – Use software and hardware LO7 – Use Big Data Methods in the Cloud	Selects and justifies cloud platforms for the implementation of IT solutions. Designs the architecture of applications and services in a cloud environment. Configures and uses cloud resources (IaaS, PaaS, SaaS). Analyzes the cost, performance and security of cloud solutions. Demonstrates skills in deploying applications to the cloud.	IS6101 Fundamentals of Cloud Computing (CLD-1) IS6105 Cloud Solutions Architecture and Development (CLD-2)
PM6108 Data Management and Intelligent Systems	11 credits	LO3 – Design database and information systems architectures LO5 – Use software to process and store data LO7 – Use research and data processing methods LO9 – Solve applied data analysis problems LO10 – Conduct an analytical review and generalization of research results	Designs databases and data management systems. Uses DBMS and tools for processing and storing information. Applies data mining and machine learning methods. Automates data processing and analysis processes in intelligent systems. Evaluates the performance and accuracy of predictive analytics models. Documents and interprets the results of intelligent systems.	SFT6103 Data and Information Management SFT6186 Artificial Intelligence

### 11. Information about the disciplines of the educational program

No.	Code and Name disciplines	Brief description disciplines (30-50 words)	Labor intensity discipline in credits	Formable results training (codes)	Prerequisites	postrequisites
<b>General education cycle disciplines (OOD)</b> <b>Mandatory component (MC)</b>						
1.	LAN6001KR Kazakh (Russian) language	Mastering the language of instruction (Kazakh or Russian) in an academic style. Formation of grammatical and spelling literacy.	5	LO6, LO8, LO11	No	LAN6002KR
2.	LAN6001A Foreign Language	Learning English at A1–A2 level: developing reading, writing, listening and speaking skills in academic and everyday contexts.	5	LO6	No	LAN6002A
3.	ICT6001 Information and Communication Technologies	Introduction to ICT: basic office programs, cloud technologies, communication platforms, digital literacy.	5	LO1, LO5, LO11	No	All disciplines using ICT
4.	LAN6002A Foreign Language	Learning English at A1–A2 level: developing reading, writing, listening and speaking skills in academic and everyday contexts.	5	LO6	No	PhC6006
5.	LAN6002KR Kazakh (Russian) language	Mastering the language of instruction (Kazakh or Russian) in an academic style. Formation of grammatical and spelling literacy.	5	LO6, LO8, LO11	No	LAW6007, JUR6505
6.	PhC6005 Physical Education	The course is dedicated to the formation of physical culture of the individual and the ability to purposefully use a variety of means of physical culture for maintaining and strengthening health.	4	LO6, LO10	No	PhC6006
7.	PhC6006 Physical Education	The course is dedicated to the formation of physical culture of the individual and the ability to use it in a targeted manner Various means of physical culture for maintaining and strengthening health.	4	LO6, LO10	PhC6005	
8.	SPS6007 Sociology-political Science	The course is dedicated to general political knowledge for ICT majors. It includes political self-awareness, improving one's political outlook and communication skills. Teaching political knowledge is communicative, interactive, student-centered, result-oriented and relies	4	LO6, LO11	No	RM6001

		heavily on students' independent work.				
9.	SPS6006 Cultural Studies- Psychology	<p>This course presents issues of psychology in a broad educational and social context. The knowledge, skills and abilities obtained and formed as a result of mastering the course content give students the opportunity to apply them in practice, in various spheres of life: personal, family, professional, business, public, in working with people - representatives of different social groups and age categories. The course is also designed to form in bachelors an understanding of the factors complicating teaching activities at the current stage of development of society, of the specific for this activity difficulties.</p> <p>The course will help to become the basis for studying the whole complex of social and humanitarian sciences, as well as a supplement to general courses in history and philosophy. The course includes such topics as morphology, semiotics, anatomy of culture; the culture of the nomads of Kazakhstan, the cultural heritage of the proto-Turks, the medieval culture of Central Asia, the formation of Kazakh culture, Kazakh culture in the context globalization, cultural policy of Kazakhstan, etc.</p>	4	LO10, LO11	SPS6001	SPS6006
10.	HK 6002 History of Kazakhstan	The course examines the modern history of Kazakhstan as part of the history of mankind, the history of Eurasia and Central Asia. The modern history of Kazakhstan is a period in which a comprehensive study of historical events, phenomena, facts, processes is carried out, identifying historical patterns that took place on the territory of the Great Steppe in the 20th century and up to the present day.	5	LO6, LO10, LO11	ECO600 7	RM6001
11.	SPS6001 Philosophy	The object of study of the discipline is philosophy as a special form of spiritual studies in its cultural and historical development and modern sound. The main directions and problems of world and domestic philosophy are studied. Philosophy is a special form of knowledge of the world, creating a system of knowledge of the general principles and foundations of human life, about the essential characteristics of the relationship of man to nature, society and spiritual life, in all its main direction	5	LO6, LO11	SPS6007	

