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Chairman of the  
Educational and Methodological  
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Technology University»

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**APPROVED**

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



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«12» December 2024 Protocol of the EMC № 5      «08» February 2025 Protocol of the AC № 10

**EDUCATIONAL PROGRAM**

**7M06114 Artificial Intelligence**

Code and classification of the field of education: 7M06 Information and Communication technologies

Code and classification of study area: 7M061 Information and Communication technologies

Group of educational programs: M094 Information technologies

ISCED level: 7

NQR level: 7

ORC level: 7

Academic Degree Awarded: Master of Technical Sciences in the educational program «7M06114 Artificial Intelligence»

Duration of study: 2 years

Number of credits: 120

**AGREED**

by Director REDPRINT LLP  
(Digital Agency "HDOCB")

**M.M. Ryskeldi**

**AGREED**





Deputy Director for Research of the Institute of  
Ionosphere

**B.A. Iskakov**

«\_\_» \_\_\_\_\_ 2025.

«\_\_» \_\_\_\_\_ 2025.

The code and name of the educational program: **7M06114 Artificial Intelligence**

№	Developers of the Educational Program (Position, Academic Degree, Scientific Degree, Full Name)	Date	Signature	Note
1	Associate Professor of the Department Mathematical and Computer Modeling, PhD Abdikalikova Z.T.			
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**List of designations and abbreviations**

CD	Cycle of core disciplines
BC	Basic competency
BM	Basic module
UC	University component
HE	Higher education
NMS	National Mandatory Standards of Higher and Post-Graduate Education
ATT	Additional types of training
EQF	European qualifications framework
EFE	European foundation for education
KSA	Knowledge, Skills and Abilities
FA	Final attestation
OC	Optional component
ISCED	International Standard Classification of Education
NQF	National qualifications framework
NQS	National qualifications system
GHM	General humanitarian module
RC	Required component
GEM	General education module
GED	Cycle of general education disciplines
AP	Academic program
GPM	General professional module
SQF	Sectoral qualifications framework
GEC	General education competence
PD	Cycle of profiling disciplines
PI	Professional internship
PS	Professional standard
PE	Postgraduate education
PC	Professional competence
PM	Professional module
LO	Learning outcome
QMS	Quality Management System
RW	Research work

## 1. Description of the educational program

The Master's program in Artificial Intelligence is aimed at training highly qualified specialists and researchers in the field of AI, capable of developing advanced algorithms, applying machine learning methods and working with big data. The training combines fundamental theoretical training and practical implementation of projects and includes research activities. Graduates of the Master's program in AI can work in various fields, such as IT companies, research and scientific organizations, startups, companies engaged in robotics and automation, financial and medical institutions, as well as in the field of smart cities, security and many other areas.

## 2. Goals and objectives of the educational program

**The goal of the EP:** Training highly qualified specialists capable of developing, implementing, and researching intelligent systems and technologies based on machine learning methods, data analysis, and neural network approaches to address current challenges in science, business, and industry.

The objectives of the Master's degree program in Artificial Intelligence are aimed at developing students' theoretical and practical knowledge and skills for successful work in this rapidly developing field.

*Main objectives:*

- In-depth study of modern deep learning architectures, including transformers, graph neural networks and generative models.
- Optimization of machine learning algorithms for problems with limited computing resources (edge AI, federative learning).
- Creation of hybrid systems that combine machine learning, statistical methods and expert systems.
- Development of innovative methods for processing unstructured data (text, images, video, audio) using neural network and traditional algorithms.
- Development of self-learning systems that are resistant to concept drift and dynamic data changes.
- Design of distributed computing and parallel algorithms for working with big data.
- Development of intelligent systems for autonomous decision-making in critical industries (avionics, medicine, finance).
- Study of the impact of artificial intelligence on the labor sphere and social institutions.
- Design of digital security models and protection of personal data in AI systems.
- Application of the theory of multi-agent systems and control to develop complex automated solutions in areas such as robotics, financial markets, autonomous transport systems and others.
- Participation in the development of scientific projects on artificial intelligence, publication of scientific articles in journals. Participation in grant programs and international hackathons.

These tasks ensure the training of highly qualified specialists who are capable of not only applying modern AI methods but also creating new technological solutions that influence the development of science, business and society.

