

AGREED

Chairman of the educational and methodological council of JSC «IITU»

Mustafina A.K.

2024

APPROVED

Chairman of the Board- Rector of JSC «International Information Technology University»

Khikmetov A.K.

2024

EDUCATIONAL PROGRAM

6B06110 «Software Engineering»

Code and classification of the field of education: 6B06 – Information and Communication Technology

Code and classification of training area: 6B061 – Information and Communication Technology

Group of educational programs: B057 – Information Technology

ISCED level: 6

NQR level: 6

ORC level: 6

Duration: 4 years

Number of credits: 240



AGREED

Director of KnewIT Programming School» LLC

Bekaulov N.M.

2024



AGREED

Executive Director of «Internet Society Kazakhstan»

Nurlybayev T.A.

2024

Almaty, 2024

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List of abbreviations and notation

BC	Basic competence
BM	Base module
HE	Higher education
SCES	State compulsory education standard
EQF	European qualification framework
EEF	European Education Foundation
KSC	Knowledge, skills, cum-savvy
NCO	National Classification of Occupations
NQF	National Qualifications Framework
NQS	National qualifications system
HM	Humanitarian module
CM	Common module
EP	Educational program
GPM	General Professional Module
IQF	Industry Qualifications Framework
PS	Professional standard
PE	Postgraduate education
PC	Professional competence
PM	Professional module
SW	Software
WG	Working group
RK	The Republic of Kazakhstan
LO	Learning outcome
SM	Special module
QMS	Quality Management System
SEM	Socio-economic module
TVE	Technical and vocational education
TaVPE	Technical and vocational education and post-secondary education
UNESCO	United Nations Educational, Scientific and Cultural Organization
UNESCO	Specialized agency of the United Nations Educational, Scientific and Cultural Organization
Cedefop	European Center for Development of Vocational Training
DACUM	from Eng. Developing curriculum
ECVET	European Credit System for vocational education and training
EQAVET	European Quality Assurance in Vocational Education and Training
ENQA	European Association for Quality Assurance in Higher Education / Europe-Skye association by to ensure qualities at 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 program

The educational program 6B06110 «Software Engineering» is designed to implement the principles of a democratic nature of educational management, expanding the boundaries of academic freedom and the authority of educational institutions, which will ensure the adaptation of the system of technical and vocational education to the changing needs of society, the economy of the labor market. The flexibility of the program will allow you to take into account the abilities and needs of the individual, production and society.

The educational program ensures the application of an individual approach to students, ensures the transformation of professional competencies from professional standards and qualification standards into learning outcomes. Provides student-centered learning - the principle of education, involving a shift in emphasis in the educational process from teaching to learning.

The area of professional activity of graduates is state and private enterprises and organizations that develop, implement and use computer hardware and software in various fields, namely: telecommunications, science and education, healthcare, agriculture, engineering, metallurgy, transport, in the service sector, administrative management, economics, business, management of various technologies, that is, in almost all spheres of human activity.

2 The goal and objectives of the educational program

The goal of the EP – to provide practice-oriented training of highly qualified specialists in the field of software development, qualified developers of software and information systems and software architects, specialists in software quality, software testers for the IT industry of the Republic of Kazakhstan.

The objectives of the EP:

1. To prepare a universal specialist who has knowledge in mathematics, ICT, computer sciences; able to use modern information and communication technologies in substantive activities.
2. Teach students how to formalize the subject area of a software project and develop specifications for components of a software product.
3. Develop students' ability to design software architecture and provide a high level of continuity and quality of complex software development.
4. To teach students to design and develop user interfaces, components of commercial software, databases and embedded software modules.
5. To acquaint students with the methods and tools for researching software code to identify / eliminate errors and malfunctions in the software.
6. To instill in students the skills to verify compliance with specifications and performance indicators and the effectiveness of integrated systems, as well as design, construct and test components of a software product.
7. Provide knowledge to students on the design of logical database schemes using relational, object-oriented, object-relational, key-value schemes for simple and complex defined systems.
8. To acquaint students with the life cycle of software development, various methodologies for its development and the place of testing in this process.
9. To teach students how to create test cases and create test kits, work out and write acceptance tests, test scripts, and document defects found.

3 Requirements for the results of the mastering of the educational program

The following examination forms are used as an assessment of learning outcomes: computer testing, a written exam (answers on the sheets), an oral exam, a project (passing a course project), practical (open questions on a computer, solving problems on a computer, including in ACM format)

comprehensive (test / written / oral + others). In accordance with table 1, the following exams are recommended:

Table 1

№	Exams form	Recommended share, %
1	Test	10%
2	Written	10%
3	Oral	5%
4	Project	30%
5	Practical	30%
6	Complex	15%

Final attestation is help on the form of defending a diploma project.

