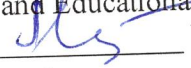
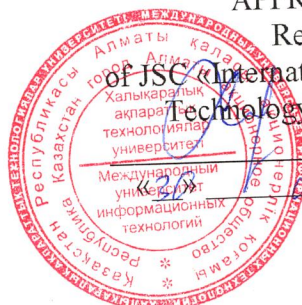


AGREED
Vice-Rector for Academic
and Educational Activities

Mustafina A.K.
«__» _____ 2023

APPROVED
Rector
of JSC «International Information
Technology University»

Hikmetov A.U.
«__» _____ 2023



EDUCATIONAL PROGRAM

6B06118 «Immersive technologies»

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

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Director of
«Dream for Gain» LLC

Oskembay D.M.
«__» _____ 2023



AGREED
Executive director of
«KazRENA Association» ALE

Tatybayev S.K.
«__» _____ 2023



Content

List of abbreviations and notation.....	4
1 Description of the educational program	5
2 Purpose and objectives of the educational program	5
3 Requirements for evaluating the learning outcomes of an educational program	6
4 Passport of the educational program	7
4.1 General information	7
4.2 Matrix for correlating the learning outcomes of the educational program with the competencies being formed	10
5 Curriculum of the educational program	14
6 Approval sheet with developers	24

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 6B06118 "Immersive Technologies" (Immersive Technologies) is designed to implement the principles of the democratic nature of education management, expanding the boundaries of academic freedom and the powers of educational institutions, which will ensure the adaptation of the system of technical and vocational education to the changing needs of society, the labor market economy. The flexibility of the program will 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, the transformation of professional competencies from professional standards and qualification standards into learning outcomes. At the same time, student-centered learning is carried out - the principle of education, which implies a shift in emphasis in the educational process from teaching to learning.

A graduate of this educational program will have the following skills, such as programming, prototyping modern XR systems, creating 3D models, special effects, animations, a user-friendly interface, optimizing and building applications using XR technologies, compiling design documents that reflect the work of future applications, artistic design.

The field of professional activity of graduates are public and private enterprises and organizations that develop, implement and use computer equipment 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 areas of human activity.

2 Purpose and objectives of the educational program

The purpose of the EP is to train highly qualified specialists with such skills as programming, prototyping modern XR systems, creating 3D models, special effects, animations, user-friendly interface, optimizing and building applications in XR, compiling design documents that reflect the work of future applications, artistic design. Applications include industrial quality control, medical imaging, geodesy, robotics, multimedia systems, virtual heritage, film and television special effects, and computer games.

Tasks of the OP:

1. Prepare a universal specialist who has knowledge in mathematics, ICT, computer science; c is able to use modern information and communication technologies in substantive activities.
2. To teach students how to formalize the subject area of a software project and develop specifications for software product components.
3. To develop students' ability to design software architecture and ensure a high level of continuity and quality of complex software developments.
4. To teach students how to design and develop user interfaces, commercial software components, databases, and embedded software modules.
5. To acquaint students with the methods and tools for studying the software code to identify / eliminate errors and malfunctions in the operation of the software.
6. To instill in students the skills to check compliance with specifications and indicators of performance and efficiency of integrated systems, as well as to design, construct and test components of a software product.
7. To teach students the basic techniques for creating and editing images in vector editors and the skills of editing photorealistic images in raster editors.
8. Apply modern information technologies to create artistic and design and design and technological solutions by means of computer graphics.
9. Apply modern information technologies to create artistic and design and design and technological solutions by means of computer graphics.

10. Use the basic laws of natural sciences in professional activities and operate modern electronic equipment and information and communication technologies in accordance with the goals of the bachelor's educational program.

11. Own methods of formal description, algorithms and software tools for the implementation of interactive software and hardware systems.

12. Analyze the prospects and directions for the development of the gaming industry.

13. Possess the skills of software implementation of multimedia systems, virtual, augmented and mixed reality using various equipment.

14. Use the main practical approaches, due to modern business processes, to the design of complex information security systems of varying degrees of complexity, depending on the nature of the object of protection.

15. Apply modern information technologies to create artistic and design and design and technological solutions by means of computer graphics.

16. Use knowledge of modern problems of science and education in solving educational and professional problems.

17. Navigate in the field of computer processing and obtaining animated images, justify the choice of software tools for solving specific problems, use the main software, technical and applied systems of computer animation.

18. Apply modern technologies and methodologies for receiving, storing, transmitting, processing big data.

19. Use modern visualization tools and technologies - the methodology for conducting design, pre-project and other creative and analytical studies, is able to apply these techniques in professional activities.

