ХАЛЫҚАРАЛЫҚ АҚПАРАТТЫҚ ТЕХНОЛОГИЯЛАР УНИВЕРСИТЕТІ
МЕЖДУНАРОДНЫЙ УНИВЕРСИТЕТ ИНФОРМАЦИОННЫХ ТЕХНОЛОГИЙ
INTERNATIONAL UNIVERSITY OF INFORMATION TECHNOLOGIES

AGREED
Chairman of the Educational and Methodological Council JSC «International University of Information Technologies»

_____A.K.Mustafina
"19" 03 2024

APPROVE
Chairman of the Board – Rector
JSC International University of Information Technologies

_____A.K. Khikmetov
"22" 03 2024

EDUCATIONAL PROGRAM
6B06103 «Big Data Analytics»

(based on prof. standard "Creation and management of information technologies" and the International Standard ACM)

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

Code and classification of training areas: 6B061 - Information and communication technologies

Group of educational programs: B057 – Information Technology
Name educational program: 6B06103 Big Data Analytics

Standard level ISCE: 6
Standard level NQF: 6

Standard level SFQ: 6

Study period: 3 years

Number of credits: 240

AGREED
General Director Albayev Zh.T.
TOO «United Data»
"07" 03 2024

AGREED
Director Myrzakhmetov B.S.
TOO «NETSHARDS»
"07" 03 2024

Almaty, 2024

The educational program 6B06103 «Big Data Analytics» is the main academic document of the university for training personnel in the direction of B057 - Information technologies. This educational program was discussed and approved at the meeting of the IS department dated 07.03.2024 Protocol № 6

Head of the Department _____ Naizabayeva L.K.

This educational program was reviewed and approved at a meeting of the University Scientific Council dated 27.03.2024 Protocol No. 8

Head of the Department
for Educational and Methodological Activities _____ Ajibayeva A. Sh.

Contents

List of abbreviations and designations

BC	Basic competence
BM	Basic module
HE	Higher education
SMSE	State mandatory standard of education
EQF	European Qualification Framework
EEF	European Education Foundation
KAS	Knowledge, abilities, skills
NKZ	National Classifier of Occupations
NQF	National Qualifications Framework
NQS	National Qualifications System
GHM	General humanitarian module
GM	General module
EP	Educational program
GPM	General professional module
SQF	Sectoral Qualifications Framework
GEC	General education competence
PS	Professional Standard
PGE	Postgraduate Education
PC	Professional competence
PM	Professional module
WG	Working Group
RK	Republic of Kazakhstan
LO	Learning Outcome
SM	Special module
QMS	Quality management system
SEM	Socio-economic module
TVE	Technical and Vocational Education
TVET	Technical and Vocational Education and Post-Secondary education
UNESCO	United Nations Educational, Scientific and Cultural Organization/ is a specialized agency of the United Nations Educational, Scientific and Cultural Affairs.
Cedefop	European Centre for the Development of Vocational Training DACUM from English Developing Curriculum
ECVET	European Credit System for vocational education and training
EQAVET	European Quality Assurance in Vocational Education and Training
ENQA	EuropeanAssociationforQualityAssuranceinHigherEducation / European - Russian Association for Quality Assurance in Higher Education
ESG	Standards and Guidelines for Quality Assurance in the European Higher Education Area
FIBAA	International agency (non-profit foundation) for accreditation and examination of the quality of higher education (Bonn, Germany)
IQM-HE	Internal Quality Management in Higher Education
TACIS	Technical Assistance for the Commonwealth of Independent States
WSI	WorldSkills International

1. Description of the educational programs

The presented Educational program is aimed at preparing a synthetic profession "data scientist". Data scientists need to have skills and knowledge from several disparate areas: computer science and programming, mathematical methods, and business administration and management. Such synthetic specialties are always in great 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, therefore, make money on it . Technology Big Data allows you to reduce the cost of IT infrastructure and software, reduce labor costs through more efficient methods of data integration, management, analysis and decision making; increase revenue and profits 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. Purpose and objectives of the educational program

The purpose (goals) of the Bachelor's degree program in the training of scientific and pedagogical personnel in the field of ICT and managers, analysts who are in demand in IT companies and large manufacturing enterprises, where it is necessary to regularly analyze large amounts of data, who can build processes for optimal data collection, operational data processing, data analysis, optimization business processes, consumer behavior forecasting, analysis of statistical indicators, risk analysis, development of business solutions, etc. to improve the efficiency of the company. The main ability of data scientists is to see the logical connections in the system of collected information and, based on this, develop certain business solutions, models. This can lead to new scientific discoveries, improved company performance, new revenue opportunities, better customer service, and so on.

