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APPROVED
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JSC «International Information Technology
University»

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«30» 03 2023

EDUCATIONAL PROGRAM

6B06101 "Computer Science"

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

Code and classification of study area: 6B061 - Information and communication technologies

Group of educational programs: 057 – Information technologies

Level according to ISCE: 6

Level according to NQF: 6

Level according to SQF: 6

Duration of study: 4 years

Credits: 240

Almaty, 2023

Content

List of abbreviations and notations

CD	Cycle of core disciplines
CC	Core competency
BM	Basic module
UC	University component
HE	Higher education
NMS	National Mandatory Standards of Higher and Post-Graduate Education
ATT	Additional types of training
EQF	European qualifications framework
EFE	European foundation for education
KSA	Knowledge, Skills and Abilities
FA	Final attestation
OC	Optional component
ISCED	International Standard Classification of Education
NQF	National qualifications framework
NQS	National qualifications system
GHM	General humanitarian module
RC	Required component
GEM	General education module
GED	Cycle of general education disciplines
AP	Academic program
GPM	General professional module
SQF	Sectoral qualifications framework
GEC	General education competence
M	Cycle of majors
PI	Professional internship
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

Computer science is a scientific field that studies the laws, methods and methods of obtaining, storing, transmitting and processing information in various fields of human activity using computer technology and telecommunications systems.

Training of a specialist in this experimental program involves the formation of certain professional competencies, including knowledge and skills in the design and evaluation of algorithms and application software interfaces; development and analysis of interacting processes in information environments; development, operation and maintenance of software systems for computers, computer networks and communication tools; identification of new areas of application of computer systems and design of software for them, etc.

Graduate training in the experimental program "Computer science" provides a professional qualification:

- Software development specialist
- Information technology specialist for telecommunications systems
- Specialist in computer design and Web application development
- Specialist in mobile app development and promotion
- Specialist in processing, analyzing and storing large data sets, so-called "BigData" (DataScientist)
- Machine learning specialist

The objects of professional activity are mathematical and software of computers, computer networks and communication tools, mathematical models of processes and systems.

Our approach involves both covering the basic skills of the EP "Computer science", and through the possibility of elective subjects covering the necessary elements of training in the direction of "Computer science".

At the same time, the student is left with the option of taking additional subjects at his discretion as free electives - these can be subjects from any specialty.

Meetings conducted by the marketing service of IITU and analysis of surveys conducted among graduates of NIS, physics and mathematics schools showed that about 15 percent of graduates seriously think about professions related to applied computer science.

2. Purpose and objectives of the educational program

The purpose of the educational program is aimed at training of specialists of higher qualification without a category, specialists of higher qualification of the second category, specialists of higher qualification of the first category. To achieve this goal, it is necessary to perform a number of tasks, including the purposeful formation of a contingent of students, specialized theoretical and practical training of students in the learning process focused on the modern needs of the employer

3. Requirements for evaluating the learning outcomes of an educational program

Training of a specialist in this specialty involves the formation of certain professional competencies, including knowledge and skills in the design and evaluation of algorithms and application software interfaces; development and analysis of interacting processes in information environments; development, operation and maintenance of software systems for computers, computer networks and communication tools; identification of new areas of application of computer systems and design of software for them.

The following forms of exams are used as an assessment of learning results: computer testing, written exam (answers on sheets), oral exam, project (passing a course project), practical (open

questions on a computer, solving problems on a computer, including in ACM format), complex (test/written/oral+others). According to table 1 the following ratio of exam forms is recommended:

Table 1

№	Examination form	Recommended percentage, %
1	Computer testing	20%
2	Written	10%
3	Oral	5%
4	Project	30%
5	Practical	30%
6	Complex	5%

The final certification ends with the defense of the diploma project.

4. Passport of the educational program

4.1 General information

№	Field name	Remark
1	Code and classification of the field of education	6B06-Information and communication technologies
2	Code and classification of training areas	6B061-Information and communication technologies
3	Group of educational programs	057-Information technology
4	Name of the educational program	6B06101 " Computer science»
5	Brief description of the educational program	Computer science is a scientific field that studies the laws, methods and methods of obtaining, storing, transmitting and processing information in various fields of human activity using computer technology and telecommunications systems. Training of a specialist in this experimental program involves the formation of certain professional competencies, including knowledge and skills in the design and evaluation of algorithms and application software interfaces; development and analysis of interacting processes in information environments; development, operation and maintenance of software systems for computers, computer networks and communication tools; identification of new areas of application of computer systems and design of software for them, etc.
6	Objective of the EP	Education of competent it professionals who are able to solve a wide range of application tasks, such as building web services, data analysis and machine learning tasks, managing software projects and their development processes.
7	Level according to ISCE	6
8	Level according to NQF	6
9	Level according to SQF	6
10	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; the basics of the legal system and legislation of Kazakhstan; trends in social development of society; the basics of physical culture and the principles of a healthy lifestyle. GC2: Have an idea: about ethical and spiritual values; about sociological approaches to the individual, the main laws and forms of regulation of social behavior; about the essence of power and political life, political relations and processes, the role of political systems in the life of society and various social groups; about the role of consciousness and self-awareness in the behavior, communication and activities of people, the formation and formation of personality. GC3: Possess: ethical and legal norms of behavior; a system of practical knowledge and skills that ensure the acquisition, development, improvement and activation of psychophysical abilities and qualities, the acquisition, preservation and promotion of	

	health, the ability to work in a team, correctly defend their point of view, offer new solutions. GC4: Ability to write and communicate verbally in the state language and the language of international communication; ability to logically correctly, argumentatively and clearly build oral and written speech; readiness to use one of the foreign languages GC5: Ability to use modern information technologies, manage information using business applications; use network computer technologies, databases and application packages in their subject area. BC1: Ability to actually use the state language, the language of international communication and a foreign language in professional activities. BC2: Ability to understand the basics of economic knowledge, scientific ideas about Finance, Economics. BC3: The ability to professionally operate modern equipment, devices, network components, computer systems (in accordance with the program goals), as well as to use safety rules, industrial sanitation, fire safety and labor protection standards. BC4: Ability to have skills in using algorithms and programs for calculating business process parameters. BC5: The ability to use the main provisions and methods for solving management tasks, the ability to perform project documentation in a computer graphics software environment for various types of projects. BC6: The ability to be competent in the choice of mathematical modeling methods for solving specific engineering problems, including the readiness to identify the natural science essence of problems that arise in the course of professional activity, and the ability to attract the appropriate physical and mathematical apparatus for its solution. BC7: Ability to design architectures of information system components, including the human-machine interface of hardware and software complexes, to choose operating systems and methods of information protection. BC8: Ability to develop information and software for an information system based on modern development methods and tools. PC1: Ability to carry out a description of applied processes and information support for solving applied problems; PC2: Ability to manage the lifecycle stages of the methodological and technological infrastructure for big data analysis in an organization; PC3: Ability to participate in the management of information system development projects at the stages of the life cycle; PC4: Ability to use modern programming environments for database design and implementation. PC5: Ability to analyze the market of software and hardware, information products and services for creating and modifying information systems. PC6: Ability to develop, implement and adapt application software. PC7: The ability to apply the acquired knowledge in the selected additional educational program
11	Learning outcomes of the educational program: LO1: Explain the choice of basic standards, principles, and design patterns, methods, tools, and programming languages, including methods and tools for building information security systems. ICT LO2: Apply mathematical models and methods of various processes LO3: Design database, software, and information system architec LO4: Design and develop ergonomic user interfaces LO5: Analyze the market for software and hardware, information products and services for creating and modifying information systems LO6: Demonstrate sociability, initiative and psychological readiness for work, including