General education cycle disciplines (GECD)						
Component by choice (CC)						
12.	JUR 6505 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 industrial activity and the responsibility of the world community for them. A very important aspect is also international cooperation to ensure sustainable development. Various areas of practical application of ecology are also considered - natural resources and environmental pollution.	5	LO6, LO8	No	
13.	MGT6706 Startups and Entrepreneurship	This course provides an introduction to what a business is, how it operates, and how to manage it. Students will identify the types of ownership and processes used in production and marketing, finance, personnel, and management in business operations.	5	LO6, LO8, LO11	No	ICT6001
14.	RM6001 Research Methodology	The course is devoted to the study of activities aimed at developing in students the ability to make independent theoretical and practical judgments and draw conclusions, the skills of objectively assessing scientific information, freedom of scientific research and the desire to apply scientific knowledge in educational activities, including for the completion of a diploma project (work).	5	LO6, LO8	No	All disciplines using ICT
15.	JUR6413 Fundamentals of Life Safety	Studies methods of safe interaction between humans and the environment (industrial, domestic, urban, natural), sustainable functioning of business facilities (organizations) in emergency situations, issues of protection from negative factors, prevention and elimination of consequences of natural and man-made emergencies and the use of modern means of destruction.	5	LO6, LO8	No	PhC6006
16.	LAW6007 Fundamentals of Law and Anti-Corruption Culture	The course presents the legal, economic and social foundations of combating corruption, reveals the features of state policy, presents international experience in combating corruption, defines the features of regulating conflicts of interest, official ethics, and methods for	5	LO6, LO8	No	JUR6505

		identifying corruption violations. As a result of successful completion of the course, students will have the following competencies: 1. Understand the measures of legal liability for participation in corruption violations. 2. Determine the conflict of interest in the activities of organizations leading to corruption. 3. Conduct an analysis of the work of organizations using various research methods.				
17.	ECO6007 Fundamentals of Economics and Financial Literacy	This course provides a comprehensive introduction to economics and legal principles relevant to business decision making and everyday personal finance. Students will understand basic economic principles and navigate the legal systems that affect individuals and businesses, and learn how to manage personal finances. Topics include economic behavior, legal research, business budgeting, taxation, investing, and case analysis. The course is open to students without an economics background who are interested in how economic, legal, and financial systems shape our lives.	5	LO6, LO8	No	SPS6001
18.	HUM6400 Inclusive Education	Philosophy, history and methodology of the inclusive approach. Documents regulating the development of the inclusive process in higher professional education. Educational needs of students with disabilities. Methods and forms of organizing the educational process at a university for students with disabilities. Development of adapted educational programs, curricula and educational trajectories for students with disabilities. Psychological and pedagogical support for students with disabilities at a university.	5	LO1, LO11	No	
<b>Basic cycle disciplines University component</b>						
19.	SFT6001 Introduction to Programming	To study the methodological foundations of program development and practical programming skills. The main objectives of studying the discipline are the following: • Study of the basics of problem algorithmization • Study of the basics of the classification of programming languages • Study of data types and classification of	6	LO1, LO2, LO3, LO5, LO7, LO8	No	IS6124, SFT613 2