4 Passport of the educational program

4.1 General information

№	Field name	Note
1	Code and classification of the field of education	6B06 – Information and Communication Technology
2	Code and classification of training areas	6B061 – Information and Communication Technology
3	Group of educational programs	B057 – Information Technology
4	Name of the educational program	6B06110 «Software Engineering»
5	Short description of the program	The educational program «Software Engineering» is aimed at training specialists in the field of developing software of a wide profile for various fields and spheres of human activity.
6	Purpose of EP	To provide practice-oriented training of highly qualified specialists in the field of software development, qualified developers of software and information systems and software architects, software quality specialists, software testers for the IT industry of the Republic of Kazakhstan.
7	Qualification characteristics of the EP graduate:	<p>Field of professional activity of the EP graduate: The field of professional activity of the EP “6B06110 Software Engineering” is the field of science and technology, which is focused on the design, design, testing and verification of complex products, primarily focused on parallel high-performance computing systems.</p> <p>Objects of professional activity of graduates of the EP: The objects of professional activity of graduates of the EP “6B06110 – Software Engineering” are software product development projects, software, life cycle processes of software systems, methods and tools for software product development, personnel management in the development of complex software systems.</p> <p>Subject of professional activity: The subjects of professional activity of a bachelor in the EP “6B06110 – Software Engineering” are organizations related to</p>

		<p>software product development tools and personnel management in the development of complex software systems.</p> <p>Types of professional activities of EP graduates: Bachelor in the direction “6B06110 – Software Engineering” prepare for the following types of professional activities:</p> <ul style="list-style-type: none"> - mastering and using computer-aided design, development, testing and software maintenance tools; - mastering and applying methods and tools for managing engineering activities and software life cycle processes; - use of standard methods for monitoring, evaluating and ensuring the quality of software products; - interaction with the customer during the implementation of the software project; - participation in the integration of software product components; -development of a test environment, creation of test scripts; - creation of software components (coding, debugging, unit and integration testing); - performing measurements and refactoring code according to plan; <p>Functions of professional activity of an EP graduate:</p> <ul style="list-style-type: none"> - programming; - testing; - design; - development; - unit integration testing; -debugging.
8	ISCED level	6
9	NQF level	6
10	IQF level	6
11	<p>List of competencies :</p> <p>GC1: The ability to be competent in the choice of mathematical modeling methods for solving specific engineering problems, including the willingness to identify the natural science essence of the problems arising in the process of professional activity, and the ability to attract an appropriate physical and mathematical apparatus for its solution.</p> <p>GC2: To know: social and ethical values based on public opinion, traditions, customs, social norms and to be guided by them in their professional activities; traditions and culture of the peoples of Kazakhstan; human and civil rights and freedoms; fundamentals of the legal system and legislation of Kazakhstan; trends in the social development of society; the basics of physical culture and the principles of a healthy lifestyle.</p> <p>GC3: Ability for written and oral communication in the state language and the language of interethnic communication; the ability is logically true, reasoned and clearly build oral and written speech; willingness to use one of the foreign languages</p> <p>KC1: Ability to use modern information and communication technologies in substantive activities</p> <p>KC2: The ability to formalize the subject area of a software project and develop specifications for software product components.</p> <p>KC3: Ability to design software architectures and provide a high level of continuity and quality</p>	

	<p>of complex software development.</p> <p>KC4: The ability to design and develop user interfaces, commercial software components, databases, and embedded software modules.</p> <p>KC5: The ability to use the methods and tools of researching software code to identify / eliminate errors and malfunctions in the software.</p> <p>KC6: The ability to verify compliance with specifications and performance indicators and the effectiveness of integrated systems, as well as design, construct and test components of a software product.</p> <p>KC7: Familiar with applicable software, modules, DBMS, programming languages, the method of identifying knowledge from data and developing client-server database applications.</p> <p>KC8: The ability to explain the principles and patterns of the historical development of society, to know their role in the development of information technology, to strive for self-improvement.</p>	
12	<p>Learning outcomes. Students will be able to:</p> <p>LO1: Demonstrate the ability to use basic math tools.</p> <p>LO2: Use various tools for software development, user interface and data storage and processing systems.</p> <p>LO3: Explain the progress of high-level language programs at the instruction level; Use a wide range of memory technologies, internal and external; To write program code for manipulating bits in a processor.</p> <p>LO4: Solve practical problems by creating programs in a good style, as well as modify and rewrite the created program using analysis tools, a development environment for creating and debugging applications, and modern compiler environments.</p> <p>LO5: Explain the compiled software documentation and compile documentation using operation diagrams, class diagrams, state diagrams, entity relationship diagrams (ER). Be able to develop models of the logical and physical architecture of the software system.</p> <p>LO6: Design logical database schemes using relational, object-oriented, object-relational, key-value schemes for simple and complex defined systems.</p> <p>LO7: Understand the life cycle of software development, the various methodologies for its development and the place of testing in this process.</p> <p>LO8: Able to create test cases and form test kits, work out and write acceptance tests, test scripts, document defects found.</p> <p>LO9: Have the skills to choose, design, implement, evaluate quality and analyze the effectiveness of software for solving problems in various subject areas.</p> <p>LO10: Independently diversify and critically analyze modern sources, draw conclusions, argue them and make decisions based on information.</p>	
13	Form of study	Full-time
14	Language of instruction	English
15	Number of credits	240 ECTS credits
16	Awarded academic degree	Bachelor in Information and Communication Technology in educational program 6B06110 «Software Engineering»
17	Professional standard for EP	<ol style="list-style-type: none"> 1. Creation and management of information technologies 2. Software developers and specialists in testing WEB and additional applications. 3. Database administration 4. Database designers and administrators 5. Development of artificial intelligence applications 6. Software testing
18	Atlas of new professions	- Universal AI developer