3 Requirements for evaluating the learning outcomes of an educational program

After mastering the educational program, the student must:

- Demonstrate the ability to use basic mathematical tools.
- Apply various tools for developing software, user interface and data storage and processing systems.
- Explain the execution of programs in a high-level language at the instruction level; use a wide range of memory technologies, internal and external;
- Write code to manipulate bits in a processor.
- Solve practical problems by creating programs in a good style, as well as modifying and rewriting the created program using analysis tools, development environment (s) for creating and debugging applications, modern compiler environments.
- Explain written program documentation and write documentation using operation diagrams, class diagrams, state diagrams, entity relationship (ER) diagrams. Be able to develop models of the logical and physical architecture of a software system.
- Design logical database schemas using relational, object-oriented, object-relational, key-value schemas for simple and complex defined systems.
- Understand the software development life cycle, different software development methodologies and the place of testing in this process.

- Able to create test cases and form test kits, develop and write acceptance tests, test scripts, document the defects found.
- Have the skills to select, design, implement, evaluate the quality and analyze the effectiveness of software for solving problems in various subject areas.
- Independently diversify and critically analyze modern sources, draw conclusions, argue them and make decisions based on information.
- To know the methods and means of computer graphics and geometric modeling, the basics of vector and raster graphics, the theoretical aspects of fractal graphics, the basic methods of computer geometry, the algorithmic and mathematical foundations of constructing realistic scenes, the implementation of computer graphics algorithms using a computer. (Basics of computer graphics)
- Know the concept and structure of the computer games industry, the history and classification of computer games. Be able to form the concept of a computer game, present the concept of a computer game. Have the skills to analyze the structure of a computer game.
- Be able to apply technologies, methods and tools for processing big data.
- Know and be able to apply in practice the basic mathematical models in the field of specialization.
- Be able to choose visualization methods and scenarios that are adequate for the subject area and the problem under study and effectively apply visualization tools to solve applied problems.
- To know the basic concepts and trends in the protection of computer information, the principles of information protection, the principles of classification and examples of security threats to computer systems, modern approaches to the protection of information technology products and systems implemented in current domestic and international IT security standards, the main tools for ensuring multi-level security in information systems.

4 Passport of the educational program

4.1 General information

No	Field name	Note
1	Code and classification of the field of education	6 B06 - Information and Communication Technologies
2	Code and classification of areas of study	061 - Information and Communication Technologies
3	Group of educational programs	B057 - Information technology
4	Name of the educational program	6B06117 "Immersive Technologies" (Immersive technologies)
5	Brief description of the educational program	The educational program "Immersive Technologies" is dedicated to the unity of technology and creative thinking. Within its framework, students will get acquainted with a wide range of subjects, ranging from the basics of algorithmization and programming, including project management skills. This direction will allow developing not only applied skills, but also the so-called soft skills, which are no less in demand among IT sector specialists in the 21st century. Students will get acquainted with the behavioral patterns of the user, understand how exactly it is necessary to use this data when developing interactive systems in augmented reality. The educational program "Immersive Technologies"

		includes basic courses in applied and social sciences, humanities, as well as a wide range of professional courses in digital media.
6	Purpose of the OP	Training of highly qualified specialists for innovative and high-tech industries in the field of computer graphics, image processing, visualization, computer vision, virtual and augmented reality, video processing, image recognition, human-computer interaction, machine learning and digital libraries. Applications include industrial quality control, medical imaging, geodesy, robotics, multimedia systems, virtual heritage, special effects in film and television, and computer games.
7	ISCED level	6
8	NQF level	6
9	ORC level	6
10	List of competencies of the educational program: OK1: The ability to be competent in choosing mathematical modeling methods for solving specific engineering problems, including the willingness to identify the natural science essence of problems that arise in the course of professional activity, and the ability to involve the appropriate physical and mathematical apparatus to solve it. OK2: Know: social and ethical values based on public opinion, traditions, customs, social norms and focus on them in their professional activities; traditions and culture of the peoples of Kazakhstan; human and civil rights and freedoms; fundamentals of the legal system and legislation of Kazakhstan; trends in the social development of society; bases of physical culture and principles of a healthy way of life of the person. OK3: Have an idea: about ethical and spiritual values; about sociological approaches to the individual, the main patterns and forms of regulation of social behavior; about the essence of power and political life, political relations and processes, about the role of political systems in the life of society and various social groups; about the role of consciousness and self-consciousness in the behavior, communication and activities of people, the formation and development of personality. OK4: Possess: ethical and legal standards 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 strengthening of health, the ability to work in a team, correctly defend one's point of view, and offer new solutions. OK5: Ability for written and oral communication in the state language and the language of international communication; the ability to logically correctly, reasoned and clearly build oral and written speech; readiness to use one of the foreign languages KK1. The ability to use modern information and communication technologies in objective activities. QC2. Able to formalize the subject area of a software project and develop specifications for software product components. QC3. Able to design software architectures and ensure a high level of continuity and quality in complex software developments. QC4 Able to design and develop user interfaces, commercial software components, databases and embedded software modules.	