## 3. Passport of the educational program

№	Field name	Note
1.	Code and classification of the field of education	7M06 Information and communication technologies
2.	Code and classification of study areas	7M061 Information and communication technologies
3.	Educational programs group	M094 Information technologies
4.	Name of the educational program	7M06114 Artificial Intelligence
5.	Purpose of the EP	Training of highly qualified specialists capable of developing, implementing and researching



		intelligent systems and technologies based on machine learning methods, data analysis and neural network approaches to solve current problems in science, business and industry.
6.	Type of Educational Program	New EP
7.	Level according to NQF	7
8.	Level according to SQF	7
9.	EP distinctive features	No
10.	University - partner	No
11.	Degree to be conferred	Master
12.	Period of study	2 years
13.	Volume of the credits	120
14.	Language of education	English
15.	Atlas of new professions	General AI Developer Artificial Neural Network Designer Multi-Experience Monitoring Specialist IT Ethics Consultant
16.	Regional standard	No
17.	Existence of the annex to the license for the direction of personnel training	Yes
18.	The license number on the direction of training	KZ81LAM00001263
19.	EP accreditation existence	No
20.	The formed educational outcomes	<p>LO1: Be able to analyze and apply the fundamental concepts, technologies, and methods of the Internet of Things (IoT) and artificial intelligence (AI); develop and integrate IoT devices using modern software and hardware tools; and create AI-based intelligent systems for processing, analyzing, and making decisions based on data received from IoT networks.</p> <p>LO2: Be familiar with the fundamental theories, methods, and algorithms of artificial intelligence, such as machine learning, neural networks, search algorithms, natural language processing (NLP), computer vision, and others.</p> <p>LO3: Be able to develop, test, and implement algorithms for machine learning, deep learning, neural networks, and other AI methods.</p> <p>LO4: Be able to effectively process large volumes of data, using a critical approach to their collection, cleaning, and analysis.</p> <p>LO5: Be able to adapt and apply AI technologies to solve problems in various fields such as healthcare, finance, robotics, transportation, and others.</p> <p>LO6: Able to conduct scientific research and develop new methods and approaches in the field of artificial intelligence. Be able to develop and publish scientific papers, participate in scientific conferences and projects.</p> <p>LO7: Be able to apply artificial intelligence</p>

		<p>methods and technologies to develop solutions aimed at improving quality of life and addressing social issues, analyze the impact of AI on society and its ethical aspects, as well as design projects and systems that contribute to sustainable development and social well-being.</p> <p>LO8: Be able to work in interdisciplinary teams where AI specialists interact with experts from other fields, such as business, engineering, or medicine.</p>
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#### 4. Professional Standards (PS), Job Cards, Job Functions

№	Name of PS	Job card	Job functions
1	Professional Standard: for educators (faculty members) of higher and/or postgraduate education institutions	Lecturer, Assistant in the field of education, High education and/or postgraduate education (HEPGE)	Teaching Conducting scientific research
2		Lecturer, Senior Lecturer in the field of education, High education and/or postgraduate education (HEPGE)	Carrying out scientific and methodological work
3	Development of big data processing and storage systems	Neural Network Specialist	Application of neural networks to solve complex problems in data processing
4		Machine Learning Specialist	Design and implementation of systems using machine learning
5		Computer Vision Programmer	Management of applications and equipment for computer vision
6	Development of artificial intelligence applications	Artificial intelligence engineer	Experimental operation of artificial intelligence systems and its implementation
7		Artificial intelligence specialist	Organization of expert system development processes Management of expert system development processes

#### 5. List of competences of the educational program:

BC1: The ability to actually use the state language, the language of international communication and foreign language in professional activities.

BC2: Ability to understand the basics of economic knowledge, scientific ideas about finance, economics.

BC3: Ability to professional use of modern equipment, devices, network components, computer systems (in accordance with the objectives of the program), as well as use the rules of safety, industrial hygiene, fire safety and labour protection standards.

BC4: Ability to possess skills of using algorithms and programs for calculating parameters of business processes.

BC5: The ability to use the basic provisions and methods for solving problems, the ability to carry out project documentation in the software environment of computer graphics for various types of projects.

BC6: The ability to be competent in the choice of mathematical modeling methods for solving specific problems, including the willingness to identify the natural scientific essence of the

problems arising in the course of professional activity, and the ability to involve the appropriate physical and mathematical apparatus to solve it.

BC7: The ability to develop information and software information systems based on modern methods and development tools.

PC1: The ability to create mathematical models using the methods of modern information technologies

PC2: The ability to model problems of pollution of ecological systems and forecast cause-and-effect relationships in the ecological system

PC3: The ability to model energetical problems

PC4: The ability to build the problem solution algorithm

PC5: The ability to apply the software programs to solve the problem

PC6: The ability to build 3D visualizations

PC7: The ability to see a logical connection in the system of collected information; mastery of advanced analytical tools.

## 6. Educational program learning outcomes

1. LO1: Be able to analyze and apply the fundamental concepts, technologies, and methods of the Internet of Things (IoT) and artificial intelligence (AI); develop and integrate IoT devices using modern software and hardware tools; and create AI-based intelligent systems for processing, analyzing, and making decisions based on data received from IoT networks.