		operators in the C++ language • Development of programs using subroutines, standard modules, programming style, indicators of programming quality, methods of debugging and testing programs, the basics of object-oriented programming.				
20.	EP 6101 Educational Practice	Introduction to the profession, formation of the first professional skills in the educational environment.	2	LO6, LO11	No	PP6102
21.	MAT6001 _1 Algebra and Geometry	The aim of the course is to introduce students to important sections of linear algebra and analytical geometry, as well as to develop their mathematical thinking and problem-solving skills. During the educational process, students should become familiar with and be able to apply algebraic and geometric methods and tools to solve various applied problems related to such important concepts as matrices, determinants, matrix rank, vectors, lines, planes, linear and Euclidean space, linear transformations and quadratic forms, and also learn to work with equations of lines and planes.	4	LO2, LO5	No	MAT6002, MAT6003
22.	PHY6001 Physics	The study of the laws, principles, postulates and equations of mechanics, molecular physics and 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.	4	LO9	No	No
23.	MAT6002 Mathematical Analysis	The objective of the course is to introduce students to important branches of calculus and its applications in computer science. During the course, students should be familiar with and able to apply mathematical methods and tools to solve various applied problems. Moreover, they will learn fundamental methods of studying infinitesimal variables using analysis, the basis of which is the theory of differential and integral calculations.	6	LO2, LO10	MAT6001	MAT6004
24.	MAT6003 Discrete Mathematics	The course is devoted to the study of discrete objects and elements of logic. It includes the study of discrete objects, the solution of combinatorial	6	LO2, LO10	MAT6001	IS6124, MAT6004

		problems, the study of types of mappings and binary relations, the reduction of propositional algebra formulas to normal forms, and the application of logic algebra to the theory of switching circuits. The ability to analyze and synthesize, and mathematical maturity are developed.				
25.	MAT6004 Probability Theory and Mathematical Statistics	The course focuses on the probability and statistics of any event, as well as the relationship between mathematics and programming through an interdisciplinary curriculum that deepens the mathematical understanding of probability and develops logical and algorithmic thinking skills.	6	LO2, LO5, LO11	MAT60 02, MAT60 03	
26.	LAN6002DA English for STEM	The course is designed to help students develop their English language skills for their current and future academic studies. Improve grammatical accuracy and develop listening, reading, writing and speaking skills in IELTS format.	4	LO6	LAN600 1A	LAN600 3PA
27.	LAN6007K Office work in the state language	Office work in the state language is a very important subject for students, since this discipline teaches how to draw up and prepare documents in the state language, and develops practical skills and abilities to independently draw up and translate documents into Kazakh.	3	LO6	LAN600 1KR	No
28.	LAN6003PA Professionall y Oriented Foreign Language	The course is devoted to the analysis of professional topics: "Computers and work", "Work in ICT", "Types of computer systems", "Basics of working with a computer", "Operating systems and graphical interface", "Text processing", "Cyberspace: security and crime", etc.	3	LO6	LAN600 2DA	No
29.	SFT6104 IT Infrastructure	This course focuses on information technology infrastructure in a business environment, including internetworking and distributed processing. Topics covered include business requirements for distributed systems, system architecture models (client/server; distributed processing, etc.), key network models and technologies, security issues related to architecture, design and	5	LO1, LO2, LO3, LO4, LO8, LO9, LO10, LO12	ICT6001	NET610 1, CLD- 1

		technology, network configuration, and management techniques.				
30.	SFT6109 Enterprise Architecture	The main objective of the course is to provide an understanding of the essence of enterprise architecture. The objective of the course is to develop a professional conceptual apparatus and develop skills for its correct application.	4	LO1, LO2, LO3, LO5, LO7, LO8, LO9, LO10, LO11	SFT610 2	IS6105
31.	PM6102 IT Product Management	This course provides students with a comprehensive overview of software project management principles, processes, and practices. Students learn methods for planning, organizing, scheduling, and controlling software projects. Students will gain practical project management skills and skills related to defining a software project, establishing project communications, managing project changes, and managing distributed teams and software projects.	5	LO3, LO4, LO5, LO6, LO8, LO11	SFT610 2	Startup projects
<b>Basic cycle disciplines Component by choice</b>						
32.	SFT 6002 Object Oriented Programming	The course includes: Encapsulation, inheritance, polymorphism. Creating classes. Creating useful client applets and standalone applications based on real requirements that students receive from real clients or employers.	5	LO1, LO3, LO4, LO5, LO9, LO10	SFT600 1	SFT610 1, IS6123
33.	SFT6110 WEB programming	The course continues web development using PHP, JavaScript and other web technologies to program web information systems. The course introduces advanced web design techniques. Topics include customer expectations, advanced markup language, multimedia technologies, usability and accessibility, and methods for evaluating web design.	6	LO 1, LO3, LO4, LO5, LO9, LO10	SFT610 1, SFT600 2	Startup projects, practice
34.	SFT6101 Web Development Fundamental s	The aim of the course is to master the technology of designing the structure of a website as an information system; - master the technology of creating a website using programming tools on the client and server side; - master the technology of hosting, supporting and maintaining a website on a server.	6	LO 1, LO3, LO4, LO5, LO10	SFT600 1	SFT611 0