	QC5. Capable of verifying compliance with specifications and indicators of performance and efficiency of integrated systems, as well as designing, constructing and testing software product components. QC6. Familiar with applicable software, modules, DBMS, programming languages, methods for extracting knowledge from data and developing client-server database applications. QC7. Explain the principles and patterns of the historical development of society, know your role in the development of information technology, strive for self-improvement. KK8 To master the basic techniques for creating and editing images in vector editors and the skills of editing photorealistic images in raster editors. KK9 Ability to use the basic laws of natural sciences in professional activities and operate modern electronic equipment and information and communication technologies in accordance with the goals of the bachelor's educational program. KK10 To master the methods of formal description, algorithms and software tools for the implementation of interactive software and hardware systems, to analyze the prospects and directions for the development of the gaming industry. KK11 Proficiency in software implementation of multimedia systems, virtual, augmented and mixed reality using various equipment. KK12 Able to use the main practical approaches, due to modern business processes, to the design of complex information security systems of varying degrees of complexity, depending on the nature of the object of protection.	
11	RO1. Demonstrate the ability to use basic mathematical tools. PO2. Apply various tools for software development, user interface and data storage and processing systems to ensure the software life cycle. PO3. Explain the execution of programs in a high-level language at the instruction level; use a wide range of memory technologies, internal and external; Write code to manipulate bits in a processor. RO6. Design logical database schemas using relational, object-oriented, object-relational, key-value schemas for simple and complex defined systems. RO7. Understand the software development life cycle, different software development methodologies and the place of testing in this process. RO9. Have the skills to select, design, implement, evaluate the quality and analyze the effectiveness of software for solving problems in various subject areas. RO10. Independently diversify and critically analyze modern sources, draw conclusions, argue them and make decisions based on information. RO11. To know the methods and means of computer graphics and geometric modeling, the basics of vector and raster graphics, the theoretical aspects of fractal graphics, the basic methods of computer geometry, the algorithmic and mathematical foundations of constructing realistic scenes, the implementation of computer graphics algorithms using a computer. RO13. Be able to choose visualization methods and scenarios that are adequate for the subject area and the problem under study and effectively apply visualization tools to solve applied problems. PO14. To know the basic concepts and trends in the protection of computer information, the principles of information protection, the principles of classification and examples of security threats to computer systems, modern approaches to the protection of information technology products and systems implemented in current domestic and international IT security standards, the main tools for ensuring multi-level security in information systems.	
12	Form of study	full-time
13	Languages of instruction	English
14	Volume of loans	240
15	Awarded Academic Degree	Bachelor in Information and Communication Technologies in the educational program 6B06117

		"Immersive Technologies"
16	Developer(s) and authors:	

4.2 Matrix for correlating the learning outcomes of the educational program with the competencies being formed

	RO1	RO2	RO3	RO4	RO5	RO6	RO7	RO8	RO9	RO10
KK1	V	V	V							
KK2					V					
KK3			V							
KK4			V	V						
KK5						V			V	
KK6					V	V				
KK7							V	V	V	
KK8							V			V
KK9	V									

3. Information about disciplines

No.	Title of the discipline	Brief description of the discipline	Number of credits	Formed competencies (codes)	Prerequisites
Cycle of general education disciplines					
Required component					
1.	History of Kazakhstan	The course examines the modern history of Kazakhstan as part of the history of mankind, the history of Eurasia and Central Asia. The modern history of Kazakhstan is a period in which a holistic study of historical events, phenomena, facts, processes is carried out, identifying historical patterns that took place on the territory of the Great Steppe in the twentieth century and to the present day.	5	PO10, PO2, PO3, PO4, PO5, PO6	No
2.	Philosophy	The object of study of the discipline is philosophy as a special form of spiritual pursuits in its cultural and historical development and modern meaning. The main	5	PO10, PO2, PO3,	No

		directions and problems of world and domestic philosophy are studied. Philosophy is a special form of knowledge of the world, creating a system of knowledge of the general principles and foundations of human life, about the essential characteristics of man's relationship to nature, society and spiritual life, in all its main directions.		PO4, PO5, PO6	
3.	Foreign language	The course includes an intensive English language program focusing on grammar and speaking skills. The course includes topics that reflect the latest developments in information technology, and the vocabulary makes them directly relevant to the needs of students.	10	PO7, PO2, PO3, PO4, PO5, PO6	No
4.	Kazakh (Russian) language	The course occupies a special place in the system of training bachelors with engineering education. For students of a technical university, studying professional Kazakh/Russian languages is not only the improvement of skills acquired at school, but also a means of mastering a future specialty.	10	OK5, KK7	No
5.	Information and communication technologies	The course examines information and communication technologies as modern methods and means of communication between people in ordinary and professional activities using information technologies for searching, collecting, storing, processing and disseminating information.	5	KK1, OK1	No
6.	Political science	The course focuses on general political knowledge for ICT majors. Includes political self-awareness, improvement of one's political outlook and communication competencies. Political knowledge teaching is communicative, interactive, student-centered, results-oriented, and relies heavily on student independent work.	2	OK3, OK4, KK7	No
7.	Sociology	The course includes knowledge of sociological subject areas, research methods and directions. The course will discuss in detail the main sociological theories and the most effective ways to gain in-depth knowledge about various aspects of our modern society. The particular importance of this course for students is to develop the sociological imagination, to understand the basic concepts of sociology as a science.	2	OK2, KK7	No
8.	Psychology	This course presents issues of psychology in a broad educational and social context. The knowledge, skills and abilities acquired and developed as a result of mastering the course content give students the opportunity to apply them in practice in various spheres of life: personal, family, professional, business, social,	2	OK2, KK7	No