The objectives (tasks) of the IS educational program are to develop:

- to form the ability to contribute to the development of the latest areas of computer science through original scientific research;
- in-depth theoretical and practical training in the chosen direction of science.
- Providing highly qualified specialists in the field of big data analysis in private and public companies.
- 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, from small enterprises up to 10 people, to large national and private organizations employing more than 1000 people.
- Development in students of flexible (soft) qualities required for the development of leadership and patriotic sides in them, necessary for shaping them as successful and purposeful leaders in their industry.

  The uniqueness and distinctive feature of the educational program lies in introduction of disciplines of working with big data into the educational program, as well as special courses.

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

The student, after mastering the entire educational program, should be able to perform the following points:

- Formulate and solve problems arising in the course of production activities that require in-depth professional knowledge. To formulate the problem, both mathematical apparatus and computer tools can be used;
- Choose the necessary approaches and methods for analyzing problems, as well as modify existing ones and develop new ones, depending on the tasks of a particular case;

- Apply psychological methods and means to improve the efficiency and quality of education in the learning process;
- Know a foreign (English) language at a professional level, allowing students to conduct scientific research at a qualitatively high level and to teach special disciplines in universities;
- Model and design complex systems using mathematical and computer models and methods;
- Apply quantitative and qualitative methods and techniques to collect primary information for research, as well as develop effective solutions to problems;
- Analyze and design software tools for data analysis, as well as algorithms, models and methods required for the development of software systems, effective data analysis and knowledge extraction from data;
- Manage a team of IT specialists in the process of implementing and deploying software systems, as well as models and methods of data analysis;
- Choose standards, methods, technologies, tools and technical means for carrying out work on further maintenance of software systems;
- Apply methods of designing and developing software systems to solve a wide class of applied problems in various fields, including interdisciplinary industries;
- Program and test various solutions (models, methods), take part in the creation and management of systems at all stages of the system development life cycle.
- Create relational and non-relational databases for efficient storage and management of data in various large organizations, government agencies and other companies.
- Create analysis models for structured, semi-structured , and partially unstructured data.
- Analyze the complexity of calculations and the possibility of parallelization (optimization) of the developed algorithms and programs.
- Evaluate the main parameters of the resulting parallel programs, such as numerical indicators of the required computing resources, acceleration, efficiency and scalability.

The following forms of exams are used as an assessment of learning outcomes: computer testing, writing exam (answers on sheets), oral exam, project (delivery of a course project), practical (open questions on a computer, solutiontasks on computer, V volume including V format ACM), complex (test/written/ oral+etc). IN compliance With table 1 recommended following ratio exam forms:

Table 1

No.	Form exams	Recommended share, %
1	Computer testing	20%
2	Writing	10%
3	Oral	5%
4	Project	30%
5	Practical	30%
6	Complex	5%

On disciplines, taken out on state exam: Algorithms data structures , Introduction to Python and libraries for data processing and analysis (BDA -1), Fundamentals of business analysis

Final attestation ends protection diploma project.

4 Passport educational programs

4.1 Are common information

No.	Name fields	Note
1	Code and classification areaseducation	6B06 - Information and communicationtechnologies

2	Code and classification of training directions	6B061 - Information and communicationtechnologies
3	Group educational programs	057 - Informational technologies
4	Name of educational programs	6B06103 Big Data Analytics
5	Brief description educational programs	Educational program «Big Data Analytics» includes working with data in structured and unstructured forms from information systems, big data processing, Big technologies Data , work with Excel , SQL and internal analytics systems. Designing internal data warehouses, linking data from various systems, as well as creating dashboards and analytical reports. Use of BI system (Oracle , IBM and others), SQL, ETL tools and programming languages. Intelligent analysis of structured and unstructured data. Using statistics, machine learning and advanced predictive analytics to solve key business problems.
6	Purpose of the EP	Prepare a universal specialist who has knowledge in mathematics, statistics, ICT, computer science, business and economics.
7	Qualifying graduate characteristics Educational Program:	A Big Data Analyst is an employee who is able to extract the necessary information from a wide variety of sources using real-time information flows; identify hidden patterns in data sets and statistically analyze them to make smart business decisions. – The sphere of professional activity is the branches of ICT, telecommunications, banking sector, public administration, agriculture. Potential employers of the program graduates are large companies and organizations that have the practice of storing large amounts of data (including in external data centers), as well as IT companies and research organizations, as well as relevant IT and analytical departments of companies and organizations in all areas of activity . – The objects of professional activity of EP graduates are enterprises and organizations of the ICT industry. – The subject of professional activity is the collection, processing and analysis of big data. – Kinds professional activities graduate OP: - production and technological; - experimental research; - organizational and managerial; - design and engineering. – Functions professional activities graduate OP: -collection of data from various sources for subsequent operational processing; -analysis of consumer behavior; - modeling of the client base and personalization of products;