2. LO2: Be familiar with the fundamental theories, methods, and algorithms of artificial intelligence, such as machine learning, neural networks, search algorithms, natural language processing (NLP), computer vision, and others.

3. LO3: Be able to develop, test, and implement algorithms for machine learning, deep learning, neural networks, and other AI methods.

4. LO4: Be able to effectively process large volumes of data, using a critical approach to their collection, cleaning, and analysis.

5. LO5: Be able to adapt and apply AI technologies to solve problems in various fields such as healthcare, finance, robotics, transportation, and others.

6. LO6: Able to conduct scientific research and develop new methods and approaches in the field of artificial intelligence. Be able to develop and publish scientific papers, participate in scientific conferences and projects.

7. LO7: Be able to apply artificial intelligence methods and technologies to develop solutions aimed at improving quality of life and addressing social issues, analyze the impact of AI on society and its ethical aspects, as well as design projects and systems that contribute to sustainable development and social well-being.

8. LO8: Be able to work in interdisciplinary teams where AI specialists interact with experts from other fields, such as business, engineering, or medicine.

## 7. Correlation matrix of learning outcomes of the educational program with the formed competencies

	LO1	LO2	LO3	LO4	LO5	LO6	LO7	LO8
BC1						V		V
BC2					V			V
BC3		V						
BC4		V		V	V			
BC5	V					V	V	
BC6				V	V			
BC7			V				V	
PC1	V			V		V		
PC2							V	V
PC3			V		V		V	V



<b>PC4</b>		V		V				
<b>PC5</b>	V				V			
<b>PC6</b>							V	V
<b>PC7</b>			V			V		

### 8. Correlation of Learning Outcomes (LO) with Job Functions

№	LO	Job functions
1.	LO1	Experimental operation of artificial intelligence systems and its implementation Organization of processes for developing expert systems
2.	LO2	Managing computer vision applications and hardware
3.	LO3	Application of neural networks in solving complex problems in data processing Experimental operation of artificial intelligence systems and its implementation
4.	LO4	Design and implementation of systems using machine learning
5.	LO5	Experimental operation of artificial intelligence systems and its implementation
6.	LO6	Teaching Conducting scientific research Implementation of scientific and methodological work
7.	LO7	Experimental operation of artificial intelligence systems and its implementation
8.	LO8	Organization of expert system development processes Management of expert system development processes Teaching

### 9. Table of relationships between competencies, learning outcomes, assessment methods and criteria

Competencies of an EP graduate	Competencies expressed in expected learning outcomes	Evaluation criteria	Name of assessment method
<b>Basic competencies</b>			
BC2 BC6	LO2	Knows the basic concepts of the area under study	Test
	LO5	Knows the basic concepts of the area under study	Case study
	LO8	Knows how to apply mathematical methods to solve various problems	Workbook
BC3 BC4 BC5 BC7	LO1	Applies acquired knowledge to solve practical problems	Project
	LO3	Applies acquired knowledge to solve practical problems	Project
	LO5	Applies acquired knowledge to solve practical problems	Project
	LO7	Applies acquired knowledge	Laboratory work
BC1	LO8	Able to present his ideas in a compelling manner	Colloquium
	LO6	Able to communicate clearly in writing	Summary
<b>Professional competencies</b>			
PC1 PC3 PC4 PC5	LO1	Applies acquired knowledge to solve practical problems	Project
	LO3	Applies acquired knowledge to solve practical problems	Calculation and graphic work
	LO5	Applies acquired knowledge	Laboratory work
PC2 PC6 PC7	LO4	Able to present his ideas in a compelling manner	Laboratory work
	LO6	Able to retrieve necessary information	Colloquium
	LO7	Able to present his ideas in a compelling manner	Laboratory work
	LO8	Able to retrieve necessary information	Colloquium