		in working with people - representatives of different social groups and age categories . The course is also designed to develop bachelors' ideas about the factors that complicate teaching activities at the present stage of social development, and about the difficulties specific to this activity.			
9.	Cultural studies	The course will help become the basis for studying the entire complex of social sciences and humanities, as well as an addition to general courses in history and philosophy. The course includes topics such as morphology, semiotics, anatomy of culture; culture of the nomads of Kazakhstan, cultural heritage of the proto-Turks , medieval culture of Central Asia, the formation of Kazakh culture, Kazakh culture in the context of globalization, cultural policy of Kazakhstan, etc.	2	OK2, KK7	No
10.	Physical Culture	The course is devoted to the formation of personal physical culture and the ability to purposefully use various means of physical culture to preserve and improve health.	8	OK2	No
11.	Economics and organization of production	New trends in economics and production organization are discussed with examples from real life and practice. The structure of the national economy, enterprises and the organization of its production are considered.	5	KK2	No
Cycle of basic disciplines					
University component					
12.	Optics	The discipline "Optics" is devoted to the study of the properties and phenomena associated with the propagation, interaction and refraction of light. In this discipline, students deepen their knowledge of fundamental concepts of optics, including beam and wave optics, diffraction, interference, and polarization. They also study the applications of optical phenomena in various fields such as medicine, telecommunications, photography, and the design of optical systems and devices. The course includes both theoretical and practical aspects of optics to enable students to better understand and use light phenomena in various fields of science and technology.	5	KK2	Physics
13.	Physics	Study the basic laws of classical mechanics, special relativity, electromagnetic phenomena, quantum mechanics, thermodynamics in search of ways to solve physical problems	5	KK2 KK9	No
14.	Algebra geometry and	Knowledge of mathematical apparatus in the form of matrices, integrals, linear dependencies is the basis of this discipline. In addition, students deepen their knowledge in algebraic operations, solving equations, and explore geometric objects and their properties. This discipline provides fundamental mathematical	4	KK2 KK9	No

		skills and applications in various fields.			
15.	Information theory	As part of this discipline, students will study the transmission, storage and processing of information. She explores concepts such as entropy, encoding and data compression and helps optimize information transfer in various fields including information technology, communications and cryptography	5	KK2 KK9	No
16.	Algorithmization and programming	The course is designed to provide basic knowledge of a programming language (C++). Students are taught basic algorithms in C++. The course also contains if / else structures and loops. Arrays, functions and pointers are the main topics. Students will write programs in a procedurally oriented language. Search, sorting and recursive algorithms will be discussed in detail.	5	KK3	No
17.	Mathematical analysis	In this discipline, students will learn methods of function and sequence analysis to model and understand continuous processes and changes.	4	KK2 KK9	No
18.	Theory of Probability and Mathematical Statistics	In this subject, students will learn the analysis of random events and data, used to estimate probabilities, predict outcomes and make informed decisions.	4	KK2 KK9	No
19.	Information Security Basics	This discipline is devoted to the study of methods for protecting information from threats, including authentication, encryption, access control and risk management, ensuring the security of data and information systems.	4	KK2 KK9	No
20.	Discrete Math	Solve combinatorial problems, explore types of mappings and binary relations, reduce propositional algebra formulas to normal forms, apply the algebra of logic to the theory of switching circuits, use the basic properties of quantifiers to transform mathematical formulas, demonstrate the ability to analyze and synthesize, and correctly formulate the result.	4	KK2 KK9	No
21.	Educational practice	Basics of programming	2	KK1 KK3,	No
22.	Internship	Gaining production experience in solving industrial problems in the field of software development	8	KK1 KK3,	No
23.	Undergraduate practice	Collection and analysis of materials for writing a diploma project	5	KK2	No
Cycle of basic disciplines					
Component of choice					
24.	Unity Basics	The course is devoted to studying the Unity platform for creating interactive 2D and 3D applications and games. Includes basic programming, creating graphic and sound effects, managing animation, and interacting with the game world.	4	KK3 KK6	Algorithmization and programming

