

«ІЛІЯС ЖАНСУГІРОВ АТЫНДАҒЫ ЖЕТІСУ УНИВЕРСИТЕТІ» КЕ АҚ  
НАО «ЖЕТЫСУСКИЙ УНИВЕРСИТЕТ ИМЕНИ ИЛЬЯСА ЖАНСУГУРОВА»  
NP JSC «ZHETYSU UNIVERSITY NAMED AFTER ILYAS ZHANSUGUROV»

**БЕКІТІЛДІ/ УТВЕРЖДЕНА/ APPROVED**

Басқарма отырысында/на заседании Правления/

at the meeting of Board /

Хаттама/ Протокол/ Protocol № 9 «15» 04 2025

Басқарма төрағасы – Ректор/ Председатель

Правления – Ректор/ Chairman of the Board-Rector

З.ғ.д., профессор Е. Бурибаев/

Ю.н., профессор Е. Бурибаев /

S.s., professor Y. Buribayev



**БІЛІМ БЕРУ БАҒДАРЛАМАСЫ  
ОБРАЗОВАТЕЛЬНАЯ ПРОГРАММА  
EDUCATIONAL PROGRAM**

6B06105 - Жасанды интеллект инжинирингі  
6B06105 - Инжиниринг искусственного интеллекта  
6B06105 - Artificial Intelligence Engineering


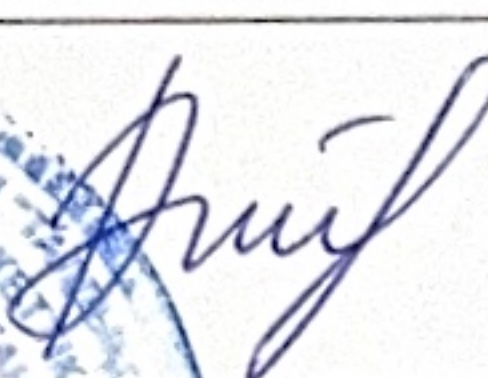
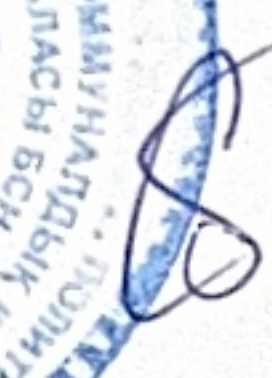

**БАКАЛАВРИАТ /  
BACHELOR'S DEGREE**



The educational program 6B06105 - Artificial Intelligence Engineering is developed in accordance with the following regulatory documents:

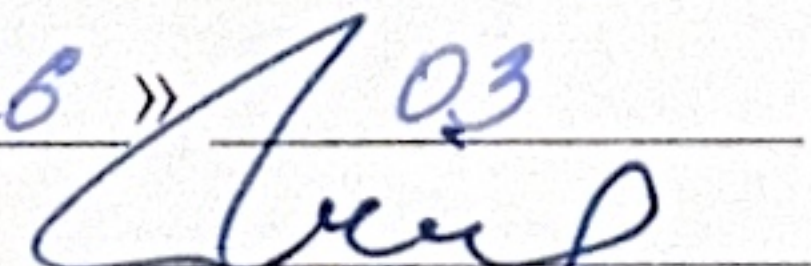
1. The Law of the Republic of Kazakhstan «On Education» dated 27.07.2007, No.319-III;
2. Order of the Minister of Education and Science of the Republic of Kazakhstan dated 20.04.2011, No.152 «Rules for the organization of the educational process on credit technology of education»;
3. Order of the Minister of Education and Science of the Republic of Kazakhstan dated 20.07.2022, No 2 «On approval of the State Mandatory Standards of Education at All levels of Education»;

Developers:


Chairman of the academic committee for the development of Educational Program		Smagulova Laura, Candidate of Pedagogical Sciences, Head of the Department of Information Technology and Artificial Intelligence, 87023939312, jgu_laura@mail.ru
Members of the academic committee for the development of Educational Program		
Academic personnel		Rima Abdualiyeva, teacher-lecturer of the Department of Information Technology and AI, 8 7470343840, rimaergaliyevna09@gmail.com
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Student consultants		Mameduly Sanzhar, 1 st year student of the educational program " Artificial Intelligence Engineering " of the Higher School of Technical Sciences 8 7089304246, mameduly.sanzhar.2007@gmail.com

The educational program was reviewed and recommended for approval at the meetings:

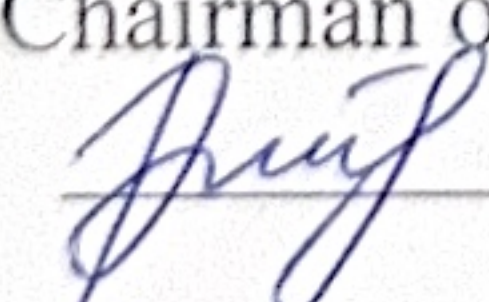
Academic Council of the University

Protocol № 7 from « 26 » 03 2025  
Chairman of Academic Council  B. Taubayev

Council of the Faculty of Physics and Mathematics

Protocol № 7 from « 21 » 02 2025  
Dean of the Faculty of Physics and Mathematics  I. Yesengabylov

Academic committee of the Faculty

Protocol № 7 from « 19 » 02 2025  
Chairman of the Academic Committee of the Faculty of Physics and Mathematics  
 R. Abdualieva



# 1. EDUCATIONAL PROGRAM PASSPORT

## 1.1 Context

**Registration number:** 6B06100154

**Education field code and classification:** 6B06 Information and Communication Technologies

**Code and classification of training direction:** 6B061 Information and Communication Technologies

**Educational Program Group:** B057 Information Technology

**Name of Educational Program:** 6B06105 - Artificial Intelligence Engineering

**Type OP:** Innovative EP

**Program Type:** First Cycle: Bachelor's Degree Level 6 NSC / ORC / ISCED

**Degree awarded:** Bachelor's degree in Information and Communication Technology in the educational program 6B06105 - Artificial Intelligence Engineering

**Total credits:** 240 academic credits

**Typical term of study:** 4 years

**Language of instruction:** Kazakh, Russian, English

**License to engage in educational activities:** The academic program is implemented based on the annex to the License №KZ49LAM00007465 from June 20, 2025 in the direction of training 6B061-“Information and Communication Technologies”, issued by the Committee for Quality Assurance in Education and Science of the Ministry of Education and Science of the Republic of Kazakhstan..