		-analysis of the effectiveness of the internal processes of the base; -analysis of various risks; -identification of possible fraud on the study of questionable transactions; - preparation of periodic reports with forecasts and presentation of data. - statistical methods; -database modeling; -methods of intellectual analysis; -applications of artificial intelligence for working with data; -methods of design and development of databases.
8	Standard level ISCE	6
9	Standard level NQF	6
10	Standard level SFQ	6
11	List of competencies of the educational program: 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; fundamentals of the legal system and legislation of Kazakhstan; trends in the social development of society; bases of physical culture and principles of a healthy way of life of the person. GC2: Have an idea: about ethical and spiritual values; about sociological approaches to the individual, the main patterns and forms of regulation of social behavior; about the essence of power and political life, political relations and processes, about the role of political systems in the life of society and various social groups; about the role of consciousness and self-consciousness in the behavior, communication and activities of people, the formation and development of personality. GC3: Own: ethical and legal standards of behavior; system of practical knowledge and skills that ensure the acquisition, development, improvement and activation of psychophysical abilities and qualities, the acquisition, preservation and strengthening of health, the ability to work in a team, correctly defend one's point of view, and offer new solutions. GC4: Ability for written and oral communication in the state language and the language of interethnic communication; the ability to logically correctly, reasoned 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 application programs; use network computer technologies, databases and application packages in their subject area BC1: The ability to actually use the state language, the language of international communication and a foreign language in professional activities. BC2: The ability to understand the basics of economic knowledge, scientific ideas about finance, economics. BC3: Ability to professionally operate modern equipment, instruments, network components, computer systems (in accordance with the objectives of the program), as well as use the rules of safety, industrial sanitation, fire safety and labor protection standards. BC4: The ability to have the skills to use algorithms and programs for calculating the parameters of business processes. BC5: The ability to use the basic principles and methods to solve managerial problems, the	

	ability to carry out project documentation in a computer graphics software environment for various types of projects. BC6: The ability to be competent in choosing mathematical modeling methods for solving specific engineering problems, including the willingness to identify the natural scientific essence of problems that arise in the course of professional activity, and the ability to involve the appropriate physical and mathematical apparatus to solve it. BC7: The ability to design the architecture of information system components, including the human-machine interface of hardware-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 methods and development tools. PC1: The 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 of big data analysis in the organization; PC3: Ability to manage the development of products, services and solutions based on big data; PC4: Ability to use modern programming environments for designing and implementing databases. PC5: The ability to apply the elements of probability theory and mathematical statistics that underlie the models and methods of data science, to correctly select machine learning methods for solving practical problems. PC6: Ability to develop and implement new methods and technologies for big data research.	
12	Learning outcomes of the educational program: LO1: To argue the choice of basic standards, principles and design patterns, methods, tools and programming languages, including choosing methods and tools for building information security systems of modern ICT LO2: Apply mathematical models and methods of various processes LO3: Design database, software and information system architectures LO4: Design and develop ergonomic user interfaces LO5: Develop and/or use software, hardware, information, mathematical, functional support of information systems, including algorithms and methods of information security LO6: Show communication skills, initiative and psychological readiness for work, including when working in a team, and make managerial and technical decisions LO7: Use big data mining methods. LO8: Extract relevant information from a variety of sources, including real-time information flows LO9: Solve applied problems of processing and analyzing data in order to identify hidden dependencies in them LO10: Conduct a comprehensive analysis and analytically summarize the results of scientific research using modern achievements in science and technology, the skills of independent data collection, study, analysis and generalization. LO11:To be able to apply the acquired knowledge in the chosen additional educational program	
	Name of professional standard: 1. Business analytics and IT project management 2. Development of big data processing and storage systems 3. Development of artificial intelligence applications	
13	Form of study	full-time
14	Languages of instruction	English

15	Volume loans	240
16	Awarded Academic Degree	Bachelor of Information and Communication Technology in the educational program 6B06103 «Big data analytics»
17	Name of professional standard	1. Business analytics and IT project management 2. Development of big data processing and storage systems 3. Development of artificial intelligence applications
18	Developer(s) And authors:	JSC «International University of Information Technologies», Department of information systems: Naizabayeva L.K. - d.t.s, professor, Shontayeva A.O, - master, lecturer Abdurakhimova A.A, - master, lecturer

