

Ministry of Agriculture of the Republic of Kazakhstan
S. Seifullin Kazakh Agro Technical Research University

APPROVED

Chairman of the Board
NCJSC «S. Seifullin Kazakh
Agro Technical Research University»

Tireuov M.K.

protocol No 28 24 04 2025 y.



EDUCATIONAL PROGRAM
8D06101 – «Big data analytics»

Code and classification of the field of education:

8D06 Information and Communication Technologies

Code and classification of training areas:

8D061 Information and Communication Technologies

Code in the International Standard Classification of Education:

0610

Degree/qualification awarded:

PhD in the educational program 8D06101 – «Big data analytics»

Astana 2025

Academic Committee:

№	Full name	Academic degree, academic title	Position	Place of work	Signature
1.	Shaushenova Anargul Gimranovna	k.t.s., Associate Professor	Head of the Department	S.Seifullin KATRU	
2.	Ismailova Aisulu Abzhapparovna	PhD, Associate Professor, docent	Acting Professor	S.Seifullin KATRU	
3.	Beldeubaeva Zhanar Toleubaevna	PhD	Senior lecturer	S.Seifullin KATRU	
4.	Mauina Gulalem Myrzalievna	Master of Technical Sciences	Lecturer at the Department of "Information Systems"	S.Seifullin KATRU	
5.	Isembayeva Aida Ualikhanovna		1st year 8D06101 Big Data Analytics	S.Seifullin KATRU	

Agreed with representatives of employers:

№	Full name	Position	Place of work	Signature, seal
1	Kadyrkulov Kuanysh Kaisarovich	Director, PhD	«Smart soft Kazakhstan» LLP	
2	Meirzhan Serikbaiuly	Deputy Director	LLP "AVR Group KZ"	

The team of authors was approved by the order of NJSC «S.Seifullin KATRU»
№. 18.1-345/н dated 17.12.2024 y.

Educational program 8D06101 – «Big data analytics»
Considered:

at the meeting of the Department «Information Systems»
protocol № 8 dated 13.03.2025 y.

at the meeting of the Faculty Council on Academic Quality
protocol № 9 dated 19.03.2025 y.

at the meeting of the Academic Council of the University
protocol № 7 dated 19.03.2025 y.

Date of updating of the EP 10.06.2025 y.

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Regulatory references

1. The Law "On Education" of the Republic of Kazakhstan dated 07/27/2007, No. 319-III-LRK

2. Order of the Minister of Science and Higher Education of the Republic of Kazakhstan dated July 20, 2022 No. 2 "On approval of State mandatory standards of higher and postgraduate education"

3. Standard rules of activity of educational organizations implementing educational programs of higher and (or) postgraduate education, approved by Order of the Ministry of Education and Science of the Republic of Kazakhstan on 10/30/2018, No. 595

4. Rules for the organization of the educational process according to the credit technology of education. Approved by the Order of the Minister of Education and Science of the Republic of Kazakhstan dated 04/20/2011 No. 152

5. On approval of the qualification requirements for educational activities and the list of documents confirming compliance with them. Approved by the Order of the Ministry of Education and Science of the Republic of Kazakhstan dated 06/17/2015, No. 391

6. The State Classifier of the Republic of Kazakhstan. Classifier of specialties of higher and postgraduate education of the Republic of Kazakhstan. Approved and put into effect by Order No. 569 of the Minister of Education and Science of the Republic of Kazakhstan dated October 13, 2018.

Professional standards used in the development of the educational program:

1) Professional standard: Teacher (faculty) of higher and (or) postgraduate education organizations (20.11.2023)

2) Software testing (05.12.2022)

2 Passport of the educational program

Purpose of the educational program Training of scientific and pedagogical teaching staff in the direction of ICT and managers, analysts for various sectors of the economy and production.

Tasks of the EP:

- to form the ability to contribute to the development of the latest areas of computer science through original scientific research;
- in-depth theoretical and practical training in the chosen direction of science

Learning outcomes

LO 1. Able to formulate the purpose and objectives of research, substantiate and apply scientific methodology, use methods of collecting, analyzing, and synthesizing information flows, as well as implement methods of intelligent data analysis within integrated decision support systems in interdisciplinary contexts.