	when working in a team, and make managerial and technical decisions LO7: Use methods for studying large data sets LO8: Installation of information system software and database loading LO8: Apply research methodologies in data science LO9: Participation in the management of technical support of an information system during its operation LO10: Conduct a comprehensive analysis and analytical synthesis of research results using modern science and technology, skills of independent data collection, study, analysis and generalization. LO11: Able to apply the acquired knowledge according to the selected additional educational program. LO12: Demonstrate the ability to conduct interdisciplinary scientific research using basic knowledge from the fields of economics and law, ecology and life safety. The ability to apply entrepreneurial qualities to the tasks of calculating the profitability of scientific projects. The ability to build personal and interpersonal relationships in compliance with an anti-corruption culture.	
12	Form of training	Full-time
13	Language of instruction	English
14	Volume of credits	240
15	Academic degree awarded	Bachelor in Information and Communication technologies in the educational program «6B06101-Computer science»
16	Developer (s) and authors:	JSC «International IT University», Department of MCM: - Omarov B.S. - Ydyrys A.Zh. - Satybaldina A.N. - Olzhayev O.M.

4.2. Matrix of correlation of learning outcomes of the educational program with the formed competencies

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
БК1	V					V						
БК2						V						V
БК3	V		V	V								
БК4		V	V		V							
БК5			V	V								
БК6		V			V							
БК7	V							V				
БК8	V		V	V								
ПК1							V	V	V			
ПК2		V		V			V	V				
ПК3					V	V				V		
ПК4			V						V	V		
ПК5					V				V	V		
ПК6			V	V				V				
ПК7											V	

4.3. Information about disciplines

№	Name of discipline	Short description of the discipline (30-50 words)	Number of credits	Formed competencies (codes)	Prerequisites	Post-requisites
Cycle of General subjects (CGS) Required component (RC)						
1.	History of Kazakhstan	This course consists of teaching the modern history of the country to understand the role and significance of the events in the historical context.	5	GC1	-	-
2.	Philosophy	This course consists of teaching philosophy to form a conscious attitude to the environment.	5	GC3	-	-
3.	Foreign language	This course consists of learning a foreign language for the formation of communication skills in a foreign language.	10	GC4	-	
4.	Kazakh (Russian) language	This Russian/Kazakh language course consists of teaching Kazakh / Russian language for the formation of communication skills in the state and Russian languages.	10	GC4	-	-
5.	Information and communication technologies	The course provides an overview in various ICT fields, allowing students to gain basic knowledge on the application of modern ICT in their scientific and practical work, for self-study and other purposes.	5	GC5 BC3	-	-
6.	Political science	The course provides students with knowledge about the political sphere of society, the relationship and mutual influence of politics and management	2	GC1 GC2 GC3	-	-
7.	Sociology	This course consists of teaching sociology to understand society and social development.	2	GC2 GC3	-	-
8.	Psychology	The course introduces various concepts, basic concepts, laws of management psychology	2	GC3	-	-
9.	Culturology	The course forms the necessary knowledge of cultural studies, develops an understanding of the uniqueness of cultures	2	GC1	-	-
10.	Physical culture	The course provides a solution to the main problems of physical education of students, provides for the delivery of control exercises and standards.	2	GC1 GC3	-	-
Cycle of General subjects (CGS) The university component (UC) and (or) the Component of choice (CC)						
11.	Elective course #1 (CGS)		5			
	Economic theory	The course provides an overview of the principles and patterns of economic relations.		BC2		
	Startups and entrepreneurship	The course is designed to help students develop IT competencies, entrepreneurial skills, Teamwork, Business Skills and Softskills.		GC3		
	Fundamentals of law and anti-	During the course, students will get acquainted with such concepts as anti-		GC1 GC3		

	corruption culture	corruption consciousness and anti-corruption culture, acquire knowledge about corruption as a phenomenon of modern reality and its historical roots. The discipline forms the acquisition of skills to work with legislation in the field of anti-corruption, and develops a civic attitude to this phenomenon.				
	Fundamentals safety of life activity and ecology	This discipline is a higher school that studies ways of safe human interaction with the environment (industrial, household, urban, natural), the 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.		GC3		
	Research metodology	The course is devoted to the study of activities aimed at developing students' ability to make independent theoretical and practical judgments and conclusions, the ability to objectively evaluate scientific information, freedom of scientific search and the desire to apply scientific knowledge in educational activities, including for the completion of a thesis project (work).		GC3 BC5		
		Cycle of basic disciplines University component				
12.	Discrete mathematics	Discrete mathematics is a part of mathematics devoted to the study of discrete objects (here discrete means consisting of separate or unrelated elements). In a more General sense, discrete mathematics is used whenever objects are counted, when relationships between finite (or countable) sets are studied, and when processes involving a finite number of steps are analyzed. The main reason for the growing importance of discrete mathematics is that information is stored and processed by computers in a discrete way	6	BC6	-	
13.	Mathematical analysis	The aim of the course is to introduce students to the important branches of calculus and its applications in computer science. During the educational process, students should learn and be able to apply mathematical methods and tools to solve various applied problems. Moreover, they study fundamental methods of studying infinitesimal variables by means of analysis, which is based on the theory of differential and integral calculations.	6	BC6	-	
14.	Algebra and geometry	The course includes: matrix Theory, systems of linear equations, vector theory, analytical geometry, limit and differentiation of functions of one variable.	4	BC6	-	Operation research
15.	Physics	The course covers topics such as:	4	BC6		

		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; electric circuits; induction of magnetism and electromagnetism; geometric and physical optics; and quantum, atomic and nuclear physics and sound.				
16.	Teaching practice	The practice includes detailing the finishing blocks of a generalized scheme, identifying the necessary classes and methods, defining sets of logically interconnected data (data streams), introducing various additional tools to ensure clarity and increase the level of service of the designed program, developing a generalized algorithm scheme, developing and debugging a program implementing the designed model.	2	BC4 BC6 PC6		
17.	Object-oriented programming	The course includes: Encapsulation, inheritance, polymorphism. The creation of classes. Create useful client applets and stand-alone apps based on real-world requirements that students receive from real clients or employers.	7	BC8	Introduction to programming	Algorithms and data structures
18.	Introduction to Programming	The course is designed to form professional and general educational competencies of future specialists in the field of computer security through familiarization with the general principles of building and using programming languages, as well as developing skills in designing and implementing algorithms for solving practical problems in a software language, using assembly languages on modern computers.	6	BC8	-	Object-oriented programming
19.	Algorithms and data structures	The process of studying the discipline is aimed at the formation of the following competencies: - the ability to search, store, process and analyze information from various sources and databases, to present it in the required format using information, computer and network technologies; - proficiency in reading, understanding and highlighting the main idea of the read source code, documentation.	6	BC4, PC2, PC3, PC6	Object-oriented programming	Elective course
20.	WEB technology	The course includes the technology of designing the structure of the web-site as an information system; the technology of creating a web-site by means of programming on the client and server side; the technology of placement, support and maintenance of the web-site on the server.	5	PC2, PC3, PC4, PC6		WEB technology Advanced
21.	Database theory	The course explains what a database system is, and then proceeds to most of the training material for the study of relational database systems - databases	5	BC5, PC4		Programming in PL/SQL