## 10. Information about the modules of the educational program

Module code / Module name	Module volume (work intensity)	Learning outcomes	Criteria for assessing learning outcomes	Disciplines forming the module Code and Name
BASIC MODULES				
BM7502 Humanitarian and pedagogical module	20	Understands the meaning of world knowledge, analysis evaluation and comparison of various theoretical concepts in the field of scientific research. Knows critical analysis of current events. Works with scientific apparatus and sources.	Oral interview, testing, report, midterm control, semester work	History and philosophy of science
		Knows English as the language of communication in the scientific environment, sources of information and knowledge bases.		Foreign Language (professional)
		They are competent in the field of scientific and scientific-pedagogical activity in the conditions of rapid updating and growth of information flows.		Higher education: psychological and pedagogical development strategies
		Masters methods of planning and conducting classes, acquires skills of pedagogical communication and assessment of students' academic achievements. Develops the ability to apply modern educational technologies and analyze their own teaching activities.	Report	Pedagogical practice
BM7506 Intelligent Machine Module	5	Knows of key concepts and stages of the data mining process, including data collection, preparation, processing and interpretation. Apply real-time machine learning methods to process streaming data (e.g. in monitoring and analysis systems).	Oral interview, testing, report, midterm control, semester work	Data Mining and Machine Learning
	5	Design and build robots for a variety of tasks, including navigation, perception, manipulation, and interaction with the environment. Use artificial intelligence techniques to solve practical problems in robotics. Apply acquired knowledge to develop intelligent systems and machines that can operate autonomously and efficiently in real-world settings.		Robotics and intelligent machines
	5	Able to work with various types of multimedia data (images, video, audio) to analyze them and extract useful information. Develop applications for business solutions, such as automation of processing large volumes of video content or audio recordings in the context of customer service, security and monitoring.		Multimedia Information Retrieval and Computer Vision
PROFESSIONAL MODULES				
PM7503 IoT Module and Symbolic Intelligence	28	Knows principles of the Internet of Things, including devices, sensors, networks, and data transfer protocols. Able to analyze large volumes of data received from IoT devices and apply AI	Oral interview, testing, report, midterm	IoT and Artificial Intelligence

		methods to extract useful information.	calculation and graphic works	
		Knows basics of computational intelligence, including its main principles, such as adaptive systems, self-tuning, evolutionary and genetic algorithms. Apply computational intelligence methods to create intelligent systems, such as recommendation systems, autonomous vehicles, computer vision systems.		Computational Intelligence and Deep Learning
		Knows imaging principles using various medical technologies. Apply machine learning and deep learning methods for image classification, segmentation and analysis. Apply methods for processing and analyzing large volumes of medical images, including the use of cloud computing and parallel computing.		Methods for Biomedical Image Formation and Processing
		Solving practical problems using symbolic methods and evolutionary algorithms: creating and training expert systems, optimizing processes and automating decisions. Using combined approaches to create intelligent systems that can adapt to changing conditions, take uncertainty into account and learn from experience. Developing applications such as robots, control systems, intelligent systems for business and industry.		Symbolic and Evolutionary AI
		Gains experience in independently conducting scientific research, including formulating goals, choosing methods, collecting and analyzing data. Develops skills in critical thinking, presenting scientific results, and preparing publications.	Report	Research practice
PM7505 Ethical AI Module	15	Masters the theoretical foundations and algorithms of reinforcement learning, including both classical and deep methods. Able to develop, apply and adapt RL algorithms to solve applied problems of artificial intelligence in various environments.	Oral interview, testing, report, midterm calculation and graphic works	Python/R for data analysis
		Study of types of scientific research, methodology of scientific knowledge, research, drawing conclusions and findings, writing scientific articles and conference reports, summarizing the results of research work in a dissertation, its structure and content.		Fundamentals of research work
		Studies the principles of developing and applying artificial intelligence systems to solve social and humanitarian problems. Masters approaches to creating ethical, fair and sustainable AI solutions in the areas of healthcare, education, ecology and social support.		Artificial Intelligence for Social Good
PM7504 Module Cognitive Technologies and Intelligent Control	10	Develop and apply reinforcement learning algorithms to solve real-world problems such as gaming environments (e.g. chess, Go, physics-based games). Apply reinforcement learning methods in robotics to control the motion of robots and autonomous systems.	Oral interview, testing, report, midterm calculation and graphic works	Deep Reinforcement Learning
		Studies basic concepts and methods of optimization, such as minimization and maximization problems, linear and nonlinear optimization. Apply game theory methods to model various interaction scenarios: in economics, business, politics, social sciences, decision-making strategy.		Optimization methods and game theory

		Know: cognitive technologies, how they help in solving problems related to storing and analyzing knowledge, and how these technologies can be used in various fields. Be able to: use AI and machine learning methods for automatic information processing, including methods for knowledge extraction, semantic analysis, and building data models.		Cognitive technologies for knowledge accumulation
		Know: the basic principles and goals of sustainable development, including environmental, social and economic sustainability. Be able to: cognitive technologies can be used to develop innovative solutions for sustainable development, such as smart cities, waste management ecosystems, efficient use of renewable energy sources, etc.		Cognitive technologies for managing sustainable development
Scientific research work	24	Knows the organizational structure and complex of technical means of the information and analytical center (IAC) of organization. Can identify the main tasks solved by the IAC. Knows the mathematical support for the selected task (set of tasks or subsystem) and software for the selected task (set of tasks or subsystem), organizational and legal support for the selected task (set of tasks or subsystem). systematization and analysis of actual materials required for writing a course paper, scientific report, and internship report.	Report	The research work of a student, including an internship and implementation of master's thesis