LO 2. Able to conduct comprehensive problem analysis and develop solutions using modern computer technologies and software; to plan and carry out theoretical and applied research in the field of artificial intelligence and the design of intelligent systems; to conduct experiments and collect data in a justified manner; and to apply analytical tools based on Big Data technologies and decision support systems.

LO 3. Analyze large information flows of Internet space data based on various technologies, solve applied problems based on the analysis of information with a large amount of data to structure this information into a single, understandable and formalized mathematical model.

LO 4. To use the skills of working with information from various literary sources, to present it in various forms of messages, presentations and reports, taking into account the specifics of the audience, justifying and competently stating their point of view on problematic issues, to work in a team when searching and solving research problems.

LO 5. To carry out a critical analysis and evaluation of modern scientific achievements, to demonstrate the ability of in-depth analysis of problems, formulation and justification of tasks, to develop conceptual and theoretical models of solved scientific problems and tasks of scientific and design-production-technological activities, to apply methods of searching for information sources, as well as to analyze the quality of the information received.

LO 6. Apply methods of descriptive, spatial, statistical analysis, implement ETL processes, OLAP analysis, as well as solve applied problems based on the use of artificial neural networks.

LO 7. Demonstrate the ability to independently acquire new knowledge and skills with the help of information technologies and use them in practical activities, including in new areas of knowledge not directly related to the field of activity, expand and deepen their scientific worldview.

3 General characteristics of the educational program

The presented Educational program is aimed at preparing a synthetic profession "data scientist". Data scientists need to have skills and knowledge from several disparate areas: computer science and programming, mathematical methods, and business administration and management. Such synthetic specialties are always in great demand, but also difficult to master. The key methods of data analysis today are machine learning, data mining, process mining, visual analytics, time series analysis, and others.

By analyzing big data, you can create new services and products, optimize your business, and, consequently, earn money.

Big Data technology allows you to reduce the cost of IT infrastructure and software, reduce labor costs through more efficient methods of data integration, management, analysis and decision

making; increase revenue and profits through new or more efficient ways of doing business. That is, at the present stage, the same technologies represent a qualitatively new value for the enterprise.

The concept of the Educational Program is the preparation of a universal specialist who has knowledge in mathematics, statistics, computer science, computer science, business and economics.

The uniqueness and distinctive feature of the EP lies in the introduction into the educational program of the disciplines of working with big data, as well as special courses: a supervisor and a foreign doctoral consultant, which will help the doctoral student to master advanced scientific and technological methods developed in the field of his research and familiarize himself with existing relevant topics. directions.

The structure of the doctoral educational program includes two components: educational and scientific, which determine the content of education.

4 Competence model (portrait) of a graduate

4.1 Areas of professional activity

The field of professional activity of doctoral graduates is: science, education, public administration and local government, economics, finance, industry, agriculture, culture, health care.

Potential employers of the program graduates are large companies and organizations that have the practice of storing large amounts of data (including in external data centers), as well as IT companies and research organizations, as well as relevant IT and analytical departments of companies and organizations in all areas activities.

The main demand for Big Data analysts is formed by IT and telecom companies, and large retail chains. Recently, Big Data has been increasingly used in the banking sector, public administration, and agriculture.

4.2. Types of professional activity

- Maintaining the effective operation of databases that ensure the functioning of information systems in the organization;
- Entrepreneurship in the field of information technology;
- Creation and management of information resources on the Internet;
- Information technologies in economics and public administration;
- Management of projects in the field of information technology;
- Development of technical documentation and methodological support for products in the field of information technology;
- Design and research activities in the field of information technology;
- Technical support for clients during the installation and operation of information and communication systems and / or their components;
- Organization of information protection in computer systems and networks.

4.3. General educational competencies

Requirements for key competencies of PhD graduates:

- 1) have an idea:
 - about scientific schools of the relevant branch of knowledge, their theoretical and practical developments;
 - about the pedagogical and scientific ethics of a scientist-researcher;
- 2) know and understand:
 - current trends, directions and patterns of development of domestic science in the context of globalization and internationalization;
- 3) be able to:
 - organize, plan and implement the process of scientific research;
 - analyze, evaluate and compare various theoretical concepts in the field of study and draw conclusions;
- 4) have skills:
 - critical analysis, evaluation and comparison of various scientific theories and ideas;
 - leadership and team management;
- 5) be competent:
 - in the field of scientific and scientific-pedagogical activity in the conditions of rapid renewal and growth of information flows.