**Professional standards for the development of the OP:** Professional standards developed by the National Chamber of Entrepreneurs of the Republic of Kazakhstan “Atame-ken”:

1. Professional standard “Software development”.
2. Professional standard “Development of artificial intelligence applications”.
3. Professional standard “Development of IoT systems”.

## 1.2 Place of Ilyas Zhansugurov Zhetysu University in the system of higher and post-graduate education of the Republic of Kazakhstan

Zhetysu University named after Ilyas Zhansugurov is a large regional multi-disciplinary university in the field of Zhetysu, carrying out three-stage training (bachelor's, master's, and PhD) in a wide range of specialties.

**Mission:** Training of competitive personnel to meet the needs of industrial-innovative development of the economy of Zhetysu region and the Republic of Kazakhstan.

**Strategic Objective:**

1. Ensuring quality training of competitive personnel;
2. Modernization of the content of higher and postgraduate education in the context of global trends.

University positions in national and international rankings:

- 4th place in the national ranking of multidisciplinary universities of the Republic of Kazakhstan (NAOCO) - 2022;
- Top 241-250 best universities in Emerging Europe and Central Asia in the regional ranking QS World University Rankings: Emerging Europe and Central Asia 2021;
- 6th place among 95 universities of the Republic of Kazakhstan in the ARES ranking.

## 1.2 Profile of the educational program

**Rationale:**

**Modern artificial intelligence (AI) technologies are transforming all areas of human activity, increasing the efficiency of business, science, and public administration.** AI enables the automation of complex processes, optimization of decision-making, creation of innovative products and services, and the formation of new competitive advantages.

The demand for specialists in the field of artificial intelligence is growing rapidly as companies and government agencies implement AI solutions for data analysis, machine learning, computer vision,

natural language processing, and robotics. This makes the program **6B06105 – "Artificial Intelligence Engineering"** highly relevant and in demand in the labor market.

#### **Labor Market Research Based on Employer Needs:**

Artificial intelligence is becoming a key driver of digital transformation across many sectors. It is actively applied in the financial industry for credit scoring and fraud detection, as well as in medicine for diagnostics and personalized treatment selection. In industry, AI helps forecast production processes and manage robotic systems, while in IT and telecommunications, it supports the operation of chatbots and recommendation algorithms. Public administration is also gaining new opportunities through big data analysis and the development of smart city concepts.

Amid this trend, companies are increasingly investing in AI-based developments, driving high demand for engineers skilled in designing, training, and implementing machine learning models.

#### **Objective of the Educational Program:**

To train bachelor's degree specialists in the field of information and communication technologies, equipped with up-to-date knowledge and practical skills in the development, implementation, and maintenance of artificial intelligence systems, including machine learning, data analysis, computer vision, and natural language processing — for effective application in various sectors of the economy and digital technologies.

#### *Distinctive features of the program:*

<i>Area of professional activity</i>	<ul style="list-style-type: none"> <li>- creation and operation of information systems that automate organizational management tasks of commercial companies and budgetary institutions;</li> <li>- analyzing requirements to information systems and business applications;</li> <li>- a set of methods and tools for developing information systems;</li> <li>- realization of design specifications and business application architecture;</li> <li>- regulations of modifications, optimizations and development of information systems.</li> </ul>
<i>Objects of professional activity</i>	are design and research institutes, automated production of industrial enterprises, telecommunication companies, management bodies, power structures, information technology departments, financial organizations, business structures, educational organizations, educational institutions, industrial production.
<i>OP Branch</i>	Future-IT robotics school IT Hub Zh.R. Janekenov Design Institute” LLP
<i>Bases of practice</i>	KazPochta JSC Kainar JSC Zhetysu TV Channel LLP Zh.R. Janekenov Design Institute LLP ASTEL LLP
<i>Academic mobility</i>	Partner universities: University of Lodz, Lodz (Poland), University of Management and Science, Kohala Lampur (Malaysia). Riga Technical University, Riga (Latvia), Czech Agrotechnical University (Czech Republic)
<i>Scholarship programs</i>	State educational order, grant of local executive bodies

#### **1.4 Portrait of a Graduate:**

***The graduate attributes according to the Dublin Descriptors are:***

- 1) demonstrate knowledge and understanding in the field of study based on advanced knowledge of the field of study;
- 2) apply knowledge and understanding at a professional level, formulate arguments, and solve problems in the field of study;
- 3) collect and interpret information to form judgments with social, ethical, and scientific considerations;
- 4) apply theoretical and practical knowledge to solve educational, practical, and professional problems in the field of study;
- 5) learning skills necessary for the independent pursuit of further studies in the field of study;
- 6) know the methods of research and academic writing and apply them to the field of study;
- 7) apply knowledge and understanding of facts, phenomena, theories, and the complex relationships between them in the field of study;
- 8) Understand the importance of the principles and culture of academic integrity.

**Competencies of the OP graduate:**

**GC1** – Has a broad understanding of society, culture, and science; takes these into account when solving professional tasks..

**GC2** – Understands the basics of social sciences and can use them to analyze social processes and decisions in a professional context.

**GC3** – Communicates effectively in Kazakh, Russian, and English, both orally and in writing, in academic, professional, and social settings.

**GC4** – Can develop, debug, and apply programs and algorithms using modern programming languages.

**GC5** – Is familiar with legislative and regulatory documents governing the development and implementation of information systems.

**GC6** – Applies basic knowledge of mathematics, logic, and natural sciences to solve technical and computational problems.

**GC7** – Can design and implement information solutions, including software, hardware, and technical support.

**GC8** – Performs installation, configuration, and testing of software system components, including databases, big data, and cloud services.

**GC9** – Understands the fundamentals of information security and applies them to protect data and IT systems.

**GC10** – Analyzes domestic and international experience in the field of information and intelligent systems.

**GC11** – Can efficiently search for, evaluate, and utilize information from various sources to solve professional tasks and for self-development.

**GC12** – Has a general understanding of artificial intelligence, its capabilities, and its applications in different fields.

**GC13** – Is capable of performing data analysis: collecting, extracting, analyzing, and visualizing data using appropriate digital tools.