		- Designer of artificial neural networks - Distributed ledger constructor
19	Developers and authors:	«International Information Technology University» JSC, Computer Engineering Department: - Chinibayeva T.T., PhD, head of the «CE» department, associate professor - Yemberdiyeva A.B., master of degree, lector of the «CE» department

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

	LO1	LO2	LO3	LO4	LO5	LO6	LO7	LO8	LO9	LO10
GC1	V									
GC2										V
GC3					V		V			
KC1		V	V	V	V	V			V	
KC2	V		V		V		V		V	V
KC3		V	V	V	V		V		V	V
KC4		V		V	V		V		V	
KC5		V	V		V		V	V	V	V
KC6		V	V		V		V	V		
KC7		V	V	V	V	V				
KC8	V									

4.3 Information about courses

№	Name of the course	Short description of the course	Number of credits	Prerequisites	Postrequisites	Formed competencies (codes)
General disciplines (GD) Mandatory component (MC)						
1	HK6002 History of Kazakhstan	The laws of the historical process, the place of man in the historical process are studied. Historical knowledge is given about the main stages of development of modern Kazakhstan; focuses on the problems of historical and cultural processes and the development of Kazakhstan.	5	-	-	GC2 KC8
2	SPS6001 Philosophy	Studying the principles of understanding philosophy as a methodology of human activity, the main directions and problems of the world. The formation of a holistic vision of philosophy as a special form of knowledge of the world, its main problems and methods of studying them in the context of future professional activity.	5	-	-	GC2 KC8
3	LAN6001A, LAN6002A Foreign language	Written and oral communication skills in English are taught.	10	-	-	GC3, KC8
4	LAN6001K R, LAN6002K R Kazakh (Russian) language	The skills of written and oral communication in the state language (the language of interethnic communication) are inculcated.	10	-	-	GC3 KC8
5	ICT6001 ICT	The skills of applying information and communication technologies in substantive activities are taught.	5	-	-	KC1 GC1
6	SPS6007 Sociology - Political science	During the course "Sociology" various phenomena of social life are studied. At the same time the study is carried out from various paradigms of social knowledge, using theories and scientific methods. Students successfully completing the course will be able to: 1. Use qualitative and quantitative research methods, which will be useful in scientific and professional field. 2. Distinguish between scientific and non-scientific knowledge. 3. Understand and analyze social phenomena and issues from different perspectives. 4. Manage to work in a team. The course Political science provides comprehensive coverage of all key elements, the study of sources and political relations, types of political systems, democratic and authoritarian systems, political mechanisms, political competition and power, political capital and values, survival of political ideas, nationalism, analysis of domestic and foreign policy, political growth, state policy in the world political system.	4	-	-	GC2 KC8
7	SPS6006 Cultural studies - Psychology	As a result of studying a course in the field of cultural studies, students will acquire the fundamentals for studying the entire complex of social sciences and humanities, and master intercultural communication. At the same time, the discipline of cultural studies can serve as an addition to general courses in history and philosophy. The course material can serve as a methodological guide for a number of special disciplines: for example, ethics, history of culture, styles of art, national schools of management, strategy and negotiation tactics,	4	-	-	GC2 KC8

		management of culture. Methods and technologies of training used in the implementation of the program: role-playing games and educational discussions in various formats; case study, project method. The psychology course studies main issues of psychology in a wide educational and social context. Knowledge and skills gained in the course give students the opportunity to practically apply them in different life spheres such as personal, family, professional, business, social (working with people of different age and social categories).				
8	PhC6005 Physical Culture	The ability to understand the practical use of healthy living standards, including prevention issues, is being instilled.	8	-	-	GC2
University component (UC)						
9	ECO6006 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.	5	-	-	KC2 LO1
10	FIN6720 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.	5	-	-	KC2 LO1
11	JUR 6470 Fundamentals of law and anti-corruption culture	The course outlines the legal, economic, and social foundations of fighting corruption. Throughout the course, students will gain practical knowledge in identifying the peculiarities of state policies, applying international experiences in combating corruption, mastering skills in conflict resolution, and detecting corruption activities using professional ethics and methods. After successful completion of the course, students will gain the following competencies: 1. Understand the measures of legal responsibility for participation in corruption violations. 2. Determine the conflict of interests in the activities of organizations leading to corruption. 3. Analyze the work of organizations using various research methods.	5	-	-	KC2 LO1
12	MGT6706 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.	5	-	-	KC2 LO1
13	JUR 6507 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	5	-	-	KC2 LO1