4.2 Matrix of correlating the learning outcomes of the educational program as a whole with the competencies being formed

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

4.3 Information about modules / disciplines (if there are modules, it is necessary to highlight)

№	Name of the discipline	Brief description of the discipline (30-50 words)	Number of credits	Formed competencies (codes)	Prerequisites
		Cycle general educational disciplinesRequired component			
1.	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 holistic study of historical events, phenomena, facts, processes is carried out, revealing historical patterns that took place on the territory of the Great Steppe in the twentieth century and up to the present day.	5	GC1	No
2.	Philosophy	The object of study of the course 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 cognition of the world, creating a system of cognition of the general principles and foundations of human life, about the essential characteristics of a person's attitude to nature, society and	5	GC1, GC2	History of Kazakhstan

		spiritual life, in all its main direction.			
3.	Foreignlanguage	The course includes an intensive English language learning program focused on grammar and conversational skills. The course includes topics reflecting the latest achievements in the field of information technology, and the terminology dictionary makes them directly relevant to the needs of students.	5	GC4	No
4.	Kazakh (Russian) language	The course occupies a special place in the system of training bachelors with engineering education. For students of a technical university, studying professional Kazakh/Russian languages is not only improving the skills and abilities acquired at school, but also a means of mastering a future specialty.	5	GC4	No
5.	Information and Communication Technologies	In the course, information and communication technologies are considered as modern methods and means of communication of people in ordinary and professional activities with the help of information technologies for the search, collection, storage, processing and dissemination of information.	5	GC5	No
6	Political science Sociology	The course is dedicated to general political knowledge for specialties in the field of ICT. It includes political self-awareness, improvement of one's political outlook and communicative competencies. The teaching of political knowledge is communicative, interactive, student-oriented, result-oriented and largely depends on the independent work of students. The course includes knowledge of sociological subject areas, research methods and directions. During the course, the main sociological theories and the most effective ways to gain in-depth knowledge about various aspects of our modern society will be discussed in detail. The special importance of this course for students is to develop the sociological imagination, to understand the basic concepts of sociology as a science.	4	GC1, GC2	No

7	Psychology Culturology	This course presents psychology issues in a broad educational and social context. The knowledge, skills and abilities acquired 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, social, in working with people - representatives of different social groups and age categories. The course is also designed to form bachelors' ideas about the factors complicating teaching at the present stage of society's development, about difficulties specific to this activity. The course will help to become the basis for the study of the entire complex of social sciences and humanities, as well as a supplement to general courses in history and philosophy. The course includes such topics as morphology, semiotics, anatomy of culture; culture of nomads of Kazakhstan, cultural heritage of Proto-Turks, medieval culture of Central Asia, formation of Kazakh culture, Kazakh culture in the context of globalization, cultural policy of Kazakhstan, etc.	4	GC2, GC3	No
8	Physicalculture	The course is devoted to the formation of physical culture of the individual and the ability of directed use of various means of physical culture to preserve and strengthen health.	4	GC1, GC3	No
9	Physicalculture	The course is devoted to the formation of physical culture of the individual and the ability of directed use of various means of physical culture to preserve and strengthen health.	4	GC1, GC3	No
Cycle of general education disciplines University component/Component of choice (Elective component)					
10	Additional educational programs	**Research methodology** - 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). **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.	5	BC2, BC3	

		3. Analyze the work of organizations using various research methods. **Basics of Financial Literacy** - The course «Basics of Financial Literacy» is aimed at gaining knowledge and skills in the field of personal finance management. As part of the course, students will learn how to use all kinds of financial tools in practice, protect and increase savings, plan a budget competently, gain practical skills in calculating and paying taxes, and correctly filling out tax reports, learn how to analyze financial information and navigate financial products to choose an adequate investment strategy. **Fundamentals safety of life activity and ecology -** 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. Also 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 ensure sustainable development. Various areas of practical application of ecology are also considered - natural resources and environmental pollution. **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. **Economic theory** - The purpose of the course is to study and explain the processes and phenomena of economic life, explain patterns and predict ways to use them.			
		Cycle of basic disciplines University component			
11	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,	3	BC1	Kazakh/Russian language

		forms practical skills and ability to independently compose, translate documents into Kazakh language.			
12	Professionally-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	BC1	Foreign language
13	Physics	The course covers topics such as: Kinematics; dynamics; circular motion and gravity; energy; momentum; simple harmonic oscillations; 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.	4	BC3, BC6	No
14	Algebra and Geometry	The course includes: Matrix theory, systems of linear equations, vector theory, analytical geometry, limits and differentiation of functions of one variable.	4	BC6	No
15	Probability theory and mathematical statistics	The course is devoted to the probability and statistics of any events, as well as the relationship between mathematics and programming, operating systems within the framework of an interdisciplinary training program covering the section of mathematical analysis, modern statistical methods and economic theory.	6	BC6, PC5	Algebra and Geometry
16	Mathematical analysis	Target course acquaint students With important industries calculus And his applications V computer sciences. In time educational process, students should familiarize themselves with and be able to apply mathematical methods And tools For solutions variousapplied tasks. More Togo, They study fundamental methods research endlessly small variables With helpanalysis, basis whom is theory differential And integral computing.	6	BK6, PC5	Algebra and geometry
17	IT-product management	This course provides students with a comprehensive overview of the principles, processes, and practices of software product management. Students learn methods for planning, organizing, scheduling and controlling software projects. Students will gain practical IT product management skills and skills related to defining a software project, establishing project communications, project change management, and managing distributed teams and software projects. .	4	BC2 BC5 PC3	No