**GC14** – Understands the principles of operation and architecture of basic machine learning models based on artificial neural networks and can implement them to solve practical problems.

**GC15** – Uses basic AI tools to work with structured and unstructured data (e.g., speech recognition and synthesis, image and video processing).

**GC16** – Takes ethical considerations into account when developing and using AI tools.

**GC17** – Possesses a structured system of criteria for selecting appropriate software and hardware solutions for AI-related tasks.

**Upon completion of the required disciplines in the General Education Cycle (GEC), the student:**

1. Assesses the surrounding reality based on worldview positions formed through knowledge of philosophy fundamentals, which provide scientific understanding and study of the natural and social world through scientific and philosophical methods of cognition.
2. Interprets the content and specific features of mythological, religious, and scientific worldviews.
3. They argue their evaluation of events occurring in social and industrial spheres.
4. Demonstrates civic responsibility based on a deep understanding and scientific analysis of the key stages, patterns, and uniqueness of Kazakhstan's historical development.
5. Uses historical methods and techniques to analyze the causes and consequences of events in the history of Kazakhstan.
6. Evaluates situations in various spheres of interpersonal, social, and professional communication based on basic knowledge of sociology, political science, cultural studies, and psychology.
7. Synthesizes knowledge from these disciplines as a modern product of integrative processes.
8. Applies scientific methods and techniques for researching a specific science, as well as the broader socio-political cluster.
9. Develops a personal moral and civic stance.
10. Operates with social, business, cultural, legal, and ethical norms of Kazakhstani society.
11. Demonstrates personal and professional competitiveness.
12. Applies knowledge in the field of social and humanitarian sciences recognized worldwide.
13. Chooses appropriate research methodology and conducts analysis.
14. Generalizes research results.
15. Synthesizes new knowledge and presents it as socially significant humanitarian output.
16. Communicates in oral and written forms in Kazakh, Russian, and foreign languages to solve interpersonal, intercultural, and professional communication tasks.
17. Uses linguistic and speech tools based on grammatical knowledge; analyzes information according to the communication context.
18. Evaluates the actions and behavior of communication participants.
19. Utilizes various types of information and communication technologies in personal activities: internet resources, cloud, and mobile services for searching, storing, processing, protecting, and distributing information.
20. Builds a personal educational trajectory throughout life for self-development and career growth, and promotes a healthy lifestyle to ensure full social and professional activity through physical culture methods and tools.
21. Knows and understands the basic patterns of Kazakhstan's history, the foundations of philosophical, socio-political, economic, and legal knowledge, and communication in oral and written forms in Kazakh, Russian, and foreign languages.
22. Applies acquired knowledge for effective socialization and adaptation in changing sociocultural conditions.
23. Possesses skills in quantitative and qualitative analysis of social phenomena, processes, and issues.

### **Learning Outcomes:**

**LO1** – Have the ability to evaluate and apply research methods and innovative approaches to understanding social, socially significant phenomena and processes in the legal, economic, entrepreneurial, industrial, environmental environment, as well as in the field of financial literacy, values of inclusion, sustainable development and anti—corruption policy.

**LO2** – Analyze system requirements, design, implement, and integrate software and hardware solutions based on the integration of artificial intelligence systems into information systems.

**LO3** – Apply mathematical methods and computer technologies to model and analyze physical and information processes.

**LO4** – Analyze software requirements, synthesize various software development principles and methodologies, implement and deploy software solutions, integrate software modules and components, and possess both fundamental knowledge and practical skills in software development.

**LO5** – Create graphical solutions using modern digital technologies and artificial intelligence tools.

**LO6** – Use computer technologies in the design, development, diagnostics, and maintenance of intelligent and robotic systems for industrial and scientific applications.

**LO7** – Evaluate requirements necessary for modeling and developing artificial neural networks using machine learning and data analysis methods.

**LO8** – Synthesize concepts and methodologies for designing intelligent cloud services and IoT devices, ensure their functionality at physical and network levels, and implement, install, and maintain them using modern AI-based tools.

**LO9** – Possess foreign language proficiency for social and professional communication, including the use of specialized vocabulary and professional terminology.

**LO10** – Analyze and implement tasks that require natural language processing (NLP) and computer vision (CV) technologies for integration into intelligent software and hardware solutions.

**LO11** – Design and develop mobile solutions using modern artificial intelligence tools.

#### **Employment opportunities:**

Graduates of the program are in demand in various sectors where artificial intelligence, machine learning, and big data analytics technologies are being actively implemented. They apply their knowledge in such fields as finance, telecommunications, energy, public administration, education, research, as well as in private companies, start-ups, and international corporations.

Their professional activity covers the development of intelligent solutions for process automation, data analysis, optimization of business processes, and digitalization of services. Such specialists can work successfully both in large banks and telecom companies, as well as in research centers and high-tech start-ups, including domestic and foreign projects. Graduates hold positions as machine learning engineers, data analysis specialists, computer vision and natural language processing experts, and AI product managers. They combine strong technical skills in programming and working with neural network architectures with a deep understanding of the ethical and legal aspects of AI applications, which makes them competitive at the national and international level.

## **2. СОДЕРЖАНИЕ ОБРАЗОВАТЕЛЬНОЙ ПРОГРАММЫ**

### **2.1 Описание модулей**

<b>№ modules</b>	<b>Module name</b>	<b>Name of discipline</b>	<b>Number of academic credits</b>	<b>Discipline cycle</b>	<b>Formative learning outcomes of the module</b>
1	Social	Physical training	31	GED	To evaluate situations in var-

	humanitarian	1) <b>Economics and entrepreneurship</b> 2) <b>Ecology and life safety basics</b> 3) <b>Basics of law and anti-corruption culture</b> 4) <b>Methods of scientific research</b> 5) <b>Ilyastanu</b> 6) <b>Fundamentals of financial literacy</b>		GED	ious spheres of interpersonal, social and professional communication taking into account the basic knowledge of sociology, political science, cultural studies and psychology; to build a personal educational trajectory throughout life for self-development and career growth, to focus on a healthy lifestyle to ensure full social and professional activity through methods and means of physical culture.
		<b>History of Kazakhstan</b>		GED	
		<b>Philosophy</b>		GED	
		<b>Social and Political knowledge module (sociology, cultural studies, political science, psychology)</b>		GED	
2	«Informational and communicative»	<b>Information and communication technology</b>	5	GED	Use various types of information and communication technologies in personal activities: Internet resources, cloud and mobile services for searching, storing, processing, protecting and disseminating information; communicate orally and in writing in Kazakh, Russian and foreign languages to solve problems of interpersonal, intercultural and industrial (professional) communication.
		<b>Foreign language</b>	10	GED	
		Kazakh (Russian) language	10	GED	
3	«Algorithmization and programming»	<b>Introduction to programming languages</b>	23	BD	analyze software requirements, synthesize various software development principles and methodologies for implementing and deploying software solutions, integrate software modules and components, possess fundamental knowledge and practical skills in software development
		Educational practice		BD	
		<b>/ Object-oriented programming</b>  1) Programming technology 2) Programming in high level language		BD	