### 11. Information about the disciplines of the educational program

№	Name of module / discipline	Brief description of discipline (30-50 words)	Number of credits	Formed competences (codes)	Prerequisites	Post-requisites
<b>Basic disciplines</b>						
<b>University component</b>						
1.	Higher education: psychological and pedagogical development strategies	The discipline focuses on studying psychological and pedagogical strategies for the development of higher education, as well as forming competencies in designing and organizing the educational process. Master's students will master modern psychological and pedagogical approaches to teaching, methods for diagnosing and assessing students, as well as digital and inclusive education technologies. Special attention is given to the development of pedagogical, research, and communication skills, as well as the prevention of professional burnout among educators. Upon completion of the course, students will be able to develop and implement effective educational strategies in universities.	6	LO8	-	Teaching Practice
2.	Foreign language (professional)	It is a one-semester practical course that tailors the English language program to the Master's students' professional/research needs. During the course the Master's students will work on an individual project and a research portfolio. By the end of the course, students will organize and present research portfolio.	5	LO6	-	-
3.	History and philosophy of science	The purpose of the discipline is to form the skills of working with scientific literature; logical, systemic, and critical thinking skills. The discipline will study: the main stages of the development of science; history and philosophy of science to form a conscious attitude to the environment and history, the basic principles of research activities.	5	LO6	-	-
4.	Teaching Practice	The course is aimed at developing master's students' professional competencies in the field of teaching. As part of the practice, students master methods of organizing the educational process, conduct classes, develop methodological materials and analyze their own teaching activities.	4	LO6		
<b>The cycle of basic disciplines</b>						
<b>Elective components</b>						
5.	Data Mining and Machine Learning	This course covers data mining techniques, machine learning methods, and their applications in various domains. Topics include classification, regression, clustering, and association rule mining. Practical applications and big data processing are key areas of focus.	5	LO2 LO4		
6.	Robotics and Intelligent Machines	This course covers the fundamentals of designing and programming robots, mechatronic systems, and autonomous devices. Topics include motion control algorithms, sensor systems, and applications of machine learning and computer vision. Case studies in industrial, medical, and service robotics are explored.	5	LO5		
7.	Multimedia	The course studies methods for analyzing,	5	LO2		

	Information Retrieval and Computer Vision	processing, and searching information in multimedia data — images, video, and audio. Students will learn the basics of computer vision, including object recognition, segmentation, and feature extraction. The second part focuses on multimedia information retrieval using machine learning and deep learning techniques. Practical applications such as video surveillance, medical image processing, and recommendation systems are covered. The course combines theory, laboratory work, and projects to master fundamental principles and modern technologies.				
<b>Cycle of profiling disciplines</b>						
<b>University components</b>						
8.	Reinforcement Learning and its Applications in AI	The "Reinforcement Learning and its Applications in AI" course is designed for undergraduate students studying artificial intelligence and provides an introduction to one of the most powerful machine learning methods that enables algorithms to optimize their behavior in complex environments based on feedback. Students will learn about basic algorithms such as Q-learning and Policy Gradient and explore various applications of reinforcement learning in real AI projects, including gaming, autonomous vehicles, and robotics. The course is enriched with practical assignments and projects that help students develop the necessary skills to implement and adapt reinforcement learning algorithms in diverse applications.	5	LO2 LO3		
9.	IoT and Artificial Intelligence	The course explores the integration of intelligent algorithms with distributed IoT systems. Students will be introduced to IoT architecture, processing streaming data using machine and deep learning, as well as security and ethics issues. The practical part includes creating prototypes of smart devices, developing AI models, and applying IoT/AI in healthcare, transportation, smart cities, and industry.	5	LO1		
10.	Methods for Biomedical Image Formation and Processing	The course studies the principles of acquiring, analyzing, and interpreting biomedical images. Special attention is given to algorithms for filtering, segmentation, registration, reconstruction, and data visualization. Methods for enhancing image quality and analyzing pathologies using computer vision and machine learning are covered. The practical part includes working with real data and developing processing tools, which builds skills applicable in medicine, research, and medical device development.	5	LO5		
11.	Research Internship	The course is aimed at developing the research skills of master's students. During the internship, students formulate scientific goals, collect and analyze data, apply methods of scientific justification, and prepare materials for publications and scientific presentations.	8	LO2 LO8		
<b>Cycle of profiling disciplines</b>						
<b>Elective components</b>						
12.	Fundamentals of research work	The study of types of scientific research, the methodology of scientific knowledge, research, the formation of conclusions and conclusions, writing scientific articles and reports at the conference, summarizing the results of research	5	LO6	Research Methodology	