		developed in accordance with the relational (or tabular) model. Then, from data abstraction, the course moves on to transaction management with additional materials to improve query performance. Finally, there are current trends in database system design, which also determine the latest developments in the broader history of data storage technologies.				
Cycle of basic disciplines Component of choice						
22.	Business correspondence in the state language	The course is dedicated to the activation and deepening of knowledge, skills and proficiency in the scientific style of speech of the Russian language, the formation of professional language competence.	2	BC1		
23.	Professionally oriented foriegn 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", "word Processing", "Cyberspace: security and crime" , etc.	4	BC1	-	
24.	Mathematical statistics for programmers	The course is devoted to the statistics of any events, as well as the relationship between mathematics and modeling, operating systems in the interdisciplinary training program, covering the section modern statistical methods and economic theory.	5	BC6, PC5	Discrete mathematics	Elective course
25.	Programming in PL/SQL	The course includes -familiarity with the basic technologies of building modern databases and databases; -familiarity with the technologies of distributed and parallel databases; -acquisition of skills with databases and data warehouses; -familiarity with OLAP-technologies; -acquisition of skills to create applications in the architecture of "client-server"; -acquisition of skills of using procedural language PL/SQL to create applications that manipulate data on the server side of the database.	5	BC4, PC2, PC3, PC4	Database theory	
26.	Computational mathematics	The course includes: Fundamentals of error theory, Systems of linear algebraic equations, Nonlinear equations and systems of nonlinear equations, Interpolation and best approximations, Differentiation and integration of functions, Ordinary differential equations, Equations of mathematical physics.	5	BC4 BC6	Algebra and geometry	Numerical methods of analysis and algebra
27.	WEB technology Advanced	The course includes methods of designing a web site as a static information system; methods of designing a web site as a dynamic information system; the theory of using graphics on web pages; methods of	5	PC2, PC3, PC4, PC6	WEB technology	

		processing and editing digital images; client side software used to create web pages; server side software used to create web pages; software for creating databases; software for creating a virtual server; basic principles of configuration of a real web server; software used to host and maintain web-pages; methods of optimization of the web-site for promotion on the Internet.				
28.	Operation research	The objectives are to master the basic concepts and methods of economic systems research; to study the current state and main directions of development of mathematical models of economic systems at various levels; to acquire the skills necessary for independent work on the design and implementation of economic analysis models and modeling algorithms; to develop a systematic type of thinking.	5	PC3 PC4	Algebra and geometry, Introduction to programming	
29.	Data analysis and visualization in Power BI	An analyst is a specialist engaged in the study and modeling of a specific field. Power BI is an analytics system that combines data from various information sources, transforms them, and presents them in a visual form convenient for analysis. BI technologies allow processing large unstructured amounts of data for decision-making. Power BI is a suite of Microsoft software services that work together to transform unrelated company data sources into holistic interactive reports. In this case, the source can be databases, Excel files, data from cloud sources and the Internet, text files, and so on. This tool helps you monitor the situation and get immediate answers to questions using detailed dashboards available on each device.	5	BC6 PC5	Design and administration in MS EXCEL	Exploratory data analysis
30.	Advanced database theory	The course provides knowledge about the procedural dialects of the SQL language and SQL stored components: views, rules, triggers, stored procedures and functions and learn how to create them, taking into account the differences in the definition and use of data stored components in various databases: PostgreSQL, MS SQL Server, Oracle SQL.	6	PC6 PC4	Database theory	
31.	Algorithmic aspects of machine learning	The course focuses on specific learning algorithms and families of classifiers, as well as theoretical issues of learning, the study of algorithmic approaches to learning, the selection of families of decision rules adequate to the task and mathematical features of the description of initial information.	6	PC5	Programming in Python, Algorithms and data	

					structures	
Cycle of major disciplines University component						
32.	Industrial practice	The practice includes the study of the organizational structure and the complex of technical means of the information and analytical center (IAC) of the organization. Identification of the main tasks solved by the IAC. The study of the information support of the selected task (a set of tasks or a subsystem). The study of the mathematical support of the selected task (a set of tasks or a subsystem). The study of the software of the selected task (a set of tasks or a subsystem). The study of the organizational and legal support of the selected task (a set of tasks or a subsystem). systematization and analysis of factual materials necessary for writing a term paper, a scientific report and an internship report.	4	BC5, BC8	-	-
33.	Professional Internship	The practice includes the study of the organizational structure and the complex of technical means of the information and analytical center (IAC) of the organization. Identification of the main tasks solved by the IAC. The study of the information support of the selected task (a set of tasks or a subsystem). The study of the mathematical support of the selected task (a set of tasks or a subsystem). The study of the software of the selected task (a set of tasks or a subsystem). The study of the organizational and legal support of the selected task (a set of tasks or a subsystem). systematization and analysis of factual materials necessary for writing a term paper, a scientific report and an internship report.	4	BC5, BC8	-	-
34.	Pregraduation practice	The practice includes the consolidation of theoretical knowledge in the academic disciplines of the specialty; mastering practical skills, technology of work in the specialty directly at the workplace using a PC, modern software and modern office equipment; studying and analyzing the real situation in the static and dynamics of CAD in the short and long term in relation to the enterprise – based internship; evaluating the commercial results achieved implementation of automation in the short and long term, in relation to these specific enterprises; familiarization with CAD development techniques and technology, procedures for making and implementing	5	BC5, BC8	-	-

		automation decisions at specific enterprises; collecting material for graduation projects.				
Cycle of major disciplines Component of choice						
35.	Algorithm Design and Analysis	The aim of the course is to convey to students an approach to algorithms in the form of a design process that begins with tasks found across the entire range of computing applications, uses a good understanding of algorithm design methods and the end result of which is the development of effective solutions to such problems.	4	PC2, PC3, PC4, PC5	Introduction to programming	
36.	Numerical methods of analysis and algebra	Fundamentals of error theory, Systems of linear algebraic equations, Nonlinear equations and systems of nonlinear equations, Interpolation and best approximations, Differentiation and integration of functions, Ordinary differential equations, Equations of mathematical physics.	5	BC4, BC6	Discrete Mathematics	-
37.	Application development in ASP.NET	The course includes the development of Windows applications using a database on ADO.NET and LINQ	5	ПК2, ПК3, ПК4, ПК6	Introduction to programming	
38.	Programming in Python	The purpose of the course is to develop programming skills in Python. As a result of mastering the discipline, the student must: know the basic constructions and idioms of the Python programming language and be able to put together a simple program in practice to perform an analytical task. Have the skills to formalize and solve practical programming problems	4	BC6, PC1	-	Algorithmic aspects of machine learning
39.	Design and administration in MS EXCEL	This course will introduce you to Microsoft Excel as the most popular data processing software. It is designed for beginners to learn the basic functions of Excel. This course is mainly considered as a general overview of MS Excel and includes practical cases for the skills of honing and mastering the material.	5	PC5 PC4	ICT	Data analysis and visualization in Power BI
40.	Programming on Internet of Things (IOT)	The course examines both practical and theoretical aspects of building an IoT solution. After completing this course, students will be fully immersed in a world where devices are controlled by the devices themselves, but according to the logic laid down by man.	5	PC6	Programming in Python, OOP	
41.	Development of Web applications in Java Spring	The course introduces the Spring framework and the specifics of its interaction with other software platforms. Students will master the connection and configuration of Spring, the specifics of data access. They will analyze the stages of development and ways to improve projects step by step:	5	PC6	WEB technology	