		1) Java programming 2) Kotlin programming		BD	
4	Skills of effective management of the educational process	1) <b>Project Studies</b> 2) <b>Development of electronic courses</b>	10	BD	apply mathematical methods and computer technologies for modeling and analysis of physical and information processes; master a foreign language at the level of social and professional communication, uses special vocabulary and professional terminology of the language..
		<b>Professional terms in the field of information systems (in English)</b>		BD	
5	«Hardware and software tools and complexes»	1) <b>Modeling information processes and systems</b> 2) <b>Mathematical and computer modeling</b>	10	BD	apply mathematical methods and computer technologies for modeling and analysis of physical and information processes; use computer technologies in the field of design, development, diagnostics and maintenance of intellectual and robotic systems of industrial and scientific-technical direction.
		1) <b>Programming in the ARDUINO environment</b> 2) <b>Intelligent Robotic Systems</b>		BD	
6	«Database Development and Management»	Python for data analysis	17	BD	analyze system requirements, design, implement and deploy software and hardware solutions based on the integration of artificial intelligence systems into information systems; assess the requirements necessary for modeling and development of artificial neural networks using machine learning and data analysis methods.
		Data analytics		BD	
		Database theory and design		BD	
		<b>Industrial Practice</b>		MD	
7	«Internet technologies»	Web application development	28	BD	synthesize concepts and methodologies for



	S»	Internet of Things		BD	designing intelligent cloud services and IoT devices, ensuring their operability at the physical and network levels, their implementation, installation and maintenance using modern intelligent tools.
		Designing cloud solutions		BD	
		1) WEB programming 2) Development of web application based on the Spring Framework		MD	
		<b>Educational practice</b>		BD	
8	«Innovative technologies in information systems»		38	BD	create graphic solutions using modern digital technologies and artificial intelligence; design and develop mobile solutions using modern artificial intelligence tools; and
		1) <b>Vector and raster graphics</b> 2) <b>Ingeering and computer graphics</b>		BD	
		1) Digital animation technology 2) 3D Modeling		BD	
		1) Mobile application development for Android 2) Mobile application development for iOS		MD	
		Industrial Practice		MD	
		Undergraduate or Industrial practice		/MD	
		Writing and defending a thesis (project) or passing a comprehensive exam		FC	
		Discrete Mathematics and Mathematical Logic	14		apply mathematical methods and computer technologies for modeling and analysis of physical and information processes



		Computational mathematics		BD	
9	Physical and mathematical base of computing technologies»	1) General Physics 2) Computational Physics		BD	
10	Artificial intelligence	Introduction to Artificial Intelligence Neural networks <b>Machine learning</b> 1/Computer vision 1 2/Computer vision 2 <b>Multimodel artificial intelligence systems</b> 1) Research methodology based on artificial intelligence 2) AI in industry and research Optimizing AI systems 1) NLP and operational management 2) Neural networks and text processing	44	BD BD BD MD MD MD MD MD MD	Evaluate the requirements necessary for modeling and developing artificial neural networks using machine learning and data analysis methods; synthesize concepts and methodologies for designing intelligent cloud services and IoT devices, ensuring their operability at the physical and network levels, their implementation, installation and maintenance using modern intelligent tools; Analyze and implement tasks requiring the use of natural language processing (NLP) and computer vision (CV) technologies to integrate them into software and hardware intelligent solutions.



## 2 Сведения о дисциплинах

№	Name of discipline	Brief description of the discipline (30-50 words)	Number of credits	Formative learning outcomes (codes)
<b>Cycle of general education disciplines Compulsory component</b>				
1.	History of Kazakhstan	<b>The purpose of the discipline</b> is to provide objective knowledge about the main stages of the historical development of Kazakhstan from ancient times to the present. It aims to develop knowledge and understanding of the key stages in the history of Kazakhstan; the ability to correlate phenomena and events of the historical past with the general paradigm of the world-historical development of human society through critical analysis; skills in analytical and axiological evaluation when studying historical processes and phenomena of modern Kazakhstan; the ability to objectively and comprehensively comprehend the inherent features of the modern Kazakhstani model of development; as well as to systematize and critically assess historical phenomena and processes in the history of Kazakhstan.	5	LO 1
2.	Philosophy	<b>The purpose</b> is to develop an understanding of philosophy as a distinct form of world cognition and to provide a comprehensive overview of its main branches, issues, and methods within the context of future professional activity. The course explores the specifics of philosophical reflection on reality, explains the role and significance of key worldview concepts as values of social and personal human existence in the modern world, and analyzes socio-cultural and personal situations to justify and make ethical decisions. It develops the ability to classify methods of scientific and philosophical knowledge of the world, as well as to formulate and coherently argue one's own moral stance on the pressing issues of contemporary global society.	5	LO 1
3.	Information and Communication Technologies (in English)	Purpose - to form the ability to critically evaluate and analyze processes, methods of searching, storing and processing information, ways of collecting and transmitting information through digital technologies. Forms the ability to critically understand the role and significance of modern information and communication technologies in the era of digital globalization and the formation of a new "digital" thinking, knowledge and skills to use modern information and communication technologies in various activities.	5	LO 1
4.	Social and Political knowledge module	The purpose of the discipline - formation of socio-humanitarian outlook of students in the context of	8	LO 1