		considered - natural resources and environmental pollution.				
14	RM6502 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).	5	-	-	KC2 LO1
15	MAT6001* * Algebra and geometry	Studying the elements of linear algebra and analytic geometry using real life and various science examples.	4	-	-	KC2 LO1 LO5
16	MAT6002 Mathematical analysis	We consider such concepts as limits and differentiation of functions of one variable, indefinite and definite (Riemannian) integrals of functions with applications, as well as an introduction to topics related to ordinary differential equations.	6	-	-	KC2 LO1 LO10
17	PHY6001 Physics	Studying the basic laws of classical mechanics, electricity, magnetism, thermodynamics, quantum mechanics, special relativity in search of ways to solve physical problems.	4	-	-	KC2 LO1 LO10
18	MAT6005 Discrete math	The study of discrete objects, the solution of combinatorial problems, the study of types of mappings and binary relations, the reduction of propositional algebra formulas to normal forms, the application of logic algebra to the theory of switching circuits. The capabilities for analysis and synthesis, and mathematical maturity are developing.	4	-	-	KC2 LO1 LO10
19	SFT6322 Introduction of artificial intelligence	The course will cover basic machine learning algorithms such as regression, classification, clustering, and neural networks, as well as deep learning and natural language processing technologies.	5	-	-	KC3 LO8 LO10
20	SFT6301 Algorithmization and programming	More complex, advanced algorithms and data structures using the C++ programming language are considered.	6	-	-	KC3 LO1 LO3 LO4
21	MAT6006 Probability theory and mathematical statistics	The course focuses on the probability and statistics of any events, as well as on the relationship between mathematics and programming through an interdisciplinary training program that deepens the mathematical understanding of probability and develops the skills of logical and algorithmic thinking.	4	-	-	KC2 LO1 LO10
22	EGR6302 Information theory	Information theory is a branch of applied mathematics and computer science involving the quantification of information. The aim of course is to form a system of knowledge on the basics of information theory and its application to the practice of modern information systems. Objectives of the course: concept and types of information systems, the concept of entropy and ways of its assess, the concept of information, ways of quantify the information, theoretical and practical aspects of efficient coding, theoretical and practical aspects of noiseless coding, data transfer systems, modulation and demodulation.	5	-	-	KC2 LO1 LO10
23	SFT6002 Object oriented programming	The course is devoted to the principles of object-oriented programming using C++ and the GUI part of the QT library. Topics covered are classes and objects, inheritance, and polymorphism. We study all the basic concepts of GUI programming in the QT library.	6	-	-	KC3PO2 LO6
24	SFT6302 Algorithms and data structures	The principles of algorithm development, analysis of algorithms and fundamental data structures are considered. The emphasis is on choosing appropriate data structures and developing effective and correct algorithms for their	4	-	-	KC3 KC5 KC7

		implementation. Important elements of the course are measuring the performance and effectiveness of programs when comparing and comparing the results of small programs written in different languages.				LO1 LO3 LO4
25	LAN6007K Business corresponde nce in the state language	Business language skills are taught. The formation and development of listening, speaking, reading and writing skills on topics related to professional activities, as well as the development of social skills such as presentations.	2	-	-	GK3 KC8 LO8
26	PP6301 Educational practice	The acquisition of primary professional skills and the consolidation of skills by independently solving the problems of algorithmization, design and practical implementation of programs using modern programming technologies.	2	-	-	KC1 KC3
27	RM6301 Research fundamental s	Studying the issues of practical organization of scientific research, analysis and generalization of research results, mastery of the theory of engineering decision making, the basics of project management, requirements analysis, architecture development, detailed design, development of user interfaces and testing methods.	4	-	-	KC2 LO10
28	Parallel programmin g	The course "Parallel Programming" is intended for those who want to learn how to create and optimize parallel programs. The course will cover the basic concepts of parallel programming, such as multithreading, parallelization of computations, thread synchronization, etc.	6	-	-	KC3 LO3
29	SFT6305 Database design. Introduction to SQL	During the course, students will learn how to create relational databases, going through all the stages of the database design process (conceptual, logical and physical). In the second part of the course, students will learn the basics of Structured Query Language (SQL).	6	-	-	KC3 KC7 LO5 LO6
30	NET6301 Introduction to computer networks	Acquaintance with the basic network concepts and technologies, as well as developing the skills of planning and implementing small networks. The architecture, structure, functions, components and models of the Internet and other computer networks are considered. The principles and structure of IP addressing, as well as the basics of Ethernet concepts, media and operations, are presented as the basis for the curriculum.	4	-	-	KC1 KC2 KC3 LO1
31	SFT6304 Programmin g in Python	Familiarity with the Python programming language and its libraries. The emphasis is on procedural programming, non-strict types of variables, designing algorithms, working forms of applications (libraries), object-oriented programming, creating web and database applications, as well as data preprocessing.	5	-	-	KC3 LO6
32	SFT6306 Software architecture and design	The study of large systems and how they are decomposed into subsystems and components. Various notations and formalisms, detailed design and architecture are considered. The use of various notation with an emphasis on UML is explored. The role of architecture and detailed project specifications are considered in terms of risk management.	4	-	-	KC3 KC4 KC7 LO3
33	ANL6301 Introduction to data science	A basic understanding of machine learning and statistics. Studying data science methodology, open source tools for data science, the basics of mathematical statistics needed for machine learning. Constructing and testing hypotheses. The use of simple predictive models.	6	-	-	KC3 KC4 KC7 LO5 LO6
34	SEC6301 Fundamenta ls of information security	It covers basic security concepts, principles and technologies, cryptography, attack methods and security monitoring. Studying basic security methods for searching for threats on the network using various popular security tools in a real network infrastructure.	4	-	-	KC1 KC8 LO10