		work in a dissertation, its structure and content.				
13.	Elective courses 1		5			
	Optimization Methods and Game Theory	The course studies methods for finding optimal solutions and modeling strategic interactions in systems with conflicting interests. The first part covers mathematical optimization methods: linear, nonlinear, integer, and stochastic optimization. The second part is dedicated to game theory — analyzing interactions of rational agents, including Nash equilibrium, cooperative and non-cooperative games. Problems from economics, politics, and business are examined. The course combines theory and practice, developing skills in analysis and decision-making under competition and uncertainty.		LO3 LO4		-
	Deep Reinforcement Learning	The course is a key subject for master's students studying artificial intelligence, focusing on complex algorithms and learning strategies that enable machines to optimize their actions in dynamic environments. Students will delve into deep methods such as Q-learning, Deep Q-Networks (DQN), Policy Gradient methods, and Actor-Critic models, which form the foundation for creating highly efficient artificial systems capable of learning independently and making decisions. The course emphasizes the application of these methods across various areas, from automated trading to managing autonomous vehicles and robotics. Including theoretical lectures, practical seminars, and lab work, the course also discusses the ethical and social aspects of using deep reinforcement learning in modern technological systems.		LO2	Mach ine Learn ing	-
14.	Artificial Intelligence for Social Good	The course explores the opportunities and challenges of applying AI in social projects aimed at improving community life. Students will learn AI methods and examine the ethical, legal, and social aspects of technology development. Special emphasis is placed on addressing issues in healthcare, education, and social justice while considering ethical principles. The course includes theory, practice, and case studies to prepare responsible professionals.	5	LO7		
15.	Computational Intelligence and Deep Learning	The course covers modern artificial intelligence methods based on computational approaches and deep learning. Students will study neural networks, evolutionary algorithms, fuzzy logic, and optimization techniques. Special emphasis is placed on deep learning, its architectures, training methods, and regularization. The practical part includes creating and training models using Python, TensorFlow, or PyTorch, as well as analyzing the results.	5	LO2 LO3		
16.	Symbolic and Evolutionary AI	The course covers methods of symbolic (knowledge-based) and evolutionary (biologically inspired) artificial intelligence. Students will become familiar with formal models, search algorithms, knowledge representation systems, as well as genetic algorithms and evolutionary computation methods. The course combines theory with practical assignments and provides a comparative analysis of the advantages of both	5	LO2		

		approaches in areas such as robotics, data processing, and automated design.				
17.	Elective courses 2		5			
	Cognitive technologies for knowledge accumulation	The course explores methods and systems for modeling, automating, and improving the processes of perception, processing, and storage of knowledge using artificial intelligence and cognitive sciences. Students will become familiar with cognitive models, semantic networks, ontologies, knowledge representation systems, and inference. Special emphasis is placed on automatic knowledge extraction from texts, databases, and multimedia, natural language processing, and machine learning. The course develops skills for creating intelligent systems to support decision-making, educational platforms, and corporate knowledge repositories.		LO4		-
	Cognitive Technologies for Sustainable Development Management	The course studies artificial intelligence and cognitive systems methods for supporting decision-making in sustainable development. It covers the collection, processing, and interpretation of data on the environment, resources, and social indicators, as well as forecasting and optimizing decisions. Special emphasis is placed on integrating cognitive technologies into energy conservation, resource management, climate change mitigation, and social well-being. The course combines theory and practice to create innovative solutions for sustainable development.		LO4		-

## 12. Educational program curriculum (Platonus)

№	Module Code	Module Name in Three Languages (Kazakh / Russian / English)	Discipline code	Course Name in Three Languages (Kazakh / Russian / English)	Cycle (GED, BD, PD)	Component (RC, EC, UC)	Total Credits (ECTS)	Total Academic Hours	Number of contact hours				Number of hours		Assessment Method (Att. 1, Att. 2, Exam, Coursework/Project, Differentiated Pass/Fail, Thesis/Dissertation Defense)	Prerequisites (Course Code)
									Total contact hours	including:			Total SIS hours	including TSIS		
										Lectures	Practical sessions (seminars)	Laboratory sessions				
1	2	3	4	5	6	7	8	9	10	11	12	13	1	2	3	4
1 course																
1 semester																
1		Ғылыми зерттеу жұмысы/ Научно-исследовательская работа/ Scientific research work	RW7001	Магистранттың ғылыми-зерттеу жұмысы, оның ішінде тағылымдама және магистрлік диссертациясының орындалуы / Научно-исследовательская работа магистранта, включая прохождение стажировки и выполнение магистерской диссертации (НИРМ) / The research work of a student, including an internship and implementation of master's thesis	GED	RC	2	60	0	0	0	0	60	15	Report, diff.credit	-
2	BM7502	Гуманитарлық және педагогикалық модуль / Гуманитарно-педагогический модуль/ Humanitarian and pedagogical module	SPS7001	Тарих және ғылым философиясы / История и философия науки / History and philosophy of science	BD	UC	5	150	45	30	15	0	105	15	MT,ET, exam	-
3	BM7502	Гуманитарлық және педагогикалық модуль / Гуманитарно-педагогический модуль/ Humanitarian and pedagogical module	SPS7002	Жоғары мектеп: психологиялық-педагогикалық даму стратегиялары / Higher education: psychological and pedagogical development strategies	BD	UC	6	180	60	30	30	0	120	15	MT,ET, exam	-
4	PM7503	IoT және символдық сана модулі/ Модуль IoT и символичный разум/ IoT and symbolic intelligence module	SFT7502	Заттар интернеті және жасанды интеллект/ Интернет вещей и искусственный интеллект Internet of Things and Artificial Intelligence	PD	UC	5	150	45	15	30	0	105	15	MT,ET, exam	-