		templating, internationalization, validation. They will study the technology of application protection using Spring Security. They will apply the acquired knowledge in the development of an online store.				
42.	Exploratory data analysis	Exploratory data analysis refers to the critical process of performing initial data studies in order to identify patterns, identify anomalies, test hypotheses, and verify assumptions using summary statistics and graphical representations.	5	PC5	Data analysis and visualization in Power BI	-
43.	Elective course #2		5			
	Amazon Web Services Foundations (AWS Foundations)	The course is designed for students who seek a common 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.		PC6	ICT	
	Parallel programming	The course is devoted to the study of the theory and methods of practical development of parallel programs for modern computer architectures. A special feature of the course is a comprehensive examination of the problems of parallelism, both at the level of libraries provided to application programmers, and at a level close to the architecture of microprocessors and graphics accelerators, which is more important for system programmers.		PC4	Introduction to programming	
	Human-computer interaction	This discipline deals with the design, evaluation and implementation of interactive computing systems for human use, as well as with the study of the main phenomena related to these issues. It is often considered as a combination of computer science, behaviorism, design, and other fields of research. The interaction between users and computers takes place at the level of the user interface (or just the interface), which includes software and hardware; for example, images or objects displayed on display screens, data received from the user through hardware input devices (such as keyboards and mice) and other user interactions with large automated systems such as an aircraft and a power plant.		PC5	ICT, Introduction to programming	
44.	Elective course #3		5			
	Development of mobile applications on Android	The course contains the following sections: Connection and use of third-party libraries; Data storage; Frameworks; Data exchange formats; Data mapping; Client-server interaction; Dynamic behavior of		PC6	Introduction to programming	

		interface objects; Application coverage with tests; Application security.				
	Development of mobile applications on iOS	The course contains the following sections: Connection and use of third-party libraries; Data storage; Frameworks; Data exchange formats; Data mapping; Client-server interaction; Dynamic behavior of interface objects; Application coverage with tests; Application security.		PC6	Introduction to programming	
45.	Minor 1	Students choose from a list of minors of other EP.	5	PC7		
46.	Minor 2		5	PC7		
47.	Minor 3		5	PC7		

4.4. List of modules and learning outcomes

Name of the educational program: «Computer science»
Qualification: bachelor in information and communication technologies in the educational program "6B06101-Computer science"

Module code / module Name	Labor intensity of the module in credits	Learning outcome	Criteria for evaluating learning outcomes	Disciplines that form the module Code / Name
GENERAL EDUCATION MODULES				
OOM01 of Sociology and ethics	5	**Has an understanding** of the principles and laws of historical development of society, the historical periodization of Kazakhstan's history and place the history of Kazakhstan in world history and the history of Eurasia **Able** to independently comprehensively and critically analyze historical and modern sources, draw conclusions, argue them.	Oral interview, testing, report, boundary control, term papers	History of Kazakhstan
	5	**Has an idea of the subject,** functions, main sections and directions of philosophy; the place and role of philosophy in the life of society and man; the main stages of development of world and Kazakh philosophical thought. **Able to** operate with special philosophical terminology and categorical and conceptual apparatus of philosophy; - creatively and critically work on original philosophical texts; - logically present their thoughts on the studied philosophical issues; - analyze the features of the Genesis and development of philosophical knowledge; - to form and argumentatively defend their own worldview.	Oral interview, testing, report, boundary control, term papers	Philosophy
	2	**Has an understanding of the subject,** functions, main sections and directions of sociology; consists in presenting key approaches in the sociology of organizations both at the level of theoretical concepts and models, and at the level of empirical research; in introducing students to the basic methods and techniques of research organizations **Able –** be able to navigate various sociological approaches to	Oral interview, testing, report, boundary control, term papers	Sociology

		the analysis of organizations and literature on each approach; - get skills in critical analysis of these approaches (understand their advantages and limitations); - get basic analytical skills of sociological research of organizations; - have an understanding of the key research methods of organizations and their limitations.		
	2	**Has an idea of the subject,** functions, main sections, must understand the basic concepts of politics and political science, the formation of the main political theories and concepts, to learn the contribution that various thinkers have made to the conceptual understanding of the most important problems of politics and society, the state and government **Able to** know the basics of scientific policy analysis at both theoretical and applied levels, the possibilities of political analysis and forecasting methods for making optimal management decisions. Apply theoretical knowledge in real political practice at the level of analysis, expertise, consulting, management;	Oral interview, testing, report, boundary control, term papers	Political science
	2	**Has an understanding of the subject,** functions, main sections and directions of psychology; the place and role of psychology in society and human life; **Formation of** fundamental knowledge, skills and competencies required in professional activities; formation of environmental, physical, ethical, legal and thinking culture; language training; formation of universal and socio-personal values;	Oral interview, testing, report, boundary control, term papers	Psychology
	2	**It has an idea of the subject** of logically completed elements of the content of the discipline, provides a basis for determining the course topics to be submitted for verification. Structuring the content of this discipline is also a prerequisite for the functioning of the rating system. In addition, such structuring helps the student to form a General idea of the development of world culture and systematize their knowledge. **Able to** give students an idea of the main problems of cultural theory;	Oral interview, testing, report, boundary control, term papers	Culturology

		identify objective patterns of world and national cultural processes; to find out the Genesis, functioning and development of culture as a specifically human way of life, which reveals itself historically as a process of cultural inheritance; consider the cultural aspects of various areas of public life; identify the features of cultural life in different regions of the world, historical epochs, cultural and historical types;		
OOM02 Language training	10	**Able to** characterize-basic reading rules; word-formation models; contextual meanings of polysemous words; terms and lexical constructions of the sublanguage corresponding to the profile of the studied specialty; the most frequent specific grammatical phenomena. **Understand** statements in a foreign language features of the compositional and semantic organization of a scientific text; basic techniques for extracting the main information of the microtext.	Oral interview, testing, report, boundary control, term papers	Foreign language
	10	**Identify** the language forms of expression of various types of information in a scientific text for solving problems of educational and professional communication; principles of writing texts of the main educational and scientific, scientific and professional genres.	Oral interview, testing, report, boundary control, term papers	Kazakh (Russian) language
	2	**Identify** the language forms of expression of various types of information in a scientific text for solving problems of educational and professional communication; principles of writing texts of the main educational and scientific, scientific and professional genres.	Oral interview, testing, report, boundary control, term papers	Business correspondence in the state language
	4	**Able to** characterize-basic reading rules; word-formation models; contextual meanings of polysemous words; terms and lexical constructions of the sublanguage corresponding to the profile of the studied specialty; the most frequent specific grammatical phenomena. **Understand** statements in a foreign language features of the compositional and semantic organization of a scientific text; basic techniques for extracting the main information of the	Oral interview, testing, report, boundary control, term papers	Professionally-oriented foreign language