18	IT-infrastructure	This course focuses on information technology infrastructure in a business environment, including inter-network data exchange and distributed data processing. The 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 technology, network configuration and management methods.	5	BC5, BC6, PC1	Computer networks, Information security and information protection
19	Enterprise architecture	The course assumes a controlled set of techniques describing the information model of the enterprise and including: Databases and data warehouses; information flows (both within the organization and communication with the outside world).	5	BC5, BC6, PC1	No
20	Introduction to Programming	The course is designed to study algorithms and develop programs for solving various tasks. For this purpose, the program structure, the principles of constructing algorithms and programs, methods of solving problems, algorithmization, debugging programs and implementing programs using the C ++ language are considered.	5	BC4	No
21	Discrete mathematics	Discrete mathematics is part mathematics devoted to the study of discrete objects (here discrete means, consisting from individual or Not related between yourself elements). IN more general sense discrete mathematics used any once, when are counted objects, When are being studiedrelationship between final (or counting) sets And When analyzed processes, including final number steps. Basic reason for the growing importance of discrete mathematicsis That, what information stored and processed computing machines in a discrete way.	6	BC6	No
22	English for STEM	Well designed, to help students develop their knowledge English language For their current and future academic research. Raise level grammatical accuracy And development of listening , reading, writing and colloquial speeches V format IELTS.	4	OK4,BC1	English language
23	Educational practice	The practice includes detailing the finishing blocks of the generalized scheme, identifying the necessary classes and methods, defining sets of logically interconnected data (data streams), introducing various additional tools to ensure visibility and increase the level of service of the designed program, developing a generalized algorithm scheme, developing and debugging a program implementing the designed model computer systems With points vision programmer on assembler, computer architect And developer logic. Well contains details of the components required for understanding concepts machine computing.	2	BC4	Introduction to Programming

Cycle of basic disciplines Component By choice					
24	Computer networks (Cisco)	Well explores network communications from local networks (LAN) before global networks Internet. Are being considered standard Problems and row decisions For each from them With a special focus on the TCP/IP protocol suite. In addition, it will prepare students for real operations By informational security. Knowledge fundamentals work With networks refresh students attention To problems With which faces contemporary infrastructure.	5	BC3	Physics
25	Web Basics - development	The well basics development web sites With help html, Cascading style Sheets (css) JavaScript And jquery .	6	BC8	No
26	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	BC6	Introduction to Programming
27	Information security and information protection	The course is centered around the main topic of security, which introduces students to the main security topics that arise during the design, analysis and implementation of network and distributed systems. Supporting topics allow students to explore broader areas in which they can apply their newly acquired skills.	5	BC7	Information and communication technologies
28	WEB programming	The course continues web development using PHP, JavaScript and other web technologies when programming information web systems. The course introduces advanced web design techniques. Topics include customer expectations, advanced markup language, multimedia technologies, practicality and accessibility, as well as methods for evaluating web design.	6	BC8	Basics of Web development
29	Legal aspects of ICT	This course introduces students to the methodology of reading legal texts: from articles to contracts, constitutions, legislation and cases in the field of information technology. It also provides an overview of the structure and hierarchical form of most domestic legal systems and their relationship to international law and organizations. The course covers the basic methods of legal research, writing and analysis. Issues of copyright and legal support of intellectual property.	3	GC3	No
30	Operating systems	This course will provide an introduction to the design and implementation of an operating system. The course will begin with a brief historical overview of the development of operating systems over the past fifty years, and then cover the main components of most operating systems. This discussion will cover the trade-offs that can be made between performance and functionality during the design and implementation of an operating	5	BC7	Information and communication technologies

		system. Special attention will be paid to three main OS subsystems: process management (processes, threads, CPU scheduling, synchronization and deadlocks), memory management (segmentation, pagination, paging), file systems and operating system support for distributed systems. Bash language proficiency, network management, network security.			
31	Human-computer interaction	This course combines a component that teaches programming of interactive user interfaces with a component that teaches methods to improve the usability of these interfaces. The course proceeds from the fact that the usability of the interface is important for successful software design, and not just as "packaging" or aesthetics.	5	BC7, BC8	Information and communication technologies
Cycle of profile disciplines University component/Component of choice (Elective component)					
32	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. Study of the information support of the selected task (complex of tasks or subsystem). Study of the mathematical support of the selected task (complex of tasks or subsystem). Study of the software of the selected task (complex of tasks or subsystem). 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.	6	BC5, BC8	No
33	Undergraduate 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 using a PC, modern software and modern office equipment; studying and analyzing the real situation in the statics and dynamics of CAD in the short and long term in relation to the enterprise – the basis of practical training; evaluation of 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 solutions at specific enterprises; collecting material for graduation projects.	5	BC5, BC8	No