4.4. Core competencies

Learning outcomes are defined on the basis of third level descriptors and are expressed through competencies. Learning outcomes are formulated both at the level of the entire program and at the level of a module, a separate discipline. Third level descriptors suggest abilities:

- 1) demonstrate a systematic understanding of the field of study, mastery of the skills and research methods used in this field;
- 2) plan, develop, implement and adjust the complex process of scientific research;
- 3) to contribute with their own original research to the expansion of the scientific field, which may merit publication at the national or international level;
- 4) critically analyze, evaluate and synthesize new and complex ideas;
- 5) communicate their knowledge and achievements to colleagues, the scientific community and the general public;
- 6) to promote the development of a society based on knowledge.

4.5. *Professional competencies*

- mastery of modern information technologies, including methods for obtaining, processing and storing scientific information;
- analysis of big data, identification of relationships and building models;
- storage, transformation of data and quick access to them;
- the ability to formulate and solve modern scientific and practical problems;
- building a data collection process for the possibility of their subsequent operational processing;
- ensuring the completeness and interconnectedness of data from different sources;
- development of solutions to optimize current processes based on the results of the analysis;
- skills of planning and performing experimental research activities in the chosen scientific specialty;
- development of effective business solutions;
- extraction of data from various sources, their transformation for analysis, loading into an analytical database.

5 Base of professional practice

The practice is carried out in order to form practical skills of scientific, scientific-pedagogical and professional activities.

The educational program of doctoral studies includes:

- 1) teaching and research practice - for students in the Ph.D. program;
- 2) industrial practice - for students under the profile doctoral program.

The pedagogical practice of doctoral students is organized at the university and during the period of pedagogical practice, doctoral students are involved in conducting classes in undergraduate and graduate programs.

The research practice of a doctoral candidate is carried out with the aim of studying the latest theoretical, methodological and technological achievements of domestic and foreign science, as well as consolidating practical skills, applying modern methods of scientific research, processing and interpreting experimental data in a dissertation research.

The industrial practice of a doctoral student is carried out in order to consolidate the theoretical knowledge gained in the learning process and improve the professional level.

The content of research and production practices is determined by the topic of the doctoral dissertation.

The scientific component of the educational program of doctoral studies is formed from the research (hereinafter referred to as SRW) or experimental research work (hereinafter referred to as EIRD) of a doctoral student, scientific publications, writing and defending a doctoral dissertation.

Within the framework of research and development (EIRD), an individual work plan for a

doctoral student to get acquainted with innovative technologies and new types of production provides for mandatory internships in scientific organizations and (or) organizations of relevant industries or fields of activity, including abroad.

The place of the internship corresponds to the scientific direction of the educational program, the subject of the doctoral dissertation and the place of work of the foreign consultant.

Doctoral students can undergo research (industrial) practice on the bases of practice of the Department of Information Systems:

№	Name	Telephone	Mail	Site
1)	Astana IT, Astana, Saryarka Avenue, 31/2	+7 775 188 8007	info@astana-it.kz	http://astana-it.kz
2)	IT Holding Samgau; Astana, st.Imanbayeva, 5V	+7 717228 1815 +7 777003 3311	info@samgau.com	http://samgau.com
3)	Oyul Kazakhstan Association of IT Companies, Astana, KabanbayBatyr Avenue, 6/5	+7 717292 5552		http://itk.kz
4)	JSC "National Infocommunication Holding "Zerde", Astana, Almaty street, 1	+7 717257 0778		http://zerde.gov.kz
5)	Transtelecom JSC, Astana, Abay Avenue, 13	+7 717260 0029		http://ttc.kz
6)	Net.com LLP, Astana, KazhymukanMunaitpasov street, 22	+7 717 247 8177		http://netcom.kz
7)	Corporate Business Systems, Astana, Kabanbaybatyr avenue, 3	+7 727 262 2218		http://cbs.kz
8)	InesSoft LLP, Astana, Mukhtar Auezov street, 8	+7 717 272 8510		http://inessoft.kz
9)	Training center "Expert-A", Astana, BauyrzhanMomyshuly Avenue, 2/1	+7 771 909 4456 +7 717 262 5266	info@expert-a.kz	http://expert-a.kz
10)	LLP "Somnium Astana", Astana, st.Kunaev, 12/2,	+7 7172 68-98-14;		
11)	JSC "Astana Innovation"			
12)	JSC "Electronic Finance"			
13)	JSC "National Information Technologies" Astana, Astana, st.Orynbor, 8	+7 7172 74-10-70; +7 7172 74-10-81;		
14)	Republican association "Union of Farnes of Kazakhstan"	87019996661; 87172509928; IbraevSerik	ibrayev.sn@gmail.com	www.sfk.kz