25.	Object-oriented programming	Apply object-oriented programming concepts in software development	6	KK3	Algorithmization and programming
26.	Web technologies	Be able to use the PHP programming language, master the basics of the MySQL database and develop server-side client web applications	6	KK3 KK6	Application Development Basics, Algorithmization and programming
27.	Software Architecture and Design (SDP5)	Within the framework of this discipline, students will learn to analyze the processes of design and development of software systems. Includes architectural design techniques, design patterns, principles for developing and testing software to ensure its reliability and efficiency.	4	KK3 KK6	Application Development Basics, Algorithmization and programming
28.	Project management	Be able to use project management tools at various stages of the project life cycle, make qualitative and quantitative assessments of project risks, and determine the effectiveness of the project Collaborative software development. Version control, planning, development process stages	5	KK3 KK4 KK5 KK6	Application Development Fundamentals
29.	Personnel Management	Software Development Lifecycle Management	4	KK3 KK4 KK5 KK6	Application Development Fundamentals
30.	Introduction to AR/VR technologies	This course is focused on developing an understanding of virtual, augmented and mixed reality, basic concepts, relevance and prospects of these technologies, as well as the principles of operation of VR/AR devices.	4	OK10 KK1 KK11	ICT
31.	Database design. Introduction to SQL	Use modern database management systems to create databases	5	KK3, KK6	Algorithmization and

					program ming
32.	OS	The course is a study of key aspects of computer operating systems. Students learn the principles and functionality of operating systems, including resource management, processes, file systems, networking, and security. The course helps students understand how operating systems enable computers to run efficiently and how they interact with application programs.	5	KK 2 KK3	Algorith mization and program ming, Algorith ms and data structure s
33.	Graphic Design Basics	The discipline provides an introduction to the basic principles and concepts of graphic design. In this discipline, students study elements of design such as composition, color, typography, and visual arts. They also learn to apply these elements to create effective and attractive design solutions in a variety of media, including printed materials, websites, advertising, and multimedia projects. The course may also include an introduction to professional graphics tools and software.	5	KK1 KK2	ICT, Applicati on Develop ment Fundame ntals
34.	Introduction to Machine Learning	Implement basic ML algorithms (decision tree, KNN, KMC, perceptron) in Python and Matlab for various problems of pattern recognition in information.	5	KK3 KK4 KK5	Algebra and geometr y, Theory of Probabili ty and Mathem atical Statistics
35.	Architecture and organization of computer systems	Understand the basic components of a computer, including the CPU, ALU and control unit, memory, I/O and memory, and a wide range of memory technologies, both internal and external.	5	KK2 KK3 KK6	ICT
36.	Computer Graphics Basics	Theoretical foundations for constructing mappings of geometric images on a plane and methods for solving engineering problems in a drawing are studied. Studying the discipline develops spatial and logical thinking, gives students the ability and skills to present technical ideas using drawings in the AutoCAD environment . The goal of the discipline is complete mastery of drawing as a means of expressing technical thought. The subject of	5	KK1 KK8	ICT

		computer graphics is the automation of the construction of graphic models, their transformation and research.			
37.	Algorithms and data structures	Every problem has multiple solutions, from both a technical and technological point of view, that best suit the non-technical aspects of the particular problem	5	KK3 KK6	Algorith mization and program ming
38.	Computer and mathematical modeling	The discipline opens up broad opportunities for understanding the connection between computer science and mathematics and other sciences - natural and social. Computer mathematical modeling in its various manifestations uses almost the entire apparatus of modern mathematics. The discipline contains the study of the basic principles of mathematical modeling and programming for technical calculations. Very often, mathematical modeling methods are the only possible ones.	5	KK2 KK9	ICT Mathem atical analysis
39.	Computer game development	This course is focused on designing, developing and testing entertainment and information applications. Familiarization with the principles of developing games aimed at various consumer groups. Disclosure of the specifics of development for various platforms: desktop, mobile, tablet devices, game consoles, as well as embedded web applications.	4	OK10 KK1 KK10	Algorith mization and program ming
40.	XR system design	This course is aimed at introducing the best practices for creating and designing mixed, virtual and augmented reality systems for developing and testing entertainment and information applications. Familiarization with the rules of interaction between the user's senses and extended reality systems will allow you to create applications that are comfortable and easy to interact with. The specifics of developing systems for various platforms and devices will also be studied.	5	OK10 KK1 KK10	ICT, Introduct ion to Program ming, Psycholo gy
Cycle of major disciplines					
University Component/Elective Component					
41.	Human-Computer Interaction	This discipline is based on the training of engineers specializing in the field of computer software development in interface design issues. The objectives of studying the discipline "Human-Machine Interaction" are to familiarize students with the basic principles of interface design, as well as problems that arise during the design process.	5	KK2 KK3 KK5	Introduct ion to Program ming
42.	Virtual simulation of physical processes	The discipline describes modern modeling methods for describing and analyzing the behavior of realistic nonlinear systems that are found in engineering and scientific disciplines.	5	KK1 KK2	Theory of Probabili ty and