35.	SFT6107 Human-Computer Interaction	This course combines a component that teaches programming interactive user interfaces with a component that teaches methods for improving the usability of those interfaces. The course assumes that interface usability is important to successful software design, and not just "packaging" or aesthetics.	5	LO1, LO4	SFT6001	SFT6110
36.	NET6101 Computer Networks (Cisco)	The course explores network communications from local area networks (LANs) to the global Internet. Common problems and a range of solutions for each are covered, with a particular focus on the TCP/IP protocol suite. Additionally, it will prepare students for real-world information security operations. Knowledge of networking fundamentals will refresh students with an awareness of the challenges faced by modern infrastructure.	5	LO1, LO3, LO5	SFT6104	SEC6101
37.	SFT6003 Operating Systems	The objective of this course is to introduce the design and implementation of operating systems. The course will begin with a brief historical overview of the evolution of operating systems over the last fifty years, and then cover the major components of most operating systems. This discussion will examine the trade-offs that may be made between performance and functionality during the design and implementation of an operating system. Particular attention will be paid to the three major OS subsystems: process management (processes, threads, CPU scheduling, synchronization, and deadlocks), memory management (segmentation, paging, swapping), file systems, and operating system support for distributed systems. Knowledge of the Bash language, network management, and network security.	5	LO1, LO3, LO5	SFT6001	SFT6104
38.	IS6123 Systems Analysis and Design	The course allows you to gain knowledge of the basic principles and approaches of system analysis and design, allowing you to study complex information systems; the ability to apply the acquired knowledge for system analysis of	3	LO3, LO5, LO6	SFT6002, MAT6003	IS6105, PM6102

		business processes; mastery of methods for applying modern tools for system analysis and design of business processes.				
39.	SEC6101 Information Security and Information Protection	The course is centered around a core security topic that introduces students to the fundamental security issues that arise in the design, analysis, and implementation of networked and distributed systems. Sub-topics allow students to explore broader areas in which they can apply their newly acquired skills.	5	LO1, LO3, LO5	NET610 1	No
40.	LAW6003 Legal Aspects of ICT	The discipline "Legal aspects of information and communication technologies" is of a theoretical and applied nature and offers to familiarize students with the basics of the legislation of the Republic of Kazakhstan operating in the sphere of regulation of relations in the sphere of information and communication technologies. Within the framework of this discipline, they become familiar with the basics of state policy in the sphere of information, with the basic concepts of information law and information security, with the features of the information system, forms and methods of ensuring information security of commercial and government structures.	3	LO1, LO10	No	SEC610 1
<b>Cycle of major disciplines University component</b>						
41.	PP6102 Industrial Internship	Familiarization with the production environment, participation in real projects of IT companies, mastering basic professional skills, documentation, teamwork.	4	LO5, LO6, LO10	EP6101	PP6103
42.	SFT6102 Fundamentals of Information Systems	This course is devoted to the full life cycle of information systems development, starting from the description of the idea, development of technical specifications, modeling, development, testing, debugging of software, calculation of the feasibility study of the cost of developing an information system, ending with a presentation to the customer. The course also covers theoretical and practical issues of building and operating an information system, namely, classification of information	5	LO1, LO3, LO5	ICT6001	IS6123, PM6102