34	Fundamentals of information systems	This course is devoted to the full life cycle of information systems development, starting from the description of the idea, the development of specifications of the terms of reference, modeling, development, testing, debugging software, calculating the feasibility study of the cost of developing an information system, ending with a presentation for the customer. The course also covers theoretical and practical issues of building and functioning of IP, namely IP classification, UML modeling, ADO technology, criteria for evaluating IT projects, etc.	5	PC4	No
35	Data and information management	The objectives of mastering the discipline "Data and Information Management" are the formation of students' knowledge on the theoretical aspects of data management in information systems, as well as practical skills in organizing storage and targeted access to large amounts of data stored on external storage devices. In the course of 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	BC5, PC4	Object-oriented Programming
36	**Elective discipline 1.1 (Major)**		5	PC2	
37	Algorithms and data structures	Data structures and algorithms are tools that you must use with confidence when writing programs. Knowing these tools, you will see a lot of what you already know in the codebases that use them. In addition, such knowledge will allow you to solve complex problems with much greater confidence.	4		Introduction to programming
38	Introduction to Python and libraries for processing and data analysis (BDA - 1)	This course aims to teach one of the fastest growing and popular programming languages, Python. The foundation covers such important concepts as object-oriented programming, functional programming, event-driven programming (GUI applications). Python is freely available for many platforms (such as Unix , Windows , Linux , RiscOS , MAC, Sun) and programs written in it are generally portable between platforms without any modification. This makes it possible to apply to learn the language of any available hardware platform.	5		Object Oriented programmingi ng
39	Multimedia technologies (GD-1)	"The main purpose of studying the discipline is to form students' scientific ideas about the essence and function of modern multimedia systems and technologies, their place and role in the system of information systems and technologies, mastering practical skills in the effective use of multimedia technologies in solving real practical problems, forming students' ability to formalize working results in the form of	5	PC6	Object-oriented Programming

		presentations, scientific and technical reports, articles and reports at scientific and technical conferences, as well as providing general training (basic knowledge) for solving practical problems in the field of information systems and technologies."			
40	Cloud Fundamentals (CLD-1)	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, core AWS services, security, architecture, pricing, and support..	5	PC4	Mathematics, ICT, Introduction to Programming
41	**Elective course - 1.3 (Major)**		5	PC2	
44	Big Data ingestion /Storage (BDA-2)	The course includes the study of data extraction technology and types of data extraction; Extract structured and semi/unstructured data. As well as storing various types of data (HDFS, NoSQL (key-value , document oriented , column base)	5	PC4	Databases in IS
45	Innovation management (BA-4)	The content of the discipline covers a range of issues related to the concept of the innovation process, the study of components, including innovation management, identification of factors for achieving success in innovation, factors for managing uncertainty, various forms of intellectual property protection, understanding of a patent, components of a patent, various ways of managing innovation like alliances, open innovation.	5	BC5	Design Templates (ISD-1)
46	Architecture and development of cloud solutions (CLD-2)	The purpose of the course is to study the main topics/modules that will be covered in the course: 1) AWS Academy Cloud Architecting 2)Introduction to Cloud architecture 3) Adding a storage layer Adding a computational layer Adding a Database layer Creating a network environment Connecting networks User and application access protection	5	PC1- PC6	Basics of cloud technologies (CLD- 1)
48	**Elective discipline - 1.3 (Major)**		5	PC4	
49	Big Data Processing (BDA-3)	The course includes: Data processing methods; Real - time / Batch Processing ; Working with raw data. Data cleaning. Various data formats, conversion and aggregation. Miscellaneous Methods conversion via Python as well as via ETL tools (Pentaho)	6	PC4	Big Data Collection and Storage (BDA-2)
51	**Elective discipline -1.4 (Major)**		5	PC4	
52	Data Modeling (BDA -4)	The course content includes topics such as: Data Modeling: Linear Regression, Logistic Regression, Decision Tree. Model validation methods. Model validation . Practical part: Python or through a tool (Knime , SAP).	6	PC6	Big Data Collection and Storage (BDA-2)