		By developing and applying such methods and tools, students will gain a deep understanding of how various systems work, allowing them to more effectively implement XR into their own projects. Examples will be considered, including problems of micro- and nanoelectronics, bioengineering, materials science, and physics.			Mathematical Statistics, Mathematical analysis
43.	Blockchain technology	The discipline is devoted to the study and application of blockchain technology, which is a decentralized and secure way of recording and transmitting data. As part of this discipline, students will learn the principles of blockchain, its application in finance, logistics and other industries.	6	KK1 KK2 KK3	Introduction to Programming, Algorithmization and Programming
44.	Artificial Intelligence Basics	The discipline is devoted to the study of the basic concepts, methods and algorithms of artificial intelligence. Students study machine learning, neural networks, natural language processing and other techniques used in creating intelligent systems.	5	KK1 KK2 KK3	Algebra and geometry, Mathematical analysis, Introduction to Programming
45.	Digital image processing	As part of this discipline, students will study methods for processing and analyzing digital images. They learn to enhance images, recognize objects in photographs, and apply this knowledge in medical, space and other fields.	5	KK1 KK2 KK3	Algebra and geometry, Mathematical analysis, Introduction to Programming
46.	Microsoft .NET framework – Application development	This discipline focuses on application development using the Microsoft .NET framework. Students learn the C# programming language and the .NET framework to create a variety of applications, including web applications, desktop applications, and mobile applications.	5	KK1 KK2 KK3	Introduction to Programming

47.	Visual information and data visualization	This discipline studies methods for presenting data in visual form. Students learn to create informative and attractive graphs, charts, and data visualizations that help them better understand and analyze information.	4	KK1 KK2 KK3	Algebra and geometry, Mathematical analysis, Introduction to Programming
48.	Pattern recognition systems	This discipline is aimed at students mastering the basics and methods of classification and identification of objects, phenomena, processes, signals, situations, etc. objects that are characterized by a finite set of certain properties and characteristics.	4	OK1 KK1	Algebra and geometry, Mathematical analysis, Introduction to Programming
49.	Digital twin development technologies + BIM	This discipline is aimed at introducing technologies for developing digital twins. These are a special type of simulation models that represent real objects. This is achieved by combining the subject's data with its simulation model. During the study of the subject, the characteristics and design, problems of creating a good digital twin using the AutoDesk solution package will be considered.	5	KK2, KK3, KK4, KK5, KK6	ICT, Algorithmization and programming
50.	Animation and visual effects	The discipline is aimed at using the principles of digital processing when shooting and editing animated films, forming basic ideas, knowledge, skills and abilities of students in the basics of computer animation and visual effects.	5	OK10 KK1 KK2 KK9	ICT
51.	Computer vision	Computer vision is a discipline that studies methods of reconstruction, interpretation of 3D scenes based on 2D images taking into account its structure and properties.	5	OK10 KK1 KK2	Object-oriented programming

52.	HCI - UI/UX in AR/VR	This discipline studies the principles of developing interfaces for XR systems. Problems arising during interaction will be considered user with technology. Students will learn to shape this interaction in such a way that the connection of spaces where the flat digital world meets three dimensions is as organic as possible .	4	OK1 KK1	ICT, Fundamentals of Graphic Design, Human-Computer Interaction
53.	Virtual reality systems	The technological aspects of the implementation of virtual reality systems are mainly considered: special devices, stages of creating virtual reality systems, its components, 3D graphics for modeling environments, objects, characters, software tools (engines) for controlling the model interactively in real time.	4	OK1 KK1 KK11	ICT, Introduction to AR/VR technologies, Algorithmization and programming

5		О ОД	О ОК	LAN600 1KR	Kazakh (Russian) language	5	3	3		5/1 50			4 5				1 5	90		5. 0			
6		О ОД	О ОК	PhC600 6	Physical Culture	4	3	3		4/1 20			1 2 0				0	0		4. 0			
7		О ОД	О ОК	SPS 6001	Philosophy	5	4	4		5/1 50	1 5		3 0				1 5	90		5. 0			
8		О ОД	О ОК	LAN600 2KR	Kazakh (Russian) language	5	4	4		5/1 50			4 5				1 5	90		5. 0			
9		О ОД	О ОК	HK6002	History of Kazakhstan	5	4	4		5/1 50	1 5	30. 0					1 5	90		5. 0			
10		О ОД	О ОК	SPS600 5	Psychology	2	5	5		2/6 0	1 5		3 0				1 5	0			2. 0		
elev en		О ОД	О ОК	SPS600 4	Cultural studies	2	5	5		2/6 0	1 5		3 0				1 5	0			2. 0		
12		О ОД	О ОК	SPS600 3	Political science	2	6	6		2/6 0	1 5		3 0				1 5	0			2. 0		
13		О ОД	О ОК	SPS600 2	Sociology	2	6	6		2/6 0	1 5		3 0				1 5	0			2. 0		
14		О ОД	О ОК	ECO60 02	Economic s and organizati on of production	5	6	6		5/1 50	1 5	30. 0					1 5	90			5. 0		
15		БД	В ОК	MAT 6001	Algebra and geometry	4	1	1		4/1 20	1 5		3 0				1 5	60	4. 0				