		systems, UML modeling, ADO technology, criteria for evaluating IT projects, etc.				
43.	PP6103 Industrial Internship	Continuing practical training: completing tasks in a project team, reporting, working with the customer, using ICT tools in practice.	4	LO5, LO6, LO10	PP6102	PP6104
44.	PP 6104 Pre-graduate practice	The final stage of preparation: work on the diploma project, collection and analysis of data, technical implementation, preparation of a report on the results.	5	LO10, LO11	PP6103	Graduation work (diploma)
<b>Cycle of major disciplines Component of choice</b>						
45.	IS6124 Algorithms and Data Structures	The discipline "Algorithms and data structures" involves studying the methods of representing algorithms and programs, methods of developing algorithms, features of the technological process of developing programs, and documenting programs.	5	LO1, LO2, LO3, LO5	SFT600 1, MAT60 03	SFT612 3, BDA courses
46.	SFT6116 Introduction to ACM ICPC Problem Solving (ACM-1)	The discipline is designed to study the basic algorithms and data structures for solving various programming competition problems. For this purpose, using data structures, the principles of constructing algorithms and programs, methods of solving, programming, debugging and implementing programs are considered.	5	LO1, LO11, LO12	IS6124	SFT612 3
47.	SFT6123 Basic Algorithms for Solving ACM ICPC Problems (ACM-2)	The course is designed to study the basic algorithms and data structures for solving various ACM ICPC problems. For this purpose, using data structures, the principles of constructing algorithms and programs, methods of solving, programming, debugging and implementing programs are considered.	5	LO1, LO 11, LO 12	SFT611 6	No
48.	SFT6132 Introduction to Python and Libraries for Data Science (BDA-1)	This course covers the basics of the Python programming language as well as programming best practices. Key content includes variable assignment, differences between different data types in Python such as strings, lists, integers, and floatingpoint numbers, using conditionals and loops (for, while) to	5	LO1, LO3, LO5	SFT600 1	SFT613 4

		control program flow, and developing functions in Python.				
49.	SFT6134 Big Data Acquisition and Storage (BDA-2)	The course includes studying the technology of data extraction and types of data extraction; Extraction of structured and semi/unstructured data. As well as storage of different types of data (HDFS, NoSQL (key-value, document oriented, column base))	5	LO 1, LO7, LO8	SFT6132	SFT6135
50.	SFT6135 Big Data Processing (BDA-3)	The course includes: Methods of data processing; Real-time/Batch Processing; Working with raw data. Data cleaning. Various data formats, conversion and aggregation. Various methods of transformation via Python as well as via ETL tools (Pentaho)	5	LO2, LO7, LO8, LO9	SFT6134	SFT6159
51.	SFT6159 Data Modeling (BDA-4)	Study of data mining technology and types of data mining; extraction of structured and semi/unstructured data. As well as storage of different types of data (HDFS, NoSQL(key-value, document oriented, column base)); data processing methods; real-time/batch processing; working with raw data. Data cleaning. Different data formats, transformations and aggregations. Different transformation methods using Python, as well as using ETL tools (Pentaho).	5	LO2, LO 7	SFT6135	diplomatic project
52.	SFT6103 Data and Information Management	The objectives of mastering the discipline "Data and Information Management" are to develop students' knowledge of the theoretical aspects of data management in information systems, as well as practical skills in organizing storage and targeted access to large volumes of data stored on external storage devices. During the training, students must master the methods of designing, modeling data and forming the structure of databases, master the skills of using the SQL language to create databases and implement mechanisms for regulated targeted access to data.	6	LO1, LO3, LO5	SFT6102	BDA-4
53.	IS6101 Fundamentals of Cloud Computing (CLD-1)	As a result of mastering the discipline, the student should be able to: know the basic principles and approaches of system analysis and design, allowing to study complex information	5	LO1, LO 7	SFT6104	IS6105