		microtext.		
OOM03 Module of information technologies	5	**Know:** – **main directions of** ICT development; - basics of using information resources for searching and storing information; – architecture and components of computer systems; – the main goals and objectives of information security. Can work in any operating system and with databases; apply methods and tools for protecting information; work with spreadsheets, perform data consolidation, and build charts. **Have the following skills**: – processing of vector and bitmap images; – create multimedia presentations; – data visualization; – use of various forms of e-learning to expand professional knowledge; – working with e-technology cloud services.	Oral interview, testing, report, boundary control, term papers	Information and Communication Technologies (ICT)
OOM04 A module of physical training	8	Knows the main tasks of physical education of students, Can pass control exercises and standards.	Test	Physical Culture
OOM05 Research and Entrepreneurship Module	5	Have an idea of the principles and laws of economic relations.	Oral interview, testing, report, milestone control, calculation and graphic works	Fundamentals of economic theory
	5	Have the ability to make independent theoretical and practical judgments and conclusions. Be able to objectively evaluate scientific information, freedom of scientific search and the desire to apply scientific knowledge in educational activities, including for the implementation of a diploma project (work).	Oral interview, report, milestone control	Research methodology
	5	Have an understanding of the principles of law and anti-corruption culture	Oral interview, report, milestone control	Fundamentals of law and anti-corruption culture
	5	Have an idea of the principles and patterns of ecology and life	Oral interview,	Fundamentals safety

		safety	report, milestone control	of life activity and ecology
	5	Have an idea of IT competence, entrepreneurial skills	Oral interview, report, milestone control	Startups and entrepreneurship
BASIC MODULE				
БМ01 Physics and mathematics module	6	**Able to** describe the basic concepts of linear algebra and analytical geometry; the basic fundamental concepts of mathematical analysis; the theory of limits; the theory of continuous functions of one variable; the differential calculus of a function of one real variable.	Oral interview, testing, report, boundary control, calculation and graphic works	Mathematical analysis
	4	**Able to** apply methods for solving differential and integral calculus of functions of several variables in applied problems; apply methods for solving differential equations in solving applied problems; obtain approximate values of solutions using power series and Fourier series expansion with a given accuracy; determine the optimal methods for solving practical problems.	Oral interview, testing, report, boundary control, calculation and graphic works	Algebra and geometry
	6	**Know:** probabilistic and statistical methods in science; basic concepts of mathematical statistics; basic methods for constructing estimates; methods for constructing confidence intervals; methods for building and testing statistical hypotheses.	Oral interview, testing, report, boundary control, calculation and graphic works	Discrete mathematics
	5	Knows the relationship between mathematics and computer science, operating systems in an interdisciplinary training program that covers the section modern statistical methods and economic theory.	Oral interview, testing, report, boundary control, calculation and graphic works	Mathematical statistics for programmers
	4	Knows and understands kinematics; dynamics; circular motion and gravity; energy; momentum; simple harmonic vibrations; torque and rotational motion; electric charge and electric force; DC Circuits; thermodynamics and mechanical waves, field and	Oral interview, testing, report, boundary control,	Physics

		potential; electrical circuits; induction of magnetism and electromagnetism; geometric and physical optics; and quantum, atomic and nuclear physics and sound.	calculation and graphic works	
БМ02 Mathematical modeling module	5	Knows and uses in modeling the Basics of error theory, systems of linear algebraic equations, Nonlinear equations and systems of nonlinear equations, Interpolation and best approximations, Differentiation and integration of functions, Ordinary differential equations, Equations of mathematical physics.	Oral interview, testing, report, boundary control, calculation and graphic works	Computational mathematics
	5	Knows and uses in modeling Nonlinear equations and systems of nonlinear equations, Interpolation and best approximations, Differentiation and integration of functions, Ordinary differential equations, Equations of mathematical physics.	Oral interview, testing, report, boundary control, calculation and graphic works	Numerical methods of analysis and algebra
БМ02 Computer science module	6	**Know:** organize the necessary data structures depending on the requirements of the task; **Be able to:** develop block diagrams of various algorithms; **Have skills:** develop programs in C ++ using the language tools.	Oral interview, testing, report, boundary control, calculation and graphic works	Introduction to programming
	7	**Be able to** develop sorting algorithms such as bubble sorting, merge sorting, quick sorting, etc **Have** the basics of OOP concepts, theory, methods and technologies of C ++, data structures and algorithms; application of algorithms and modern trends in technologies of a large company	Oral interview, testing, report, boundary control, calculation and graphic works	Object-oriented programming
	6	**Able to** know: basic algorithms to solve biological processes of different nature; **Can** use software language tools to solve biological problems and be able to perform data analysis and identify trends. **Have** skills in: implementing algorithms and data structures,	Oral interview, testing, report, border control, calculation and graphic works	Algorithms and data structures

		as well as using programming language functions using modern software tools		
	4	**Know:** Python programming language for working with genomic data; Unix operating system and commands for working in this environment; scripting languages and methods for writing program codes on them. **Has** the skills to develop programs for analysis of genes and genomes, using other additional packages such as Biopython, R, Bioconductor and Galaxy.	Oral interview, testing, report, border control, calculation and graphic works	Programming in Python
	5	Knows methods of designing a web site as a static information system; methods of designing a web site as a dynamic information system; theory of using graphics on web pages; methods of processing and editing digital images; client-side software used to create web pages; server-side software used to create web pages; software for creating databases; software for creating a virtual server; basic principles of configuration of a real web server; software tools used for hosting and maintaining web pages; methods for optimizing a web site for promotion on the Internet.	Oral interview, testing, report, boundary control, calculation and graphic works	Advanced WEB technologies
	5	**Know:** basic methods of numerical research of biological processes of various nature. **Be able to: i**nterpret the results of numerical analysis of biological data, identify trends, make forecasts; **Own:** implementations of numerical methods using modern software tools.	Oral interview, testing, report, boundary control, calculation and graphic works	Database theory
	5	Designs the structure of a web site as an information system. Knows the technology of creating a web site using client-side and server-side programming tools; the technology of hosting, supporting and maintaining a web site on the server.	Oral interview, testing, report, border control, calculation and graphic works	Web-technology
	5	Knows the basic technologies for building modern databases and DBMS; distributed and parallel DBMS technology; Has skills in working with databases and data warehouses; with OLAP technologies; creating applications in the client-server architecture»;	Oral interview, testing, report, boundary control, calculation and graphic works	Programming in PL/SQL

		Uses the PL/SQL procedural language to create applications that manipulate data on the DB server side.		
	4	Knows algorithms in the form of a design process that begins with problems encountered across the entire range of computing applications. Uses a good understanding of algorithm design methods and the end result is the development of effective solutions to such problems.	Oral interview, testing, report, boundary control, calculation and graphic works	Algorithm design and analysis
	6	Know learning algorithms and classifier families, algorithmic approaches to learning.	Oral interview, testing, report, boundary control, calculation and graphic works	Algorithmic aspects of machine learning
	6	Know: procedural dialects of the SQL language and SQL stored components: views, rules, triggers, stored procedures and functions and learn how to create them, taking into account the differences in the definition and use of data stored components in different DBMS: PostgreSQL, MS SQL Server, Oracle SQL.	Oral interview, testing, report, boundary control, calculation and graphic works	Advanced database theory
PROFESSIONAL MODULES				
ПМ01 Module of elective courses	5	Have professional skills	Oral interview, testing, report, boundary control, calculation and graphic works	Discipline of choice №2 from the КЭД
	5			Discipline of choice №3 from the КЭД
ПМ02 Data Analysis module	5	Have an idea: about comparative analysis in genomics of ideological and methodological criteria for understanding the structural subsections of the new science-structural genomics, proteomics and transcriptomics.	Oral interview, testing, report, boundary control, calculation and graphic works	Data analysis and visualization in Power BI
	5	He is proficient in the basic concepts and methods of economic systems research. Knows the state and main directions of development of mathematical models of economic systems at various levels. Has the skills necessary for independent work on the design		Operation research