16		БД	В К	SFT6006	Algorithmization and programming	6	1	1			6/180	150	1300	15		15	105	60							
17		БД	В К	SFT6010	Software Architecture and Design (SDP5)	4	1	1			4/120	150	1300			15	60	40							
18		БД	В К	PHY6001	Physics	5	2	2			5/150	150	900	30		15	0	50							
19		БД	В К	MAT6002	Mathematical analysis	4	2	2			4/120	150	1300			15	60	40							
20		БД	В К	SFT6007	Web technologies	6	2	2			6/180	150	1300	15		15	105	60							
21		БД	В К	PP6301	Education al practice	2	2				2/60				60	0	0	20							
22		БД	В К	EEC6600	Optics	5	2	2			5/150	150	1300	15		15	75	50							
23		БД	В К	MAT6003	Discrete Math	4	3	3			4/120	150	1300			15	60	40							
24		БД	В К	SFT6002	Object-oriented programming	6	3	3			6/180	150	1300	15		15	105	60							
25		БД	В К	EGR6302	Information theory	5	3	3			5/150	150	1300			15	90	50							

26		БД	ВК	MAT6004	Theory of Probability and Mathematical Statistics	4	4	4	4	4/1 20	1 5	30. 0						1 5	60				4. 0				
27		БД	ВК	PP6302	Internship	4	4			4/1 20								1 2 0	0	0			4. 0				
28		БД	ВК	SFT6327	Unity Basics	4	5	5		4/1 20	1 5	30. 0							1 5	60			4. 0				
29		БД	ВК	PP6303	Internship	4	6			4/1 20								1 2 0	0	0				4. 0			
thirty		БД	ВК	PP6304	Undergraduate practice	5	8			5/1 50								1 5 0	0	0							5. 0
31		БД	ВК	SEC6301	Information Security Basics	4	8	8		4/1 20	1 5	30. 0							7 5	0							4. 0
32		БД	ВК	PM6301	Project management	5	8	8		5/1 50	1 5	30. 0							1 5	75							5. 0
33		ПД	ВК	SFT6305	Database design. Introduction to SQL	5	1	1		5/1 50	1 5	30. 0								90	5. 0						
34		ПД	ВК	SFT6300	XR system design	4	3	3		4/1 20	1 5	30. 0								60				4. 0			

35		ПД	В К	SFT637 9	Introduction to AR/VR technologies	4	4	4	4	4/1 20	1 5	1 5	30. 0						1 5	60					4. 0				
36		ПД	В К	SFT638 1	Graphic Design Basics	5	4	4	4	5/1 50	1 5	1 5	30. 0						1 5	90					5. 0				
37		ПД	В К	SFT638 2	Virtual simulation of physical processes	5	5	5	5	5/1 50	1 5	1 5	30. 0						1 5	90					5. 0				
38		ПД	В К	VRT638 4	Pattern recognition systems	5	6	6	6	5/1 50	1 5	1 5	30. 0						1 5	90					5. 0				
39		ПД	В К	SFT638 5	Animation and visual effects	5	6	6	6	5/1 50	1 5	1 5	30. 0						1 5	90					5. 0				
40		ПД	В К	VRT638 7	Computer vision	5	7	7	7	5/1 50	1 5	1 5	30. 0						1 5	90					5. 0				
41		ПД	В К	SFT638 8	HCI - UI/UX in AR/VR	4	7	7	7	4/1 20	1 5	1 5	30. 0						1 5	60					4. 0				
42		ПД	В К	SFT638 9	Virtual reality systems	4	7	7	7	4/1 20	1 5	1 5	30. 0						1 5	60					4. 0				
43		ПД	В К	SFT631 9	Blockchain technology	6	7	7	7	6/1 80	1 5	1 5	30. 0						1 5	10 5					6. 0				