		systems; the ability to apply the acquired knowledge for system analysis of business processes; mastery of methods of applying modern tools of system analysis and design of business processes.				
54.	IS6105 Cloud Solutions Architecture and Development (CLD-2)	The objective of the course is to cover the core topics/modules that will be covered in the course: 1) AWS Academy Cloud Architecting 2) Introduction to Cloud Architecture 3) Adding a Storage Layer 4) Adding a Compute Layer 5) Adding a Database Layer 6) Creating a Networking Environment 7) Connecting Networks Securing User and Application Access	5	LO1, LO3, LO5, LO7	IS6101	Practice, diploma project
55.	SFT6186 Artificial intelligence	The aim of the course is to study the basics of artificial intelligence, various types of neural networks and their application in various tasks, machine learning methods, principles of constructing neural networks. As a result of mastering the discipline, students will gain knowledge in the field of modern models of artificial neural networks, learn methods of their use to solve practical problems. Students will have to carry out innovative engineering projects for the development and software of various purposes using modern design methods, best practices in developing competitive products, analyze and compare them. Students will be able to set tasks and develop algorithms for their solution to implement software implementations of neural networks in order to solve various practical problems. This discipline provides a detailed overview and description of the most important methods of training neural networks of various structures, as well as practical problems solved by these networks.	5	LO2, LO7, LO8, LO9	BDA-1	IS6101

### 12. Curriculum of the educational program (Platonus)

№	Module name	Discipline cycle	Discipline component	Code of discipline	Name of discipline	Academic credits	Academic study period	Control in the academic period			Number of hours							Distribution of credits per academic period																					
											Classroom work					IWS		1 course		2 course		3 course		4 course															
								Exams	Differentiated test	Term paper/project	Total	Lectures	Laboratory trainings	Practice	Studio lessons	Practice	IWST	IWS	1	2	3	4	5	6	7	8													
								Number of weeks in the academic period																															
								15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15														
<b>Minor module for disciplines</b>																																							
<b>General modules</b>																																							
1	OOM6002 Language and ICT skills development module	GED	RC	LAN6001KR	Kazakh (Russian) language	5	1	1		5/150			45			15	90	5.0																					
2		GED	RC	LAN6001A	Foreign language	5	1	1		5/150			45			15	90	5.0																					
3		GED	RC	ICT6001	Information and Communication Technologies	5	1	1		5/150	15	30.0				15	90	5.0																					
4		GED	RC	LAN6002A	Foreign language	5	2	2		5/150			45			15	90		5.0																				
5		GED	RC	LAN6002KR	Kazakh (Russian) language	5	2	2		5/150			45			15	90		5.0																				
6	OOM6003 Module of physical culture	GED	RC	PhC6005	Physical Culture	4	2	2		4/120			45			15	60		4.0																				
7		GED	RC	PhC6006	Physical Culture	4	3	3		4/120			45			15	60		4.0																				

8	OOM6005 Module of social and cultural development	GED	RC	SPS6007	Sociology-Political science	4	2	2			4/120	15		30			15	60		4.0														
9		GED	RC	SPS6006	Cultural studies-Psychology	4	3	3			4/120	15		30			15	60		4.0														
10		GED	RC	HK 6002	History of Kazakhstan	5	3	3			5/150	15		30			15	90		5.0														
11		GED	RC	SPS6001	Philosophy	5	4	4			5/150	15		30			15	90		5.0														
12	OOM6004 Module of personal and social development	GED	EC	JUR 6505	Ecology and sustainable development	5	8	8			5/150	15		30			15	90																
13		GED		MGT6706	Startups and entrepreneurship						8			5/150	15		30			15	90													
14		GED		RM6001	Research methodology						8			5/150	15		30			15	90													
15		GED		JUR6413	Fundamentals safety of life activity						8			5/150	15		30			15	90													5.0
16		GED		LAW6007	Fundamentals of law and anti-corruption culture						8			5/150	15		30			15	90													
17		GED		ECO6007	Foundation of economics and financial literacy						8			5/150	15		30			15	90													
18		GED		HUM6400	Inclusive education						8			5/150	15		30			15	90													
<b>Modules of specialty/education programm</b>																																		
19	BM6109 Fundamentals of programming, algorithmization and practice (BDA)	BD	UC	SFT6001	Introduction to Programming	6	1	1			6/180	15	30.0	15			15	105	6.0															
20		BD	UC	EP 6101	Teaching practice	2	2				2/60					60			2.0															
21		BD	EC	SFT 6002	Object-oriented programing	5	4	4			5/150	15	30.0					15	90		5.0													
22		BD	EC	SFT6110	WEB programming	6	7	7			6/180	15	30.0	15				15	105								6.0							