	(sociology, cultural studies, political science, psychology)	solving the problems of modernization of public consciousness, strengthening the values of tolerance, intercultural dialogue. Formation of students' understanding of the basic principles of functioning of modern society and its social and political institutions, understanding of the main stages of development of culture of Kazakhstan. To develop students' skills of independent analysis of modern realities and trends in the development of society, assessment and forecasts. Giving skills to use the knowledge obtained in the process of mastering disciplines of socio-political module in professional activity; formation of critical thinking skills and the ability to apply it in practice.		
5.	Foreign language	The aim is to form intercultural-communicative competence of students in the process of foreign language education at the sufficient level (A2, general European competence) and the level of basic sufficiency (B1, general European competence). Depending on the level of preparation, the learner reaches the level B2 of the Common European Framework of Reference at the end of the course, if the language level of the learner at the start is above the level B1 of the Common European Framework of Reference.	10	LO 1
6.	Kazakh (Russian) language	The purpose of the discipline is to ensure the qualitative mastering of the Kazakh language in the Kazakh language in terms of national culture as a means of social, intercultural, professional communication by forming communicative competence in all types of speech activity in accordance with the qualification level A2, B1, B2, C1 learners studying Kazakh as a foreign language at the Kazakh level A1 - elementary. Establishes communication in oral and written form in the Kazakh language to understand the lexico-grammatical system, information in the text, solving problems of social and domestic, cultural, socio-political, professional, personal communication.	10	LO 1
7.	Physical training	Examines the characteristics of physical education and sport. Discloses the main forms of physical training in school and extracurricular activities. It is aimed at the formation of a healthy lifestyle, student's personality, his physical improvement and self-regulation	8	LO 1
<b>Cycle of general education disciplines Elective component</b>				
8.	Economics and entrepreneurship	The aim is to familiarize students with economic problems of modern society life, to form economic thinking and to obtain knowledge in the field of theoretical foundations and practical skills in the field of entrepreneurship. It is oriented on the formation of students' comprehensive understanding of the regularities of the functioning of the economy, obtaining business education aimed at acquiring applied competencies in different spheres of entrepreneurial activity, reveals the peculiarities of creating and successfully running their own business	5	LO 1



	Ecology and life safety basics	Purpose - to form knowledge on the basics of ecology and life safety, allowing to analyze ecological processes, assess socio-ecological consequences of anthropogenic activities, methods and technologies of protection in emergency situations. Forms skills to assess the impact of environmental factors on human health; to forecast environmental processes for planning and implementation of measures to improve life safety; to make decisions in unfavorable environmental and emergency situations, taking into account the possible consequences of accidents, disasters, natural calamities.	5	LO 1
	Basics of law and anti-corruption culture	The aim is to familiarize students with the main branches and institutions of law, the basics of anti-corruption culture, as well as the regularities of the emergence, development and functioning of the state and law. The course develops anti-corruption culture skills and a high level of theoretical knowledge of the main functions of law in the state and society, its influence on the development of the rule of law and civil society.	5	LO 1
	Methods of scientific research	Purpose - to form knowledge of principles, technologies, practical methods and techniques of scientific research based on modern achievements of scientists. Forms the basic foundations of scientific culture and ethics, flexible perception of scientific texts, skills to effectively apply the acquired knowledge in planning and organizing research work, ability to analyze and summarize the results of research.	5	LO 1
	Ilyastanu	The purpose of the discipline is to develop a deeply thinking personality with high aesthetic taste, appreciating literature, art, traditions, culture and language of the Kazakh people through a deep and comprehensive study of the works of Ilyas Zhansugurov. Forms understanding of the significance of Ilyas Zhansugurov's works in the development of the Kazakh literary language, intellectual and creative thinking skills, the ability to cherish the values of the national-spiritual heritage.	5	LO 1
	Fundamentals of financial literacy	The course is aimed at obtaining knowledge of skills in the field of personal finance management. Also within the framework of the course students will learn to use in practice all kinds of tools in the field of finance, to save and increase savings, to plan the budget competently, to learn to analyze financial information and navigate in financial products to choose an adequate investment strategy	5	LO 1
<b>Cycle of basic disciplines</b> <b>University component</b>				
1.	Introduction to programming languages	The course is designed to provide students with basic knowledge and skills in software development. The course covers fundamental programming concepts, including working with variables, operators, conditions, loops, functions, arrays and data structures. Emphasis is placed on logical thinking, algorithmic approach to problem solving and writing readable, correct and	6	LO4



		efficient code. The discipline covers the basics of structural and procedural programming, as well as the first ideas about the principles of object-oriented approach.		
2.	Discrete mathematics and mathematical logic	Formation of fundamental knowledge in the field of discrete mathematics and mathematical logic, necessary for formalization, analysis and solution of problems related to logical, combinatorial and structural modeling in the field of computer science, programming, cybernetics and related disciplines.	5	LO3
3.	Computational mathematics	Formation of students' fundamental knowledge and practical skills of numerical modeling, algorithmization and application of numerical methods to solve applied problems arising in artificial intelligence systems, machine learning and data mining.	5	LO3
4.	Data analysis	The discipline forms theoretical knowledge of modern principles, methods and tools of data analysis, practical skills and abilities to apply modern methods of data analysis in information systems.	5	LO2, LO7
5.	Introduction to Artificial Intelligence	The course aims to develop students' basic understanding of the concepts, methods, and technologies of artificial intelligence (AI), as well as to enhance their skills in applying AI techniques to solve practical problems. It is designed to provide a theoretical and practical foundation for further study of specialized subjects such as machine learning, deep learning, natural language processing, and other AI-related fields.	5	LO10
6.	Object-oriented programming	Formation of students' theoretical knowledge and practical skills of software design, development and maintenance using object-oriented programming paradigm. Mastering the principles of OOP contributes to the creation of modular, scalable and reusable software solutions.	5	LO4
7.	Python for data analysis	The course is dedicated to the study of the Python programming language and its application for data analysis. It covers key Python libraries and tools such as NumPy and Pandas, which enable efficient work with large datasets, statistical analysis, data visualization, and the development of machine learning models.	5	LO7
8.	Professional Terms in the Field of Information Technology (in English)	The course develops English language skills to a necessary and sufficient level of communicative competence, enabling the use of the foreign language in various areas of official and business communication, professional activities, scientific and practical work, interaction with international partners, as well as for self-education and other purposes.	5	LO9
9.	Neural Networks	The course is focused on studying the basic principles of operation and architecture of neural networks. During the course, students will master both theoretical foundations and practical aspects related to the structure and functional capabilities of neural networks. The	5	LO7