5	PM750 5	Этикалық ЖИ модулі/ Модуль Этичный ИИ/ Ethical AI Module	MAT757 1	Оқытуды күшейту және оны ЖИ-де қолдану Обучение с подкреплением и его применения в ИИ/ Reinforcement Learning and its Applications in AI	PD	UC	5	150	45	15	30	0	105	15	MT,ET, exam	
6	BM750 6	Интеллектуалды машиналар модулі/ Модуль интеллектуальных машин/ Intelligent Machine Module	SFT7501	Деректерді өндіру және машиналық оқыту/ Интеллектуальный анализ данных и машинное обучение/ Data Mining and Machine Learning	BD	EC	5	150	45	15	30	0	105	15	MT,ET, exam	
7	BM750 6	Интеллектуалды машиналар модулі/ Модуль интеллектуальных машин/ Intelligent Machine Module	SFT7503	Робототехника және интеллектуалды машиналар/ Робототехника и интеллектуальные машины/ Robotics and intelligent machines	BD	EC	5	150	45	15	30	0	105	15	MT,ET, exam	
In total for 1 <sup>st</sup> semester:							33	990	285	12 0	16 5	0	705	105		
2 semester																
8		Ғылыми зерттеу жұмысы/ Научно-исследовательская работа/ Scientific research work	RW7002	Магистранттың ғылыми-зерттеу жұмысы, оның ішінде тағылымдама және магистрлік диссертациясының орындалуы / Научно- исследовательская работа магистранта, включая прохождение стажировки и выполнение магистерской диссертации (НИРМ) / The research work of a student, including an internship and implementation of master's thesis	GED	RC	3	90	0	0	0	0	90	15	Report, diff.credit	
9	BM750 2	Гуманитарлық және педагогикалық модуль / Гуманитарно-педагогический модуль/ Humanitarian and pedagogical module	LAN 7001A	Шет тілі (кәсіби) / Иностранный язык (профессиональный) / Foreign language (professional)	BD	UC	5	150	45		45	0	105	15	MT,ET, exam	-
10	BM750 2	Гуманитарлық және педагогикалық модуль / Гуманитарно-педагогический модуль/ Humanitarian and pedagogical module	PP7501	Педагогикалық тәжірибе / Педагогическая практика / Teaching practice	BD	UC	4	120	0	0	0	0	120	15	report	SPS 700 2
11	PM750 3	IoT және символдық сана модулі/ Модуль IoT и символьный разум/ IoT and symbolic intelligence module	SFT7506	Есептеу интеллект және терең оқыту / Вычислительный интеллект и глубокое обучение/ Computational Intelligence and Deep Learning	PD	EC	5	150	45	15	30	0	105	15	MT,ET, exam	
12	PM750 5	Этикалық ЖИ модулі/ Модуль Этичный ИИ/ Ethical AI Module	RM7502	Ғылыми-зерттеу жұмысының негіздері / Основы научно-исследовательской работы / Fundamentals of research work	PD	EC	5	150	45	15	30	0	105	15	MT,ET, exam	
13	PM750 4	Когнитивті технологиялар және интеллектуалды басқару модулі/ Модуль Когнитивные технологии и интеллектуальное	SFT7504	Оңтайландыру әдістері және ойын теориясы Методы оптимизации и теория игр/ Optimization methods and game theory	PD	EC	5	150	45	15	30	0	105	15	MT,ET, exam	
			MAT757	Терең күшейту арқылы оқыту/ Глубокое												