35	SFT6307 Web technologies	Learning the basic web technologies for front-end and back-end development using modern languages, tools and frameworks.	7	-	-	KC3 KC7 LO2 LO5 LO9
36	PM6301 Project management	Learning the basics of project management and the necessary steps to ensure successful project management. Studying the main characteristics of project management and various roles in the project to ensure success. Application of key skills to the project to evaluate, plan and develop control mechanisms.	4	-	-	KC3 KC4 KC6 KC7 LO8 LO10
37	LAN6003P A Professionally-oriented foreign language	Business English skills are taught. The formation and development of listening, speaking, reading and writing skills in English on topics related to professional activities, as well as the development of social skills such as presentations.	4	-	-	GK3 KC8 LO10
38	PP6302 Industrial practice	The consolidation of theoretical knowledge and the acquisition of practical skills in enterprises.	4	-	-	KC1 KC3
39	PP6303 Industrial practice	Systematization, consolidation and expansion of theoretical knowledge, development of practical skills, mastery of the elements of independent practical and research work in enterprises.	4	-	-	KC1 KC3
40	PP6304 Pre-diploma practice	Search for information for writing the diploma project	5	-	-	KC2
Elective courses (EC)						
41	SFT6309 UX/UI development	The course introduces students to the concept of designing systems that can effectively interact with people. Students will learn the principles of design and human behavior, as well as empirical research methods used to solve real problems in developing the interface.	5	ICT	project	KC4 KC6 KC7 LO2
42	MIN601 Minor 1	Additional educational program (minor) - a set of disciplines and (or) modules and other types of educational work, determined by students for study in order to form additional competencies	5	-	-	KC2 KC3 KC6 LO1 LO10
43	NET6310 Operating System	The purpose of the discipline "Operating System" is to teach students the basics of working and managing the operating system. Upon completion of the course, students should have an understanding of the core concepts and be able to use it effectively in a variety of scenarios.	5	-	-	KC2 KC3 KC5 KC6 KC7 LO3
44	SFT6328 Development of mobile applications on IOS	The student will learn the features of databases and information assurance applications in operation systems iOS; will utilize enterprise information systems to support information security applications; to have basic skills in database administration of enterprise information systems.	7	Application Development Basics	Full stack development, project	KC2 KC3 KC5 KC6 KC7 LO5 LO7 LO8
45	SFT6311 Front-end development	In this course, students will study in detail the process of creating the client side of the site, namely the layout of the site template and the development of the user interface.	5	Introduction to Application	Full stack development	KC2 KC3 KC5 KC6

				Development	Project	
						KC7 LO2 LO9
46	MIN602 Minor 2	Additional educational program (minor) - a set of disciplines and (or) modules and other types of educational work, determined by students for study in order to form additional competencies	5	-	-	KC2 KC3 KC5 KC6 KC7 LO1 LO10
47	MIN603 Minor 3	Additional educational program (minor) - a set of disciplines and (or) modules and other types of educational work, determined by students for study in order to form additional competencies	5	-	-	KC2 KC3 KC5 KC6 KC7 LO1 LO10
48	SFT6321 QA testing	This course includes theoretical and practical classes on the following topics: main types of testing; basics and classification of testing; testing principles; WEB-product testing; software development methodology; test design techniques; work with Requirements for the tester; compiling and working with checklists in practice; compiling and working with test cases in practice; compiling and working with bug reports in practice; compiling and working with test sets; work in the JIRA system, etc.	6	-	-	KC2 KC3 KC5 KC6 KC7 LO8
49	SFT6319 Blockchain technology	The Blockchain course is for those who want to learn more about blockchain technology and its applications. The course will look at how blockchain works, what its advantages and disadvantages are, what cryptocurrencies and tokens use blockchain, how to create and use smart contracts, and what are the examples of blockchain applications in various fields such as finance, logistics, medicine, etc. others	6	-	-	KC2 KC3 KC5 KC6 KC7 LO10
50	SFT6303 PL/SQL Programming	The course is a continuation of "Database Design. Introduction to SQL". It is based on fundamental procedural SQL concepts that are used to extract and process data from databases. Topics covered include control structures, composite data types, exception handling, triggers and packages, functions and procedures.	5	-	-	KC2 KC3 KC5 KC6 KC7 LO5 LO6
51	SFT6374 Architecture and Organization of Computer Systems	The discipline of «Architecture and Organization of Computer Systems» focuses on the study of computer hardware architecture, system organization, and the principles that govern the design and operation of computer systems. It provides students with a deep understanding of the inner workings of computers, enabling them to design efficient and reliable systems. «Architecture and Organization of Computer Systems» discipline aims to provide students with a comprehensive understanding of computer system architecture, organization, and design principles. It prepares them for careers in computer engineering, embedded systems, system administration, and related fields, equipping them with the knowledge and skills to design, develop, and optimize efficient and reliable	5	-	-	KC2 KC3 KC5 KC6 KC7 PO3 LO7