		goal of the course is to develop a comprehensive understanding of neural networks as a universal tool for information analysis and processing. Students will become familiar with basic concepts such as artificial neurons, network layers, activation functions, back-propagation algorithms, and optimization methods. Various types of neural networks will also be examined.		
10.	Theory and Design of Databases	The course is dedicated to the study of fundamental database theory and methods for designing efficient data storage systems. It covers key aspects such as normalization, creation of logical and physical database schemas, and query development for data manipulation. The course aims to develop skills in database design, optimization, and ensuring data integrity.	5	LO2
11.	Machine Learning	Developing students' theoretical knowledge and practical skills in machine learning, understanding the principles behind algorithm operation, and enhancing the ability to apply machine learning methods to solve real-world problems involving data analysis, forecasting, and decision automation.	5	LO7
12.	Web Application Development	A course that studies the process of creating web applications for the internet. Within this course, students learn the fundamental concepts and technologies used to build modern websites and applications. During the training, students practice designing user interfaces, optimizing performance, and ensuring the security of web applications.	5	LO8
13.	Design of Cloud Solutions	The course aims to develop students' systemic understanding of the principles of designing, developing, and implementing cloud solutions using modern approaches and technologies. The goal of the course is to teach how to create scalable, fault-tolerant, and secure cloud architectures based on business requirements and technical constraints.	5	LO2, LO8
14.	Internet of Things (IoT)	The course aims to develop students' theoretical knowledge and practical skills in designing, developing, and implementing systems based on Internet of Things (IoT) technologies, including working with sensors, microcontrollers, network protocols, and cloud platforms.	6	LO8
<p style="text-align: center;"><b>Core Curriculum</b> <b>Elective Component</b></p>				
1.	General physics	Studies the fundamental interactions of nature that govern the movement of matter. It is aimed at forming in students a modern idea of the physical picture of the world, skills of research work, obtaining and processing experimental results, as well as skills of modeling physical processes in solving specific prob-	4	LO3



		lems.		
2.	Computational Physics	Describes the tasks of modeling physical processes and phenomena, the main computational methods used in solving physical problems and processing experimental data, methods for their optimal implementation in a computer, and estimation of errors in calculation results.	4	LO3
3.	Project Research	The core content of the course reflects a competency-based approach aimed at preparing students for active participation in modern intelligent technologies. It involves mastering research skills and abilities, ranging from preparing scientific articles and writing research papers to their public defense, as well as searching for funding sources for various research projects.	5	LO6
4.	Development of Electronic Courses	The course is aimed at studying methods for preparing and using electronic courses in the educational process, technologies for collaborative creation and sharing of electronic documents and audio-video materials for their application in teaching and scientific research.	5	LO4, LO8
5.	Programming Technology	The course aims to develop competencies in programming technology and acquire practical skills in using modern programming methods and techniques, implementing and constructing algorithms, as well as the ability to effectively utilize information tools and resources. It provides an introduction to fundamental programming methods.	5	LO4
6.	Programming in a High-Level Language	The course involves the theoretical study and practical mastery of programming fundamentals using high-level programming languages. It covers the syntax and semantics of popular programming languages, as well as the development of skills for creating software solutions to address a variety of problems.	5	LO5
7.	Vector and Raster Graphics	The course involves theoretical study and practical mastery of the fundamentals of computer graphics, including the exploration of computer technologies for processing graphic information. This is essential because the professional activity of a modern specialist in the field of information technology is closely connected with the extensive practical application of various methods for computer processing of graphic data.	5	LO5
8.	Engineering and Computer Graphics	The course aims to develop students' theoretical knowledge and practical skills in engineering and computer graphics, necessary for creating and interpreting technical drawings, developing engineering projects, as well as using modern graphic software tools in engineering practice.	5	LO5



9.	Java Programming	The course aims to develop students' theoretical knowledge and practical skills in creating reliable, modular, and portable software solutions using the Java programming language. Mastering Java as a universal cross-platform programming language opens opportunities for developing applications of varying complexity — from mobile apps to distributed server-side systems.	5	LO4, LO11
10.	Kotlin Programming	Mastering the Kotlin programming language, studying its syntax, features, and capabilities for developing modern applications, including mobile (Android), web applications, backend services, and other platforms. The course is aimed at developing practical programming skills in Kotlin and applying the language in real-world projects.	5	LO4, LO11
11.	Digital Animation Technologies	Introduces students to the fundamental digital technologies necessary for implementing projects in various design fields. Develops basic skills in using applied software for computer graphics, animation, video, and audio editing.	5	LO5
12.	3D Modeling	The course covers the fundamentals of modern 3D graphics and animation, including mastering the principles of operation and basics of modeling. A key objective of the course is to acquire solid knowledge and practical skills in using new technologies for collecting and processing spatial data, as well as creating three-dimensional objects.	5	LO5
13.	Modeling of Information Processes and Systems	The course covers the main classes of models and modeling methods, principles of constructing models of information processes, methods of formalization, algorithmization, and implementation of models using modern computer tools; methods for conducting computational experiments using simulation modeling techniques.	5	LO3
14.	Mathematical and Computer Modeling	The course provides students with an understanding of modeling as a method of scientific cognition and the use of computers as a tool for research activities. It covers the basic concepts and properties of models; general principles of computer modeling; and the technology of model construction.	5	LO3
15.	Programming in the ARDUINO Environment	The course aims to develop students' theoretical knowledge and practical skills in programming microcontrollers within the Arduino integrated development environment. It also focuses on building competencies in designing and implementing devices based on the Arduino hardware platform to solve tasks related to automation, control, sensing, and interaction with external devices.	5	LO6