		and implementation of economic analysis models and modeling algorithms; system thinking.		
	5	Able to use MS Excel and solves practical cases for honing and mastering the material.		Design and administration in MS EXCEL
	5	Able to identify patterns, identify anomalies, test hypotheses and verify assumptions using summary statistics and graphical representations.		Exploratory data analysis
ПМ03 Practice module	2	Knows the organizational structure and complex of technical means of the information and analytical center (IAC) of the organization. Can identify the main tasks solved by the IAC. Knows the mathematical support for the selected task (set of tasks or subsystem) and software for the selected task (set of tasks or subsystem), organizational and legal support for the selected task (set of tasks or subsystem). systematization and analysis of actual materials required for writing a course paper, scientific report, and internship report.	Report	Teaching practice
	4			Industrial practice
	4			Professional internship
	5			Externship
ПМ04 The module of Minor disciplines	5, 5, 5	He is able to apply the acquired knowledge according to the selected additional educational program.	Oral interview, testing, report, boundary control	Minor 1, 2, 3
ПМ05 Programming module	5	Be able to develop Windows applications using a database on ADO.NET and LINQ	Oral interview, testing, report, boundary control, calculation and graphic works	Application development in ASP.NET
	5	Be able to build IoT systems		Programming on Internet of Things (IOT)
	5	Know the connection and configuration of Spring, the specifics of data access		Development of Web applications in на Java Spring

5. Curriculum of the educational program

№	Module code	Module name in three languages (kaz / rus / eng)	Discipline Code	Discipline name in three languages (kaz / rus / eng)	Cycles (GED, CD, M)	Components (RC, OC, UC)	Total number of credits (ECTS)	Total number of academic hours	Number of classroom hours				Number of SIS hours		Form of control (Midterm, End-of-term, examination, CP defense, differential test, DP defense)	Prerequisites (Discipline Code)
									Total number of classroom hours	Including			Total number of SIS hours	Including TSIS		
										lectures	practical classes (sem.)	laboratory classes				
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
1 year																
1 semester																
1	OOM02	Тілдік дайындық / Языковая подготовка / Language training	LAN6001A	Шет тілі / Иностранный язык / Foreign language	CGS	RC	5	150	45	0	45	0	105	15	M, E, Exam	-
2	OOM03	Ақпараттық технологиялар модулі / Модуль информационных технологий / Information Technology Module	ICT6001	Ақпараттық-коммуникациялық технологиялар / Информационно-коммуникационные технологии / Information and Communication Technologies	CGS	RC	5	150	45	15	0	30	105	15	M, E, Exam	-
3	БМ01	Физика - математикалық Модуль / Модуль Физико-математический / The Physics and Mathematics module	MAT6001	Алгебра және геометрия / Алгебра и геометрия / Algebra and Geometry	BD	UC	4	120	45	15	30	0	75	15	M, E, Exam	-
4	БМ03	Компьютерлік модельдеу модулі / Модуль компьютерного моделирования / Computer simulation module	SFT6001	Бағдарламалауға кіріспе / Введение в программирование / Introduction to Programming	BD	UC	6	180	60	15	15	30	120	15	M, E, Exam	-
5	БМ03	Компьютерлік модельдеу модулі / Модуль компьютерного моделирования / Computer simulation module	SFT6564	WEB технологиялары / WEB технологии / WEB technology	BD	UC	5	150	45	15	0	30	105	15	M, E, Exam	-
6	БМ01	Физика - математикалық Модуль / Модуль Физико-математический / The Physics and Mathematics module	MAT6003	Дискреттік математика / Дискретная математика / Discrete Mathematics	BD	UC	6	180	60	30	30	0	120	15	M, E, Exam	-
				Total number for a 1 semester:			**31**	**930**	**300**	**90**	**12**	**90**	**630**	**90**		

											0					
2 semester																
7	OOM02	Тілдік дайындық / Языковая подготовка / Language training	LAN6002A	Шет тілі / Иностранный язык / Foreign language	CGS	RC	5	150	45	0	45	0	105	15	M, E, Exam	-
8	OOM01	Әлеуметтану және этика / Социологии и этики / Sociology and Ethics	SPS6003	Саясаттану / Политология / Political science	CGS	RC	2	60	30	15	15	0	30	15	M, E, Exam	-
9	OOM01	Әлеуметтану және этика / Социологии и этики / Sociology and Ethics	SPS6002	Әлеуметтану / Социология / Sociology	CGS	RC	2	60	30	15	15	0	30	15	M, E, Exam	-
10	OOM04	Дене шынықтыру модулі / Модуль физической подготовки / Physical training module	PhC6005	Дене шынықтыру / Физическая культура / Physical Culture	CGS	RC	4	120	45	0	45	0	75	15	M, E, dif.test	-
11	ПМ03	Тәжірибе модулі / Модуль практик / The Practice module	PP6501	Оқыту практика / Учебная практика / Teaching practice	BD	UC	2	60	30	0	30	0	30	0	dif.test	-
12	БМ01	Физика - математикалық Модуль / Модуль Физико-математический / The Physics and Mathematics module	PHY6001	Физика / Физика / Physics	BD	UC	4	120	45	15	0	30	75	15	M, E, Exam	-
13	БМ01	Физика - математикалық Модуль / Модуль Физико-математический / The Physics and Mathematics module	MAT6002	Математикалық талдау / Математический анализ / Mathematical analysis	BD	UC	6	180	60	30	30	0	120	15	M, E, Exam	-
14	БМ03	Компьютерлік модельдеу модулі / Модуль компьютерного моделирования / Computer simulation module	SFT6516	Python бағдарламалау / Программирование на Python / Programming in Python	MD	CC	4	120	45	15	0	30	75	15	M, E, Exam	-
				Total number for a 2 semester:			**29**	**870**	**330**	**90**	**180**	**60**	**540**	**105**		
				TOTAL NUMBER FOR THE 1 YEAR:			**60**	**1800**	**630**	**180**	**300**	**150**	**1170**	**195**		
2 year																
3 semester																
15	OOM02	Тілдік дайындық / Языковая подготовка / Language training	LAN6001KR	Қазақ (орыс) тілі / Казахский (русский) язык / Kazakh (Russian) language	CGS	RC	5	150	45	0	45	0	105	15	M, E, Exam	-
16	OOM01	Әлеуметтану және этика / Социологии и этики / Sociology and Ethics	SPS6005	Психология / Психология / Psychology	CGS	RC	2	60	30	15	15	0	30	15	M, E, Exam	-
17	OOM01	Әлеуметтану және этика / Социологии и этики / Sociology and Ethics	SPS6004	Мәдениеттану / Культурология / Cultural studies	CGS	RC	2	60	30	15	15	0	30	15	M, E, Exam	-