		computer systems.				
52	SFT6333 Creating Video Games	Creating Video Games is a class that introduces students to the complexities of working in small, multidisciplinary teams to develop video games. Students will learn creative design and production methods, working together in small teams to design, develop, and thoroughly test their own original digital games. Design iteration across all aspects of video game development (game design, audio design, visual aesthetics, fiction and programming) will be stressed. Students will also be required to focus test their games, and will need to support and challenge their game design decisions with appropriate focus testing and data analysis	5	-	-	KC2 KC3 KC5 KC6 KC7 LO4 LO8
53	SFT6329 Introduction to quantum computing	In the course, quantum computing will be considered more from the point of view of mathematics, rather than quantum physics, the main concepts on which quantum algorithms are built will be told, some existing quantum algorithms will be considered.	6	-	-	KC2 KC3 KC5 KC6 KC7 LO1
54	SFT6332 Knowledge Management	The discipline is devoted to modern methods and means of managing information systems (IS) in the enterprise. The course examines the theory of knowledge management in organizations and the main information systems used for knowledge management in organizations	5	-	-	KC2 KC3 KC5 KC6 KC7 LO9 LO10
55	SFT6313 Mobile technologies and applications	Studying the design, implementation, testing, debugging and publishing of applications for Java-based smartphones.	7	OOP	Project	KC2 KC3 KC5 KC6 KC7 LO1 LO2
56	SFT6314 Full stack development	Full Stack development is the development of databases, servers, systems engineering and customer interactions. Depending on the project, customers may need a mobile stack, a web stack, or their own application stack. The course examines the technologies needed to complete the "full stack" of the project.	5	Web-technologies	project	KC2 KC3 KC5 KC6 KC7 LO1 LO3 LO10
57	SFT6376 Microsoft .NET Framework	The discipline "Microsoft .NET Framework - Application Development" is included in the university educational program and is intended for students interested in developing software on the Microsoft .NET Framework platform. The course includes learning the basics of technologies and tools used to create modern applications that run on the .NET platform. Within this discipline, students learn the basics of programming on the .NET platform, including the programming languages C# and Visual Basic.NET, as well as the basics of working with the Visual Studio integrated development environment. Students also learn how to build and debug applications that use various .NET components	5	C# programming language, VB.NET, introduction to SQL databases, web	Project	KC2 KC3 KC5 KC6 KC7 LO2 LO9

		such as Windows Forms, ASP.NET, ADO.NET, WPF (Windows Presentation Foundation) and others.		technologies		
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4.4 List of modules and learning outcomes

Module name	Total number of credits	Learning outcomes	Criteria for assessing learning outcomes	Module-forming disciplines
GENERAL EDUCATION MODULES				
General education module	10	The student has an idea of the principles and laws of the historical development of society, the historical periodization of the history of Kazakhstan, the place of the history of Kazakhstan in world history and the history of Eurasia, the place and role of philosophy in the life of society and man; the main stages of development of world and Kazakh philosophical thought.	Testing, interview, term presentation, midterm. oral report, paper,	History of Kazakhstan
Social and political knowledge module	16	The student has an idea of socio-ethical values based on public opinion, traditions, customs, social norms and focuses on them in their professional activities; traditions and culture of the peoples of Kazakhstan; the rights and freedoms of man and citizen; the foundations of the legal system and legislation of Kazakhstan; social development trends in society; the basics of physical culture and the principles of a healthy lifestyle.	Testing, interview, term presentation, midterm. oral report, paper,	Philosophy Political science Sociology Psychology Cultural studies Physical training
Language module	25	The student can freely express himself in writing and verbally, including professionally in the state language, the language of interethnic communication and English; knows how to logically correctly, reasonably and clearly build oral and written speech.	Testing, interview, paper, presentation, midterm. oral term	Foreign language Kazakh (Russian) language Professional Kazakh (Russian) language Professionally-oriented foreign language
BASIC MODULES				
Basic module	9	The student is able to use modern ICT in professional activities, independently versatile and critically analyze modern sources, draw conclusions, argue them and make decisions based on information.	Testing, oral report, presentation, laboratory work, midterm control. interview, paper, laboratory	Information and communication technology Physics Research fundamentals
Math module	24	The student is able to use basic mathematical tools to solve professional problems.	Testing, oral interview, course, laboratory, control work, midterm. control	Algebra and geometry Mathematical analysis Theory of probability and mathematical statistics Discrete math Information theory
PROFESSIONAL MODULES				
Programming module	40	The student is able to apply suitable data structures and develop appropriate algorithms to solve various computational problems. The student is able to use various tools for software	Testing, oral interview, course, laboratory, control work, midterm.	Introduction to data science Algorithmization and programming Parallel programming