16.	Intelligent Robotic Systems.	The course is dedicated to the fundamentals of the theory and methodology for creating intelligent systems and robotic complexes. It covers the basics of intelligent systems theory, including knowledge representation and problem-solving methods. The course also provides methodology and examples of expert system development.	5	LO6
<b>Cycle of Specialized Disciplines</b> <b>University Component</b>				
1.	Computer Vision 1	This course introduces students to extracting information from images. It covers the basics of image processing (noise reduction, color correction, edge detection), image classification (key functions), and content-based image retrieval (descriptor compression, approximate methods for descriptor comparison).	5	LO10
2.	Computer Vision 2	The course is dedicated to an in-depth study of methods and technologies used to solve complex computer vision tasks, such as 3D image processing, real-time object detection, as well as enhancement and optimization of algorithms for handling large datasets. The course covers advanced approaches, including the use of convolutional neural networks (CNNs), generative models, and deep learning techniques to address more complex problems.	5	LO10
3.	Multimodal Artificial Intelligence Systems	Multimodal Artificial Intelligence Systems focus on the study of methods and technologies that enable comprehensive analysis and processing of data from multiple sources—text, audio, images, and video. During the course, students learn to develop integrated solutions capable of effectively perceiving, processing, and interpreting data in various formats to solve diverse tasks.	4	LO10
4.	Optimization of AI Systems	The course studies methods and algorithms that enable finding optimal solutions for tasks related to data processing and analysis, model training, and decision-making. It focuses on the ability to select optimal solutions in product development, automated technologies and manufacturing, automation tools and systems, control, diagnostics and testing, production management, product lifecycle and quality management, software development, implementation, and efficient operation considering program reliability requirements.	5	LO10
<b>Cycle of specialized courses</b> <b>Elective component</b>				
1.	Methodology of Artificial Intelligence-Based Research	Developing students' systematic understanding of scientific research methodology through artificial intelligence technologies, as well as cultivating their skills in applying AI methods and algorithms for data analysis, pattern recognition, forecasting, and decision-making support in scientific research.	5	LO10



2.	AI in Industry and Research	Forming a systematic understanding of the methods and technologies of artificial intelligence (AI) and their application in industrial automation, production process control, technical diagnostics, as well as in scientific research and engineering data analysis. Special attention is paid to the practical use of machine learning algorithms, intelligent information processing and modeling.	5	LO10
3.	Web programming	Mastering the discipline "Web Programming" involves students acquiring knowledge of Internet programming, developing skills in working with web pages, and effectively combining elements created using various technologies.	6	LO8
4.	Development of a web application based on Spring Framework	The discipline is designed to improve web application development skills, allowing students to learn markup languages and technologies, fundamental concepts of server-side programming, client-side programming using scripting languages, create HTML documents containing simple scripts, and develop server applications.	6	LO8
5.	NLP and operational management	The goal of the discipline is to master the theory and practice of natural language processing. The course covers theoretical aspects of NLP, including basic information from the field of linguistics, as well as practical methods of text processing using natural language tools and system queries to solve practical problems based on NLP.	5	LO10
6.	Neural Networks and Text Processing	The course focuses on studying neural networks and their application for processing textual information. It covers the fundamentals of working with neural networks, including architectures of deep neural networks, recurrent neural networks (RNN), and transformers. The course also includes the study of natural language processing (NLP) methods, such as text analysis, classification, information extraction, and text generation using modern technologies. This knowledge is essential for developing intelligent systems and applications focused on working with text, which is relevant for professional activities in the field of artificial intelligence and data processing.	5	LO7
7.	Mobile application development for Android	The discipline is aimed at studying the full cycle of mobile application development for the Android operating system, including both frontend and backend programming. During the course, students learn the basics of the Kotlin (or Java) programming language, working with the Android Studio development environment, and the principles of designing a user interface using XML and Jetpack Compose.	5	LO11
8.	Mobile application development for iOS	The course is dedicated to developing iOS applications on Swift using Xcode. Students study architecture and OS, creating interfaces with SwiftUI and programming using UIKit, working with the API, data storage, the basics of testing and publishing in the app store based on Apple's human interface recommendations.	5	LO11

### 2.3 Structure of the Educational Program



The structure of the educational program is developed by the State Compulsory Standard of Higher and Postgraduate Education (Order of the Minister of Science and Higher Education of the Republic of Kazakhstan dated July 20, 2022, No. 2

## **2.4 Additional Educational Programs (Minor)**

When determining their learning path within the elective component, the student selects courses from the main educational program (Major) and/or additional educational program (Minor).

The list of Minor programs, their brief description, course composition, and learning outcomes are provided in the Catalog of Additional Educational Programs (Minor).

## **2.5 Innovative technologies and teaching methods used in the educational process**

To develop key graduate competencies and learning outcomes for the educational program "6B06102 - Information Systems," the teaching staff employs the following innovative technologies and teaching methods:

- ICT (Information and Communication Technologies): Padlet, Kahoot testing
- Case studies, project work, portfolios, SWOT analysis, sociograms
- Critical thinking techniques: Venn diagrams, Jigsaw, brainstorming, association, ZUM
- Small group work (teamwork)
- Project-based learning
- Case study analysis
- Role-playing and business games
- Modular training
- Contextual learning
- Critical thinking development
- Problem-based learning
- Individualized learning
- Self-paced independent study
- Interdisciplinary learning
- Experiential learning

In the event of restrictive measures, emergencies, or the introduction of a state of emergency due to social, natural, or man-made circumstances, the educational process may be conducted using distance learning technologies in online or blended formats.

Online classes involve real-time interactive learning through video conferencing tools (Google Meet, Skype, Discord, MOODLE, Zoom, Google Classroom, Microsoft Teams, Hangouts, Cisco WebEx Meetings, etc.).

## **2.6 Implementation Conditions of the Educational Program for Persons with Disabilities and Special Educational Needs**

If there are people with special educational needs in the contingent of students enrolled in the educational program, this educational program adapts to the special educational needs of such students.

For persons with special educational needs, a special time limit is established for mastering the discipline "Physical Culture", taking into account their state of health. The choice of internship sites for people with disabilities is carried out taking into account the health status of students and accessibility requirements. The current, intermediate, and final attestation at the university takes into account the individual psycho-physical characteristics of people with disabilities. Students with special educational needs are provided with printed and/or electronic educational resources in forms adapted to the limitations of their health.

For the social adaptation of students with special educational needs, individual support is provided, which is continuous and comprehensive. The support of students with special educational needs is determined by the goals, content, and methods of the educational process, aimed at preventing emerging problems of educational adaptation that hinder the timely formation of the necessary competencies.