		управление/ Cognitive technologies and intelligent control module	2	обучение с подкреплением/ Deep Reinforcement Learning													
				<b>In total for 2<sup>nd</sup> semester:</b>			27	810	180	45	135	0	630	90			
				<b>TOTALLY FOR 1<sup>st</sup> COURSE:</b>			60	1800	465	165	300	0	1335	195			
<b>2 course</b>																	
<b>3 semester</b>																	
14		Ғылыми зерттеу жұмысы/ Научно-исследовательская работа/ Scientific research work	RW7003	Магистранттың ғылыми-зерттеу жұмысы, оның ішінде тағылымдама және магистрлік диссертациясының орындалуы / Научно-исследовательская работа магистранта, включая прохождение стажировки и выполнение магистерской диссертации (НИРМ) / The research work of a student, including an internship and implementation of master's thesis	GED	RC	5	150	0	0	0	0	150	15	Report, diff.credit		
15	PM7503	IoT және символдық сана модулі/ Модуль IoT и символичный разум/ IoT and symbolic intelligence module	SFT7507	Биомедициналық бейнелерді қалыптастыру және өңдеу әдістері/ Методы формирования и обработки биомедицинских изображений/ Methods of formation and processing of biomedical images	PD	UC	5	150	45	15	30	0	105	15	MT,ET, exam		
16	PM7504	Когнитивті технологиялар және интеллектуалды басқару модулі/ Модуль Когнитивные технологии и интеллектуальное управление/ Cognitive technologies and intelligent control module	SFT7511	Білімді жинақтауға арналған когнитивті технологиялар/ Когнитивные технологии для накопления знаний/ Cognitive technologies for knowledge accumulation	PD	EC	5	150	45	15	30	0	105	15	MT,ET, exam		
			SFT7512	Тұрақты дамуды басқарудың когнитивті технологиялары/ Когнитивные технологии для управления устойчивым развитием/ Cognitive technologies for sustainable development management													
17	PM7505	Этикалық ЖИ модулі/ Модуль Этический ИИ/ Ethical AI Module	MAT7543	Әлеуметтік игілікке арналған жасанды интеллект / Искусственный интеллект для социального блага / Artificial Intelligence for Social Good	PD	EC	5	150	45	15	30	0	105	15	MT,ET, exam		
18	PM7503	IoT және символдық сана модулі/ Модуль IoT и символичный разум/ IoT and symbolic intelligence module	SFT7509	Символдық және эволюциялық жасанды интеллект/ Символьный и эволюционный искусственный интеллект/ Symbolic and evolutionary artificial intelligence	PD	EC	5	150	45	15	30	0	105	15	MT,ET, exam		
19	BM7506	Интеллектуалды машиналар модулі/ Модуль интеллектуальных машин/ Intelligent Machine Module	SFT7508	Мультимедиялық ақпаратты іздеу және компьютерлік көру/ Поиск мультимедийной информации и компьютерное зрение/Multimedia Information Retrieval and Computer Vision	BD	EC	5	150	45	15	30	0	105	15	MT,ET, exam		

				<b>In total for 3<sup>rd</sup> semester:</b>			<b>30</b>	<b>900</b>	<b>225</b>	<b>75</b>	<b>15</b>	<b>0</b>	<b>675</b>	<b>90</b>		
											<b>0</b>					
<b>4 semester</b>																
20		Ғылыми зерттеу жұмысы/ Научно-исследовательская работа/ Scientific research work	RW7008	Магистранттың ғылыми-зерттеу жұмысы, оның ішінде тағылымдама және магистрлік диссертациясының орындалуы / Научно- исследовательская работа магистранта, включая прохождение стажировки и выполнение магистерской диссертации (НИРМ) / The research work of a student, including an internship and implementation of master's thesis	GED	RC	14	420	0	0	0	0	420	15	Report, diff.credit	
21	PM750 3	IoT және символдық сана модулі/ Модуль IoT и символьный разум/ IoT and symbolic intelligence module	PP7504	Зерттеу тәжірибесі / Исследовательская практика / Research practice	PD	UC	8	240	0	0	0	0	240	15	report	
22				Магистрлік диссертацияны тіркеу және қорғау / Оформление и защита магистерской диссертации / Registration and defense of a master's thesis			8	240	0	0	0	0	240	15	Defense of Master's Thesis	
				<b>In total for 4<sup>th</sup> semester:</b>			<b>30</b>	<b>900</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>900</b>	<b>45</b>		
				<b>TOTALLY FOR 2<sup>nd</sup> COURSE:</b>			<b>60</b>	<b>1800</b>	<b>225</b>	<b>75</b>	<b>15</b>	<b>0</b>	<b>157</b>	<b>135</b>		
				<b>TOTALLY:</b>			<b>120</b>	<b>3600</b>	<b>690</b>	<b>24</b>	<b>45</b>	<b>0</b>	<b>291</b>	<b>330</b>		
										<b>0</b>	<b>0</b>		<b>0</b>			