		development, user interface, storage and data processing systems.		Object oriented programming Algorithms and data structures Operating System Database design. Introduction to SQL Programming in Python Web technologies UX/UI development PL/SQL Programming Minor 1 Minor 2 Mobile technologies and applications Full stack development Minor 3 QA testing Front-end development Architecture and Organization of Computer Systems Creating Video Games Introduction to quantum computing Blockchain technology Knowledge Management Microsoft .NET Framework Development of mobile applications on IOS
Advanced programming module	40	The student is able to use various tools for software development, user interface, storage and data processing systems.	Testing, oral interview, course, laboratory, control work, midterm.	Introduction to computer networks Fundamentals of information security
Network and system administration module	20	The student is able to administer systems and networks of any configuration, troubleshoot and prevent threats.	Testing, oral interview, course, laboratory, control work, midterm.	Software architecture and design Economics and organization of production Project management
Project module	13	The student is able to use various software development methodologies, compile software documentation using the required diagrams, develop models of the logical and physical architecture of a software system, database, and manage the development process.	Testing, oral interview, course work, laboratory work, test work, midterm control.	

5 Curriculum of the educational program

№	Code	Subject	Number of hours						Study language	Result. control	Distribution of credits per semester			
			Total		SSH		Aud.				Number of academic credits	Number of academic credits	Extra term	
			ST	SH	S	H	PS	L						Lab
Core subjects														
1	LAN6001A	Foreign language	150	15	90	45	45	0	0	0	0	5		
2	ICT6001	Information and Communication Technologies	150	15	90	45	0	15	30	0		5		
3	LAN6002A	Foreign language	150	15	90	45	45	0	0	0			5	
4	PhC6005	Physical Culture	120	15	60	45	45	0	0	0			4	
Catalogue of University disciplines														
5	SFT6301	Algorithmization and Programming	150	15	90	45	0	15	30	0		5		
6	NET6301	Introduction to computer networks	150	15	90	45	0	15	30	0		5		
7	SFT6305	Database Design. Introduction to SQL	150	15	90	45	0	15	30	0		5		
8	MAT6001	Algebra and Geometry	120	15	60	45	30	15	0	0		4		
9	PHY6001	Physics	120	15	60	45	0	15	30	0			4	
10	MAT6002	Mathematical analysis	180	15	105	60	30	30	0	0			6	
11	EP6301	Educational practice	60	0	0	60	0	0	0	60			2	
12	SFT6306	Software Architecture and Design	150	15	90	45	0	15	30	0			5	
13	SFT6304	Programming in Python language	150	15	90	45	0	15	30	0			5	
		Total:	1800	180	1005	615	195	150	210	60		29.0	31.0	0.0

№	Code	Subject	Number of hours						Study language	Result. control	Distribution of credits per semester			
			SSH		Aud.		Contact hours				Number of academic credits	Number of academic credits	Extra term	
			Total	ST	SH	Aud.	L	Lab						WP
Core subjects														
1	LAN6001KR	Kazakh (Russian) language	150	15	90	45	45	0	0	0	5			
2	PhC6006	Physical Culture	120	15	60	45	45	0	0	0	4			
3	SPS6001	Philosophy	150	15	90	45	30	15	0	0	5			
4	LAN6002KR	Kazakh (Russian) language	150	15	90	45	45	0	0	0	5			
5	HK6002	History of Kazakhstan	150	15	90	45	30	15	0	0	5			
Catalogue of University disciplines														
6	MAT6005	Discrete mathematics	120	15	60	45	30	15	0	0	4			
7	SFT6302	Algorithms and Data Structures	150	15	90	45	0	15	30	0	5			
8	EGR6302	Information theory	150	15	90	45	0	15	30	0	5			
9	SFT6322	Introduction of artificial intelligence	150	15	90	45	0	15	30	0	5			
10	MAT6006	Probability theory and mathematical statistics	120	15	60	45	30	15	0	0	4			
11	SFT6002	Object oriented programming	150	15	90	45	0	15	30	0	5			
12	LAN6003PA	Professionally oriented foreign language	120	15	60	45	30	15	0	0	4			
13	IP6302	Industrial practice	120	0	0	120	0	0	0	120	4			
Qualification examination														
14		History of Kazakhstan											5	
		Total:	1800	180	960	660	285	135	120	120	32.0		28.0	0.0