53	System analysis and design(ISB-1)	The course allows you to gain knowledge of the basic principles and approaches of system analysis and design, allowing you to explore complex information systems; the ability to apply the acquired knowledge for the system analysis of business processes; possession of methods for applying modern tools for system analysis and design of business processes.	5	PC4	IP project management
	Data analytics	Data Analytics is a discipline that trains students to use basic tools for analyzing and interpreting data. It includes learning the basics of Excel and Python for data analysis. The discipline will cover analytical thinking, business problems, and data science. Students will learn the basics of Excel and learn how to use the tool to analyze and visualize data. In addition, an introduction to Python and its use for data analysis will be provided. Students will learn to use Python to process and analyze large amounts of data, as well as write scripts to automate tasks.	6	PC1	no

5. Curriculum of the educational program

Module code	Module name	The cycle of discipline	Discipline Component	Discipline Code	Name of the discipline	Academic credits	academic period	Control by academic periods		Number of hours								Distribution of credits by academic periods					
								Exams	Coursework / project	Total	Лекции	Лабораторные	Практические	Студийные занятия	Практика	СРОП	СРО	1	2	3	4	5	6
																		Weeks in academic period					
																		15	15	15	15	15	15
General modules																							
Specialty/educational program modules																							
Additional modules outside the qualification																							
Optional modules																							
		GED	GC	LAN6001A	Foreign language	5	1	1		5/150			45			15	90	5.0					
		GED	GC	LAN6001KR	Kazakh (Russian) language	5	1	1		5/150			45			15	90	5.0					
		GED	GC	ICT6001	Information and Communication Technologies	5	1	1		5/120	15	30.0				15	90	5.0					
		GED	GC	PhC6005	Physical Culture	4	1	1		4/120			45			15	60	4.0					
		GED	GC	LAN6002A	Foreign language	5	2	2		5/150			45			15	90		5.0				
		GED	GC	LAN6002KR	Kazakh (Russian) language	5	2	2		5/150			45			15	90		5.0				
		GED	GC	SPS6003	Political science-Sociology	4	1	1		4/120	15		30			15	60	4.0					

8		GED	GC	PhC6006	Physical Culture	4	3	3		4/120			45			15	60			4.0			
9		GED	GC	SPS6005	Psychology-Culturology	4	2	2		4/120	15		30			15	60			4.0			
0		GED	GC	HK6002	History of Kazakhstan	5	2	2		5/150	15		30			15	90			5.0			
1		GED	GC	SPS6001	Philosophy	5	4	4		5/150	15		30			15	90				5.0		
2		GED	UK	FIN6720	Basics of Financial Literacy	5	6	6		5/150	15		30			15	90						5.0
				RM6502	Economic theory																		
				JUR 6507	Fundamentals of law and anti-corruption culture																		
				JUR 6470	Fundamentals safety of life activity and ecology																		
				MGT6706	Research metodology																		
				ECO6006	Startups and entrepreneurship																		
3		BD	BC	MAT6001	Algebra and geometry	4	1	1		4/120	15		30			15	60	4.0					
4		BD	BC	SFT6001	Introduction to programming	5	1	1		5/150	15	30.0				15	90	5.0					
5		BD	BC	PHY6001	Physics	4	1	1		4/120	15	30.0				15	60	4.0					
6		BD	BC	MAT6002	Mathematical analysis	6	2	2		6/180	30		30			15	105		6.0				
7		BD	BC	PP6101	Educational practice	2	2			2/60					60	0	0		2.0				
8		BD	BC	MAT6003	Discrete Math	6	3	3		6/180	30		30			15	105			6.0			
9		BD	BC	LAN6002DA	English for STEM	4	3	3		4/120			45			15	60			4.0			

20		BD	BC	LAN6007K	Office work in the state language	3	1	1		3/90			30			15	45	3.0					
21		BD	BC	LAN6003PA	Professionally oriented foreign language	3	3	3		3/90			30			15	45			3.0			
22		BD	BC	MAT6004	Theory of Probability and Mathematical Statistics	6	2	2		6/180	30		30			15	105		6.0				
23		BD	BC	SFT6108	IT product management	4	4	4		4/120	15	30.0				15	60				4.0		
24		BD	BC	SFT6104	IT infrastructure	5	5	5		5/120	15	30.0				15	90					5.0	
25		BD	BC	SFT6109	Enterprise architecture	5	4	4		5/150	15	30.0				15	90				4.0		
26		BD	CCh	SFT6002	Object Oriented Programming	5	3	3		5/150	15	30.0				15	90			5.0			
27		BD	CCh	SFT6101	Fundamentals of Web Development	6	3	3		6/180	30	30.0				15	105			6.0			
28		BD	CCh	SEC6101	Information security and information protection	5	3	3		5/150	15	30.0				15	90				5.0		
29		BD	CCh	NET6101	Computer networks (Cisco)	5	4	4		5/150	15	30.0				15	60					5.0	
30		BD	CCh	SFT6003	OS	5	3	3		5/150	15	30.0				15	90			5.0			
31		BD	CCh	SFT6110	WEB programming	6	5	5		6/180	30	30.0				15	105					6.0	
32		BD	CCh	SFT6107	Human-computer interaction	5	4	4		5/150	15	30.0				15	90				5.0		
33		БД	КВ	IS6123	System analysis and design(ISB-1)	5	5	5		5/150	15		30			15	90					5.0	
34		PD	BC	SFT6103	Data and information management	6	4	4		6/180	30	30.0				15	105				6.0		