18	ООМ01	Әлеуметтану және этика / Социологии и этики / Sociology and Ethics	HK6002	Қазақстан тарихы / История Казахстана / History of Kazakhstan	CGS	RC	5	150	45	15	30	0	105	15	M, E, Exam	-
19	ООМ04	Дене шынықтыру модулі / Модуль физической подготовки / Physical training module	PhC6006	Дене шынықтыру / Физическая культура / Physical Culture	CGS	RC	4	120	45	0	45	0	75	15	M, E, dif.test	-
20	БМ03	Компьютерлік модельдеу модулі / Модуль компьютерного моделирования / Computer simulation module	SFT6517	Объектті-бағдарланған программалау / Объектно-ориентированное программирование / Object-oriented programming	BD	UC	7	210	75	15	30	30	135	15	M, E, Exam	SFT6001
21	ПМ02	Деректерді талдау модулі / Модуль Анализа данных / Data Analysis Module	SFT6535	MS EXCEL бағдарламасында жобалау және басқару / Проектирование и администрирование в MS EXCEL / Design and administration in MS EXCEL	MD	CC	5	150	45	0	45	0	105	15	M, E, Exam	
				Total number for a 3 semester:			**30**	**900**	**315**	**60**	**225**	**30**	**585**	**105**		
4 semester																
22	ООМ02	Тілдік дайындық / Языковая подготовка / Language training	LAN6002KR	Қазақ (орыс) тілі / Казахский (русский) язык / Kazakh (Russian) language	CGS	RC	5	150	45	0	45	0	105	15	M, E, Exam	-
23	БМ03	Компьютерлік модельдеу модулі / Модуль компьютерного моделирования / Computer simulation module	SFT6501	Алгоритмдер және деректер құрылымы / Алгоритмы и структуры данных / Algorithms and data structures	BD	UC	6	180	60	15	15	30	120	15	M, E, Exam	SFT6517
24	БМ03	Компьютерлік модельдеу модулі / Модуль компьютерного моделирования / Computer simulation module	SFT6507	Деректер қоры теориясы / Теория базы данных / Database theory	BD	UC	5	150	45	15	15	15	105	15	M, E, Exam	
25	ПМ03	Тәжірибе модулі / Модуль практик / The Practice module	PP6502	Өндірістік практика / Производственная практика / Industrial practice	MD	UC	4	120	0	0	0	0	120	15	report	-
26	БМ01	Физика - математикалық Модуль / Модуль Физико-математический / The Physics and Mathematics module	MAT6558	Программистерге арналған математикалық статистика / Математическая статистика для программистов / Mathematical statistics for programmers	BD	CC	5	150	45	15	30	0	105	15	M, E, Exam	
27	БМ02	Математикалық модельдеу модулі / Модуль математического моделирования / Mathematical modeling module	MAT6534	Есептеу математикасы / Вычислительная математика / Computational mathematics	BD	CC	5	150	45	15	15	15	105	15	M, E, Exam	MAT6001
				Total number for a 4 semester:			**30**	**900**	**240**	**60**	**120**	**60**	**660**	**90**		

				TOTAL NUMBER FOR THE 2 YEAR:			**60**	**1800**	**555**	**120**	**345**	**90**	**1245**	**195**		
3 year																
5 semester																
28	OOM05	Зерттеу және кәсіпкерлік модулі / Модуль исследований и предпринимательства / Research and Entrepreneurship Module	RM6502	Зерттеу әдістемесі / Методология исследования / Research metodology	CGS	CC	5	150	45	15	30	0	105	15	M, E, Exam	-
			JUR 6507	Тіршілік қауіпсіздігінің және экологияның негіздері / Основы экологии и безопасности жизнедеятельности / Fundamentals safety of life activity and ecology												
			JUR 6470	Заң және сыбайлас жемқорлыққа қарсы мәдениеттің негіздері / Основы права и антикоррупционной культуры / Fundamentals of law and anti-corruption culture												
			MGT6706	Стартаптар және кәсіпкерлік / Стартапы и предпринимательство / Startups and entrepreneurship												
			ECO6006	Экономикалық теория / Экономическая теория / Economic theory												
29	OOM02	Тілдік дайындық / Языковая подготовка / Language training	LAN6002PA	Кәсіби бағытталған шет тілі / Профессионально-ориентированный иностранный язык / Professionally oriented foreign language	BD	CC	4	120	45	0	45	0	75	15	M, E, Exam	-
30	OOM02	Тілдік дайындық / Языковая подготовка / Language training	LAN6007K	Мемлекеттік тілде іс қағаздарын жүргізу / Делопроизводство на государственном языке / Business correspondence in the state language	BD	CC	2	60	30	0	30	0	30	15	M, E, Exam	
31	ПМ05	Бағдарламалау модулі / Модуль программирования / Programming module	SFT6542	Internet of Things (IOT) бағдарламалау / Программирование Internet of Things (IOT) / Programming on Internet of Things (IOT)	MD	CC	5	150	45	15	0	30	105	15	M, E, Exam	SFT6516
32	ПМ05	Бағдарламалау модулі / Модуль программирования / Programming module	SFT6566	Java spring-те Web қосымшаларын әзірлеу / Разработка Web приложений на Java Spring / Development of Web applications in Java Spring	MD	CC	5	150	45	15	0	30	105	15	M, E, Exam	SFT6564
33	ПМ04	Майнор пәндер модулі / Модуль Майнор дисциплин / The module of Minor disciplines	MIN601	Майнор 1 / Майнор 1 / Minor 1	MD	CC	5	150	45	15	15	15	105	15	M, E, Exam	-
				Total number for a 5 semester:			**26**	**780**	**255**	**60**	**120**	**75**	**525**	**90**		
6 semester																

34	ООМ01	Әлеуметтану және этика / Социологии и этики / Sociology and Ethics	SPS6001	Философия / Философия / Philosophy	CGS	RC	5	150	45	15	30	0	105	15	M, E, Exam	-
35	ПМ03	Тәжірибе модулі / Модуль практик / The Practice module	PP6503	Өндірістік практика / Производственная практика / Professional Internship	MD	UC	4	120	0	0	0	0	120	15	report	
36	БМ03	Компьютерлік модельдеу модулі / Модуль компьютерного моделирования / Computer simulation module	SFT6548	PL/SQL тілінде бағдарламалау / Программирование на PL/SQL / PL/SQL programming	BD	CC	5	150	45	15	0	30	105	15	M, E, Exam	SFT6507
37	ПМ02	Деректерді талдау модулі / Модуль Анализа данных / Data Analysis Module	SFT6585	Power BI деректерді талдау және визуализациялау / Анализ и визуализация данных в Power BI / Data analysis and visualization in Power BI	BD	CC	5	150	45	0	45	0	105	15	M, E, Exam	SFT6535
38	БМ02	Математикалық модельдеу модулі / Модуль математического моделирования / Mathematical modeling module	MAT6559	Анализ бен алгебраның сандық әдістері / Численные методы анализа и алгебры / Numerical methods of analysis and algebra	MD	CC	5	150	45	15	15	15	105	15	M, E, Exam	MAT6534
39	ПМ05	Бағдарламалау модулі / Модуль программирования / Programming module	SFT6581	ASP.NET платформасында қосымшалар жасау / Разработка приложений на ASP.NET / Application development in ASP.NET	MD	CC	5	150	45	15	0	30	105	15	M, E, Exam	SFT6001
40	ПМ04	Майнор пәндер модулі / Модуль Майнор дисциплин / The module of Minor disciplines	MIN602	Майнор 2 / Майнор 2 / Minor 2	MD	CC	5	150	45	15	15	15	105	15	M, E, Exam	MIN601
				Total number for a 6 semester:			**34**	**1020**	**270**	**75**	**105**	**90**	**750**	**105**		
				TOTAL NUMBER FOR THE 3 YEAR:			**60**	**1800**	**525**	**135**	**225**	**165**	**1275**	**195**		
4 year																
7 semester																
41	БМ03	Компьютерлік модельдеу модулі / Модуль компьютерного моделирования / Computer simulation module	SFT6550	Жетілдірілген мәліметтер базасы / Продвинутые базы данных / Advanced database theory	BD	CC	6	180	60	15	15	30	120	15	M, E, Exam	SFT6507
42	БМ03	Компьютерлік модельдеу модулі / Модуль компьютерного моделирования / Computer simulation module	SFT6559	Жоғары деңгейлі WEB технологиялары / Продвинутые WEB технологии / Advanced WEB technology	BD	CC	5	150	45	15	0	30	105	15	M, E, Exam	SFT6564
43	ПМ02	Деректерді талдау модулі / Модуль Анализа данных / Data Analysis Module	MAT6523	Операцияларды зерттеу / Исследование операции / Operation research	BD	CC	6	180	60	15	15	30	120	15	M, E, Exam	MAT6001