№	Code	Subject	Number of hours						Study language	Result. control	Distribution of credits per semester				
			SSH		Aud.		Contact hours				1	2	Extra term		
			Total	ST	SH	Aud.	L	PS						Lab	WP
Core subjects															
1	SPS6006	Cultural studies-Psychology	120	15	60	45	15	30	0	0	0	4			
2	SPS6007	Sociology-Political science	120	15	60	45	15	30	0	0	4				
Catalogue of University disciplines															
3	LAN6007K	Business correspondence in the state language	60	15	15	30	0	30	0	0	2				
4	SFT6307	Web-technologies	150	15	90	45	15	0	30	0	5				
5	HRD6302	Architecture and Organization of Computer Systems	150	15	90	45	15	0	30	0	5				
6	SFT6303	PL/SQL Programming	150	15	90	45	15	0	30	0	5				
7	SFT6321	QA testing	150	15	90	45	15	0	30	0	5				
8	SFT6319	Blockchain technology	180	15	105	60	15	30	15	0	6				
9	EGR6301	Operating Systems	150	15	90	45	15	0	30	0	5				
10	IP6303	Industrial practice	120	0	0	120	0	0	0	120	4				
Electives															
11	RM6502	Research methodology	150	15	90	45	15	30	0	0	5				
12	JUR 6507	Fundamentals safety of life activity and ecology	150	15	90	45	15	30	0	0	5				
13	MGT6706	Startups and entrepreneurship	150	15	90	45	15	30	0	0	5				
14	JUR 6470	Fundamentals of law and anti-corruption culture	150	15	90	45	15	30	0	0	5				
15	FIN6720	Basics of Financial Literacy	150	15	90	45	15	30	0	0	5				

16	ECO6006	Economic theory	150	15	90	45	15	30	0	0	exam.			
17	SFT6309	UX/UI development	150	15	90	45	15	15	15	0	exam.	5		
18	MNR6701	Minor 1	150	15	90	45	15	15	15	0	exam.			
19	SFT6311	Front-end development	150	15	90	45	15	15	15	0	exam.			
20	SFT6313	Mobile technologies and applications (Android)	150	15	90	45	15	0	30	0	exam.	5		
21	SFT6328	Development of mobile applications on IOS	150	15	90	45	15	0	30	0	exam.			
22	MNR6702	Minor 2	150	15	90	45	15	0	30	0	exam.			
	Total:		3150	315	1770	1065	300	345	300	120		31.0	29.0	0.0

№	Code	Subject	Number of hours						Study language	Result. control	Distribution of credits per semester				
			Total		SSH		Aud.				1	2	Extra term		
			ST	SH	L	PS	U	GP						Number of academic credits	Number of academic credits
Catalogue of University disciplines															
1	RM6301	Research fundamentals	150	15	90	45	15	0	30	0	by student's option	t.w.	5		
2	SEC6301	Fundamentals of information security	150	15	90	45	15	30	0	0	by student's option	exam.	5		
3	ANL6301	Introduction to data science	180	15	105	60	15	30	15	0	by student's option	exam.	5		
4	SFT6333	Creating Video Games	150	15	90	45	15	30	0	0	by student's option	exam.	5		
5	SFT6329	Introduction to quantum computing	180	15	105	60	30	30	0	0	by student's option	t.w.	6		
6	PM6301	Project management	150	15	90	45	15	30	0	0	by student's option	exam.		5	
7	SFT6325	Parallel programming	180	15	105	60	15	30	15	0	by student's option	exam.		6	
8	SFT6332	Knowledge Management	150	15	75	60	30	30	0	0	by student's option	t.w.		5	
9	PP6304	Pre-diploma practice	150	0	0	150	0	0	0	150	by student's option	pract		5	
Electives															
10	SFT6314	Full Stack Development	150	15	90	45	15	30	0	0	by student's option	exam.	5		
11	SFT6376	Microsoft .NET Framework	150	15	90	45	15	30	0	0	by student's option	exam.			
12	MIN603	Minor 3	150	15	90	45	15	30	0	0	by student's option	exam.			
Qualification examination															
13		Diploma thesis/project												8	
		Total:	1890	165	1020	705	195	300	60	150			31.0	29.0	0.0

6 Developer approval sheet

The title of the educational program: 6B06110 «Software Engineering»

№ п/п	Position, degree, last name and initials of a developer of the educational program	Date	Signature	Note
1	PhD, head of the «CE» department, associate professor T.T.Chinibayeva	27.03.2024		
2	MSc, lector of the «CE» department Yemberdiyeva A.B.	27.03.2024	