23	BM6101 Mathematics and Natural Sciences	BD	UC	MAT6001_1	Algebra and geometry	4	1	1			4/120	15		30			15	60	4.0							
24		BD	UC	PHY6001	Physics	4	2	2			4/120	15	30.0				15	60		4.0						
25		BD	UC	MAT6002	Mathematical analysis	6	2	2			6/180	30		30				15	105		6.0					
26		BD	UC	MAT6003	Discrete mathematics	6	3	3			6/180	30		30				15	105			6.0				
27		BD	UC	MAT6004	Probability theory and mathematical statistics	6	4	4			6/180	30		30				15	105				6.0			
28	BM6107 Languages and Business Communication	BD	UC	LAN6002DA	English for STEM	4	3	3			4/120			45			15	60			4.0					
29		BD	UC	LAN6007K	Business correspondence in the state language	3	3	3			3/90			30			15	45			3.0					
30		BD	UC	LAN6003PA	Professionally oriented foreign language	3	4	4			3/90			30			15	45				3.0				
31	BM6104 Web and User Interfaces	BD	EC	SFT6101	Introduction to Web Development	6	4	4			6/180	30	30.0				15	105				6.0				
32		BD	EC	SFT6107	Human-Computer Interaction	5	6	6			5/150	15	30.0				15	90						5.0		
33	BM6110 Infrastructure and Corporate Systems (BDA)	BD	EC	NET6101	Computer Networks (Cisco)	5	5	5			5/150	15	30.0				15	90						5.0		
34		BD	UC	SFT6104	IT Infrastructure	5	7	7			5/150	15	30.0				15	90							5.0	
35		BD	UC	SFT6109	Enterprise Arhitecture	5	7	7			5/120	15	30.0				15	60							5.0	
36		BD	UC	PM6102	IT-product Management	5	8	8			5/150	15	30.0				15	90								5.0
37	BM6111 Design and Functioning of Computer Systems	BD	EC	SFT6003	Operating Systems	5	5	5			5/150	15	30.0				15	90						5.0		

38		BD	EC	IS6123	System analysis and design	3	7	7			3/90	15		15			15	45					3.0
39	BM6106 Information Security and Law	BD	EC	SEC6101	Information Security & Data Protection	5	6	6			5/150	15	30.0				15	90				5.0	
40		BD	EC	LAW6003	Legal aspects of ICT	3	8	8			3/90	15		15			15	45					3.0
41	PM6107 Algorithmic Thinking and Programming	MD	EC	IS6124	Algorithms and data structures	5	2	2			5/150	15	30.0				15	90		5.0			
42		MD	EC	SFT6116	An Introduction to solving ACM ICPC problems(ACM-1)	5	5	5			5/150	15	30.0				15	90				5.0	
43		MD	EC	SFT6123	Basic algorithms for solving ACM ICPC problems (ACM-2)	5	6	6			5/150	15	30.0				15	90				5.0	
44	PM6101 Fundamentals of Information Systems and Practical Training	<b>MD</b>	<b>UC</b>	<b>PP6102</b>	<b>Internship</b>	<b>4</b>	<b>4</b>				<b>4/120</b>					120					4.0		
45		MD	UC	SFT6102	Fundamentals of IS	5	5	5			5/150	15	30.0				15	90				5.0	
46		<b>MD</b>	<b>UC</b>	<b>PP6103</b>	<b>Internship</b>	<b>4</b>	<b>6</b>				<b>4/120</b>					120						4.0	
47		<b>MD</b>	<b>UC</b>	<b>PP 6104</b>	<b>Undergraduate practice</b>	<b>5</b>	<b>8</b>				<b>5/150</b>					150							5.0
48	PM6105 Big Data Analytics and Processing	MD	EC	SFT6132	Introduction to Python and libraries to data analysis and processing (BDA-1)	5	4	4			5/150	15	30.0				15	90				5.0	
49		MD	EC	SFT6134	Big Data ingestion /Storage (BDA-2)	5	5	5			5/150	15	30.0				15	90				5.0	
50		MD	EC	SFT6135	Big Data Processing (BDA-3)	5	7	7			5/150	15	30.0				15	90					5.0