35		BD	CCh	LAW6003	Legal aspects of ICT	3	6	6		3/90	15		15			15	45						3.0
36		PD	BC	PP6102	Internship	6	4			6/120					180	0	0				6.0		
37		PD	BC	SFT6102	Fundamentals of information systems	5	3	3		5/150	15	30.0				15	90			5.0			
38		PD	BC	PP6104	Undergraduate practice	5	6			5/150					150	0	0					5.0	
39		PD	CCh	IS6124	Algorithms and data structures	4	2	2		4/120	15	30.0				15	60		4.0				
40		PD	CCh	SFT6132	Introduction to Python and Data Science Libraries (BDA-1)	5	4	4		5/150	15	30.0				15	90				5.0		
41		ПД	КВ	SFT6115	Multimedia technologies (GD-1)	5	5	5		5/150	15	30.0				15	90					5.0	
42		PD	CCh	IS6101	Cloud Fundamentals (CLD-1)	5	5	5		5/150	15	30.0				15	90					5.0	
43		PD	CCh	SFT6134	Big Data Collection and Storage (BDA-2)	5	5	5		5/150	15	30.0				15	90					5.0	
44		ПД	КВ	SFT6140	Innovation management (BA-4)	5	5	5		5/150	15	30.0				15	90					5.0	
45		PD	CCh	IS6105	Architecture and Development of Cloud Solutions (CLD-2)	5	5	5		5/150	15	30.0				15	90					5.0	
46		PD	CCh	SFT6135	Big Data Processing (BDA-3)	6	6	6		6/180	30	30.0				15	105						6.0
47		PD	CCh	SFT6159	Data modeling (BDA-4)	6	6	6		6/180	30	30.0				15	105					6.0	
48		ПД	КВ	SFT6185	Data analitics	6	6	6		6/180	30	30.0				15	105					6.0	
		Average weekly load in hours																0	0	0	0	0	0
1		**General education disciplines (GED)**				56		12	56	1680	90	30	420	0	0	180	960	23	23	0	5	0	5
		Required component (GED/RC)				51		11	51	1530	75	30	390	0	0	165	870	23	23	0	5	0	0
		University component (GED/UK)				5		1	5	150	15	0	30	0	0	15	90	0	0	0	0	0	5
		Component of choice (GED/CCh)				0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2		**Basic disciplines (BD)**				102		21	102	3000	345	360	270	0	60	315	1710	16	14	34	19	16	3
		Required component (BD/RC)				0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

		University component (BD/UC)	57		12	57	1650	180	150	225	0	60	180	915	16	14	13	9	5	0
		Component of choice (BD/CCh)	45		9	45	1350	165	210	45	0	0	135	795	0	0	21	10	11	3
3		Profiling disciplines (PD)	74		12	74	1890	240	360	0	0	330	180	1110	0	4	5	17	25	23
		Required component (PD/RC)	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		University component (PD/UC)	16		1	16	150	15	30	0	0	330	15	90	0	0	5	6	0	5
		Selectable component (PD/CV)	58		11	58	1740	225	330	0	0	0	165	1020	0	4	0	11	25	18
4		**Disciplines for the formation of professional competencies (BDFPK)**	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Required Component(BDFPK/OK)	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		University component (BDFPK / VK)	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Optional Component(BDFPK/CV)	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5		**Disciplines of personal development and formation of leadership qualities (BDLR)**	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Required Component(BDLR/OK)	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		University component (BDLR / VK)	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Optional Component(BDLR/CV)	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Total Curriculum	232			0	6570	675	750	690	0	390	675	3780	39	41	39	41	41	31

Additional types of training	**Number of credits**	**Term**	**Number of hours**	**Number of weeks**
Модуль итоговой аттестации (MFA)	**8**		**240.0**	
Total with uch . IGA	**240**		**7200.0**	

6 Approval sheet with developers

Name of the educational program: 6B06103 «Big Data Analytics»

No. p/p	Position, academic or academic degree and Surname of the acting developer of the educational program	Date	Painting	note
1	Naizabayeva L.K. - d.t.s, professor, head of the department IS			
2	Shontayeva A.O - master, lecturer			
3	Abdurakhimova A.O - lecturer , master			