44	ПД	К В	EGR6376	Computer and mathematical modeling	5	5	5	5/1 50	1 5	30. 0			1 5	90	5. 0		
45	ПД	К В	SFT6375	Artificial Intelligence Basics				5/1 50	1 5	30. 0			1 5	90			
46	ПД	К В	SFT6378	Introduction to Machine Learning	5	5	5	5/1 50	1 5	30. 0			1 5	90	5. 0		
47	ПД	К В	VRT6388	Digital image processing				5/1 50	1 5	30. 0			1 5	90			
48	ПД	К В	MIN601	Minor 1	5	5	5	5/1 50	1 5	30. 0	1 5		1 5	75	5. 0		
49	ПД	К В	SFT6377	Computer game development	4	6	6	4/1 20	1 5	30. 0			1 5	60	4. 0		
50	ПД	К В	SFT6380	Virtual reality systems				4/1 50	1 5	30. 0			1 5	90			
51	ПД	К В	MIN602	Minor 2	5	6	6	5/1 50	1 5	30. 0	1 5		1 5	75	5. 0		
52	ПД	К В	SFT6376	Microsoft .NET Framework Application	5	7	7	5/1 50	1 5	30. 0	1 5		1 5	75		5. 0	

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	Mandatory component(ООД/ОК)	51		13	00	1530	105	60	570	00		165	630	10	99	99	15	44	400
	University component(ООД/ВК)	5		1	00	150	15	30	00	00		15	90	00	00	00	00	500	00
	Component of choice(ООД/КВ)	0		0	00	00	00	00	00	00		00	00	00	00	00	00	00	00
2	Basic disciplines(БД)	81		14	00	1980	210	450	135	00		2450	915	14	22	15	840	40	14
	Required component(БД/ОК)	0		0	00	00	00	00	00	00		00	00	00	00	00	00	00	00
	University component(БД/ВК)	81		14	00	1980	210	450	135	00		2450	915	14	22	15	840	40	14
	Component of choice(БД/КВ)	0		0	00	00	00	00	00	00		00	00	00	00	00	00	00	00
3	Major disciplines (ПД)	95		20	00	2850	300	600	75	00		3000	1575	50	04	09	2033	500	00
	Mandatory component(ПД/ОК)	0		0	00	00	00	00	00	00		00	00	00	00	00	00	00	00
	University component (/VC)	52		11	00	1560	165	330	15	00		165	885	50	49	05	10	19	00
	Component of choice (ПД/КВ)	43		9	00	1290	135	270	60	00		135	690	00	00	05	194	5	5
4	Disciplines for the formation of professional competencies (БДФПК)	0		0	00	00	00	00	00	00		00	00	00	00	00	00	00	00
	University component (БДФПК/ВК)	0		0	00	00	00	00	00	00		00	00	00	00	00	00	00	00
	Component of choice(БДФПК/КВ)	0		0	00	00	00	00	00	00		00	00	00	00	00	00	00	00
5	Disciplines of personal development and formation of leadership qualities (БДЛР)	0		0	00	00	00	00	00	00		00	00	00	00	00	00	00	00

[illegible]

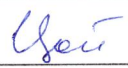
5. Additional educational programs

No.	Cycle	Discipline code	Name of the discipline	Semester	Loans	Prerequisites
3rd year						
1.	ПД	EGR6376	Computer and mathematical modeling	5	5	ICT, Mathematical analysis
2.	ПД	SFT6375	Artificial Intelligence Basics	5	5	Machine Learning Basics
3.	ПД	EGR6300	Computer Graphics Basics	5	5	ICT
4.	ПД	SFT6383	Human-Computer Interaction	5	5	ICT
5.	ПД	SFT6378	Introduction to Machine Learning	5	5	Algebra and geometry, Theory of Probability and Mathematical Statistics
6.	ПД	VRT6388	Digital image processing	5	5	ICT
7.	ПД	SFT6377	Computer game development	6	5	Mathematical analysis
8.	ПД	SFT6380	Virtual reality systems	6	5	Introduction to AR/VR technologies, Algorithmization and programming
4th year						
9.	ПД	VRT6386	Digital twin development technologies + BIM	7	5	Fundamentals of Computer Science Theory of Probability and Mathematical Statistics Basics of mathematical analysis
10.	ПД	SFT6376	Microsoft .NET Framework - Application Development	7	5	OS Database

11.	ПД	VRT6389	Visual information and data visualization	7	4	Mathematical analysis Linear algebra and geometry Theory of Probability and Mathematical Statistics
12.	ПД	VRT6383	Pattern recognition systems	7	4	Algebra and geometry, Mathematical analysis, Introduction to Programming
13.	ПД	MGT6300	Personnel Management	8	5	Application Development Fundamentals
14.	ПД	SFT6374	Architecture and organization of computer systems	8	5	ICT

6. Agreement sheet with developers

Name of educational program: 6B06118 «Immersive Technologies»

No.	Educational program developer's position, scientific or academic degree and Last name of I.O.	Date	Signature	Note
1	Генеральный Директор Т.Т.	15.03.23		
2	Ученый Д.Д.	15.03.23		
3				
4				