51		MD	EC	SFT6159	Data Modelling (BDA-4)	5	8	8			5/150	15	30.0				15	90							5.0	
52	PM6106 Cloud Technologies and Solution Architecture	MD	EC	IS6101	Cloud Fundamentals (CLD-1)	5	5	5			5/150	15	30.0				15	90						5.0		
53		MD	EC	IS6105	Architecture and Development of Cloud Solutions (CLD-2)	5	6	6			5/150	15	30.0				15	90						5.0		
54	PM6108 Data Management and Intelligent Systems	MD	EC	SFT6103	Data and information management	6	6	6			6/180	15	30.0	15			15	105						6.0		
55		MD	EC	SFT6186	Artificial intelligence	5	7	7			5/150	15	30.0				15	90							5.0	
<b>Additional modules beyond qualification</b>																										
<b>Modules of choice</b>																										
<b>Weekly average workload at hours</b>																										
																		0	0	0	0	0	0	0	0	
<b>1</b>	<b>General education disciplines (GED)</b>					<b>56</b>		<b>12</b>	<b>0</b>	<b>0</b>	<b>1530</b>	<b>75</b>	<b>30</b>	<b>390</b>	<b>0</b>	<b>0</b>	<b>165</b>	<b>870</b>	<b>15</b>	<b>18</b>	<b>13</b>	<b>5</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>5</b>
	Required component (GED/RC)					51		11	0	0	1530	75	30	390	0	0	165	870	15	18	13	5	0	0	0	0
	University component (GED/UC)					0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Elective component (GED/EC)					5		1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5
<b>2</b>	<b>Basic disciplines (BD)</b>					<b>102</b>		<b>21</b>	<b>0</b>	<b>0</b>	<b>3030</b>	<b>330</b>	<b>360</b>	<b>285</b>	<b>0</b>	<b>60</b>	<b>315</b>	<b>1680</b>	<b>10</b>	<b>12</b>	<b>13</b>	<b>20</b>	<b>10</b>	<b>10</b>	<b>19</b>	<b>8</b>
	Required component (BD/RC)					0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	University component(BD/UC)					59		12	0	0	1740	180	150	240	0	60	180	930	10	12	13	9	0	0	10	5
	Elective component (BD/EC)					43		9	0	0	1290	150	210	45	0	0	135	750	0	0	0	11	10	10	9	3



### 13. Additional educational programs ( Minor )

Name of the (Minor), indicating the list of disciplines that form the Minor	Number of credits for additional courses / number of credits for the discipline	Description, Competencies formed by the additional educational program, learning outcomes
Name of Minor discipline	15	
SFT6186 Artificial intelligence	5	<p>The course covers the fundamental principles of artificial intelligence, including machine learning, neural networks, intelligent systems, and the application of AI to real-world data processing problems.</p> <p>Competencies (being developed):            PC5: application of probability theory and statistics methods in AI;            PC6: development of new methods for big data analysis;            LO2: Application of models and methods;            LO9: data analysis and pattern identification;            LO10: comprehensive analysis and generalization of results.</p> <p>Learning outcomes:            The student is able to select and apply machine learning methods;            Implement and interpret artificial intelligence models;            Apply AI to solve applied problems in the field of Big Data.</p>
IS6101 Fundamentals of Cloud Computing (CLD-1)	5	<p>The course is devoted to introduction to cloud technologies, IaaS/PaaS/SaaS architectures, virtualization, distributed computing and basic principles of cloud systems operation.</p> <p>Competencies (being developed):            PC1: working with big data in infrastructure;            LO1: choice of architectures and tools;            LO7: Using cloud platforms for data analysis.</p> <p>Learning outcomes:            The student understands the basics of cloud platforms and services;            Can design basic cloud architectures;            Uses cloud environments for data storage and analysis tasks.</p>
IS6105 Cloud Solutions Architecture and Development (CLD-2)	5	<p>The course focuses on learning advanced cloud architecture based on AWS Academy Cloud Architecting, including storage, compute, databases, networking layers, security, and DevOps.</p> <p>Competencies (being developed):            PC4, PC6: design of cloud systems, implementation of new approaches;            LO3: Cloud Solutions Architecture;            LO5: Implementation and use of distributed systems;            LO8: Working with streams and distributed data sources.</p> <p>Learning outcomes:            Design and implementation of a full-fledged cloud solution;            Use of security and access control tools;</p>