Support services include:

- organizational and pedagogical support, which is aimed at monitoring the studies of students with special educational needs through the graph of the educational process in an inclusive learning environment;
- psychological and pedagogical support, which is provided for students with special educational needs who have problems in learning, communication, and social adaptation, is aimed at studying, developing, and correcting the student's personality and the adequacy of competence formation through psychodiagnostic procedures, psychological prevention, and correction of personality distortions;
- preventive and health-improving support, which provides for solving tasks aimed at increasing the adaptive capabilities of students with special educational needs;
- social support, which solves a wide range of social tasks, on which the successful education of students with special educational needs depends. It includes assistance in solving everyday problems, living in a dormitory, transport issues, social benefits, allocation of financial assistance, organization of leisure, summer holidays, their involvement in student self-government, organization of volunteer movement, etc.

### **3 AVAILABILITY OF THE EDUCATIONAL PROGRAM**

#### **3.1 Human resources**

The educational program is staffed with teaching and teaching staff by the Order of the Minister of Science and Higher Education of the Republic of Kazakhstan dated January 5, 2024 No. 4. Registered with the Ministry of Justice of the Republic of Kazakhstan on January 8, 2024 No. 33892 "On approval of qualification requirements for educational activities of organizations providing higher and (or) postgraduate education, and a list of documents confirming compliance with them."

#### **3.2 Material and technical base**

The University has 3 academic buildings, a teaching and laboratory complex, a library, 3 dormitories, the Kulager training and recreation ground on Lake Balkhash, the Karlygash sports and educational training ground, and a stadium with 1,000 seats..

The material and technical base of the Educational institution is completed following the Order of the Minister of Science and Higher Education of the Republic of Kazakhstan dated January 5, 2024, No. 4 "On approval of qualification requirements for educational activities and a list of documents confirming compliance with them."

#### **3.3 Information and library support**

Completed by the Order of the Minister of Science and Higher Education of the Republic of Kazakhstan dated January 5, 2024 No. 4. Registered with the Ministry of Justice of the Republic of Kazakhstan on January 8, 2024 No. 33892 "On approval of qualification requirements for educational activities of organizations providing higher and (or) postgraduate education, and a list of documents confirming compliance with them."

#### **3.4 Social resources**

For those who wish to improve their qualifications or receive additional education, the university has a Center for Advanced Training and Additional Education. Based on the center, university students can take free language training in English and prepare for the IELTS exam to confirm the international level of English proficiency - IELTS.

To develop the entrepreneurial competencies of students and young scientists, the University has a department of science and commercialization of scientific projects, a Startup Academy. The Startup Academy provides all the necessary infrastructure for the youth of the Zhetysay region to develop innovative and entrepreneurial activities and increase the number of small and medium-sized businesses. The Academy conducts training sessions and seminars, focuses on the targeted search, selection, and development of startup projects, as well as consulting support on startup development and government support for entrepreneurship, mentoring, expert support, and grant competitions.

In their free time, students can practice for free in gyms and sections for several sports. The university's Sports Club is actively working in this direction, which is engaged in the formation and promotion of healthy lifestyle values, uniting students into teams to demonstrate their needs and abilities in a freely chosen sport, organizing and conducting physical culture, sports and wellness events, organizing youth participation in sports competitions at various levels.

The university's sports base is a multifunctional stadium with a standard football field, with sectors for long jumps, grenade throwing and running tracks, boxing, gymnastics, wrestling halls, and a gym equipped with modern sports equipment.

The University has created favorable conditions for the formation of competencies for social interaction, an active lifestyle, civic consciousness, self-organization and self-government, and a system-activity nature..

The Department of Educational and Social Work and the Youth Center are responsible for the development of students' creative activity in the socio-cultural environment of the University. To reveal the diverse creative abilities of students at the university, there are: the Department of the Assembly of the Peoples of Kazakhstan; dance and vocal-instrumental ensembles, student theater, debaters club, volunteer clubs, KVN commissions, literary, intellectual clubs, labor association "Zhasyl El", association of assistants of the public police "Zhas Kyran", military-patriotic club "Yerlik", and others.



**4 THE PLAN  
FURTHER DEVELOPMENT  
EDUCATIONAL PROGRAMS**

<b>№</b>	<b>Event content</b>	<b>Implement ation period</b>	<b>Responsible persons</b>
<b>Educational and methodical direction</b>			
1	Development of lecture materials, preparation of educational materials for practical and laboratory classes, and creation of methodological guidelines for independent student work (SRO - самостоятельная работа обучающихся)	2025-2029	PTS
2	Development of internship programs and guidelines for thesis work completion	2025-2029	PTS
3	Development of Teaching and Learning Materials Package	2025-2029	PTS
4	Organization and conduct of methodological seminars, trainings, and master classes	2025-2029	PTS
5	Development of test assignments and exam tickets	2025-2029	PTS
<b>Research direction</b>			
1	Publication of textbooks, educational manuals, and monographs	2025-2029	PTS
2	Development and implementation of innovative technologies in the educational process	2025-2029	PTS
3	Participation of teaching staff in regional, national and international conferences	2025-2029	PTS
4	Publication of articles in scientific journals of the KKSON database, RSCI	2025-2029	PTS
5	Publication of articles in scientific journals of the Scopus database, Web of Science	2025-2029	PTS
6	Implementation of scientific projects of the State Fund for Education and Science of the Republic of Kazakhstan	2025-2029	PTS
7	Creation of electronic textbooks, patents, copyright certificates, and implementation certificates based on research results	2025-2029	PTS
8	Students' participation in competitions, Olympiads, research grant programs, startups	2025-2029	PTS
<b>Educational direction</b>			
1	Students' participation in various university and faculty events	2025-2029	PTS
2	Students visit various sports sections and a sports club	2025-2029	PTS
<b>Professional development</b>			
1	Participation of teaching staff in scientific seminars for the purpose of professional development	2025-2029	PTS
2	Completion of internships in scientific centers, universities of the Republic of Kazakhstan, far and near abroad by the teaching staff of the Department	2025-2029	PTS
3	Completion of advanced training courses, language training	2025-2029	PTS
<b>Career guidance work</b>			
1	Participation in the organization of the University's open days	2025-2029	PTS
2	Publication of information on the website and in the newspaper about the activities of the OP	2025-2029	PTS