44	БМ03	Компьютерлік модельдеу модулі / Модуль компьютерного моделирования / Computer simulation module	SFT6582	Алгоритмді жобалау және талдау / Дизайн и анализ алгоритмов / Algorithm Design and Analysis	MD	CC	4	120	45	15	0	30	75	15	M, E, Exam	SFT 6001
45	ПМ04	Майнор пәндер модулі / Модуль Майнор дисциплин / The module of Minor disciplines	MIN603	Майнор 3 / Майнор 3 / Minor 3	MD	CC	5	150	45	15	15	15	105	15	M, E, Exam	MIN602
46	ПМ02	Деректерді талдау модулі / Модуль Анализа данных / Data Analysis Module	SFT6526	Деректерді барлау талдауы / Исследовательский анализ данных / Exploratory data analysis	MD	CC	5	150	45	15	15	15	105	15	M, E, Exam	SFT 6585
				Total number for a 7 semester:			**31**	**930**	**300**	**90**	**60**	**150**	**630**	**90**		
8 semester																
47	ПМ03	Тәжірибе модулі / Модуль практик / The Practice module	PP6504	Диплом алдындағы практика / Преддипломная практика / Pregraduation practice	MD	UC	5	150	0	0	0	0	150	15	report	
48	БМ03	Компьютерлік модельдеу модулі / Модуль компьютерного моделирования / Computer simulation module	SFT6560	Машиналық оқытудың алгоритмдік аспектілері / Алгоритмические аспекты машинного обучения / Algorithmic aspects of machine learning	BD	CC	6	180	60	15	15	30	120	15	M, E, Exam	SFT 6501
49	ПМ01	Элективті пәндер модулі / Модуль элективных дисциплин / The module of elective disciplines	SFT6523	Amazon Web Services Foundations (AWS Foundations)	MD	CC	5	150	45	15	15	15	105	15	M, E, Exam	SFT 6001
			SFT6543	Параллель бағдарламалау / Параллельное программирование / Parallel programming												
			SFT6533	Адамның компьютермен өзара әрекеттесуі / Взаимодействие человека с компьютером / Human-computer interaction												
50	ПМ01	Элективті пәндер модулі / Модуль элективных дисциплин / The module of elective disciplines	SFT6525	Android-де мобильді қосымшаларды әзірлеу / Разработка мобильных приложений на Android / Development of mobile applications on Android	MD	CC	5	150	45	15	15	15	105	15	M, E, Exam	SFT 6001
			SFT6515	IOS-та мобильді қосымшаларды әзірлеу / Разработка мобильных приложений на iOS / Development of mobile applications on IOS												
51				Дипломдық жұмысты, дипломдық жобаны жазу және қорғау немесе кешенді емтиханды дайындау және тапсыру / Написание и защита дипломной работы, дипломного проекта или подготовка и сдача комплексного экзамена / Writing and			8	240	0	0	0	0	240	15	DP defence	

				defending a diploma thesis, diploma project or preparation and passing of a comprehensive exam													
				Total number for a 8 semester:			**29**	**870**	**150**	**45**	**45**	**60**	**720**	**75**		
				TOTAL NUMBER FOR THE 4 YEAR:			**60**	**1800**	**450**	**135**	**105**	**210**	**1350**	**165**		
				TOTAL:			**240**	**7200**	**2160**	**570**	**975**	**615**	**5040**	**750**		

Summary table of indicators of the academic program's number of credits in the context of cycles of disciplines and semesters

Cycles of disciplines / Semester	1 sem.	2 sem.	3 sem.	4 sem.	5 sem.	6 sem.	7 sem.	8 sem.	Total number of credits ECTS	Note (AP structure according to the National Mandatory Standards of Higher and Post-Graduate Education)
Cycle of general education disciplines (GED)	**10**	**13**	**18**	**5**	**5**	**5**			**56**	*** 56 cr.**
- including the required component (GED RC)	10	13	18	5		5			51	*** 51 cr.**
- including optional component (GED OC)					5				5	*** 5 cr.**
Cycle of core disciplines (CD)	**21**	**12**	**7**	**21**	**6**	**10**	**17**	**6**	**100**	******
- including the university component (CD UC)	21	12	7	11					51	
- including optional component (CD OC)				10	6	10	17	6	49	
Cycle of majors (M)		**4**	**5**	**4**	**15**	**19**	**14**	**15**	**76**	******
- including the university component (M UC)				4		4		5	13	
- including optional component (M OC)		4	5		15	15	14	10	63	
Professional internship (PI)		*2*		*4*		*4*		*5*	*15*	
Additional types of training										
Final attestation (FA)								**8**	**8**	**Not less than 8 cr.**
TOTAL number of credits for the academic program	**31**	**29**	**30**	**30**	**26**	**30**	**31**	**29**	**240**	**Not less than 240 cr.**

**The cycle of core disciplines and majors (CD, M) is not less than 176 cr.

6. Additional educational programs (Minor)

Name of the additional educational program (Minor) with an indication of the list of disciplines that form the Minor	The total number of loans/ number of credit hours in the discipline	Semesters of study	Documents on the results of the development of additional educational programs (Minor)
Machine Learning Specialist			
SFT6503 Python for Data Analysis	5	5	Transcript
SFT6508 Machine Learning 1	5	6	Transcript
SFT6540 Machine Learning 2	5	7	Transcript
System Administrator			
HRD6302 Architecture and organization of computer systems	5	5	Transcript
EGR6301 Operating Systems	5	6	Transcript
NET6302 System Administration	5	7	Transcript
Robotics			
EEC6003 Design and simulation of electronic devices	5	5	Transcript
HRD6304 Sensor technologies	5	6	Transcript
HRD6306 Artificial intelligence in robotics	5	7	Transcript
Big Data Processing and Analysis			
EPP 4106 Internet Entrepreneurship	5	5	Transcript
SFT6185 Data Analytics	5	6	Transcript
BDO 4310 Oracle NoSQL Databases	5	7	Transcript

7. An approval sheet with the developers

Name of the educational program: 6B06101 “Computer science”

№	Position, scientific or academic degree and full name of developer of educational program	Data	Signature	Note
1	Assistant Professor, PhD Omarov B.S.			
2	Assistant Professor, PhD Ydyrys A.Zh.			
3	Senior Lecturer Satybaldina A.N.			
4	Senior Lecturer Olzhayev O.M.			