15)	LLP "PLATONUS"	87055166919; 87172472525; AidarManas	ISPUSINOV@ PLATONUS.K Z	PLATONUS.KZ
16)	Global Services International, MukhitovAzat	87077555273;	maz@gse.kz	
17)	Terra Point LLP	87015333406;	Aida_mullashe va@mail.ru	terrapoint.kz

6 The structure of the doctoral study program

The structure of the educational program of doctoral studies by profile

No. p / p	Name of cycles of disciplines and activities	General laborintensity	
		in academic hours	in academic credits
1	2	3	4
1.	Theoretical training	1350	45
1.1	The cycle of basic disciplines (DB)	750	25
	University component	600	20
	Academic writing	150	5
	Research methods	150	5
	Pedagogical training	300	10
	Elective component	150	5
	Intelligent data analysis in information systems	150	5
	Predictive analytics in scientific research		
1.2	Cycle of major disciplines (PD)	600	20
	University component	450	15
	Research practice	300	10
	Computer and mathematical modeling in scientific research	150	5
	Elective component	150	5
	Corporate knowledge management technologies	150	5
	Applied statistical analysis		
2	Experimental research work of a doctoral student (EIRD)	3690	123
1)	Experimental research work of a doctoral student, including an internship and a doctoral dissertation	3690	123
3	Additional types of training (VET)	0	0
4	Final certification (FA)	360	12
1)	Writing and defending a doctoral dissertation	360	12
	Total	5400	180

The curriculum (for the entire period of study)

Рассмотрено
на заседании Академического
совета университета
Протокол № 62
24-06-24

Министерство сельского хозяйства Республики Казахстан
НАО "Казахский агротехнический исследовательский университет им. С. Сейфуллина"

УТВЕРЖДАЮ
М.А.С. Прямиков - проректор
по учебной и образовательной деятельности
НАО "КАТНУ им. С. Сейфуллина"
Курбанов Е. О.
2024 г.

УЧЕБНЫЙ ПЛАН
на 2024-2027 учебные годы
для образовательной программы К00101. Академический факультет
направления подготовки К00101 – Информационно-коммуникационные технологии
специальности подготовки К00101 – Информационные технологии
Специальность: Информационные технологии
Формы обучения: Очно (дипломатическая программа)
Год поступления: 21-05-2024

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Директор Института Постдипломного образования

Дополнительно
Заведующий кафедрой

Хусеин Жибек Сатиев
Николай Павлович Сидорович
Николай Андреевич Тюрин

The relationship between the achievability of the formed learning outcomes according to the educational program and academic disciplines

[illegible]

5.	Computer and mathematical modeling in scientific research	Definition and properties of models. Modeling goals. Modeling under conditions of uncertainty described from the standpoint of fuzzy set theory. Modeling and experiment. Types of computer simulations. Examination of the modeling object. Conceptual formulation of the modeling problem. Mathematical formulation of the modeling problem. The choice and justification of the choice of the method of solving the problem. Implementation of a mathematical model in the form of a computer program. Checking the adequacy of the model. Practical use of the constructed model and analysis of modeling results.		+	+	+			+	
Cycle of major disciplines Optional component										
6.	Applied statistical analysis	To provide doctoral students with knowledge about the diversity of modern statistical research approaches, to explore modern statistical methods, to instill a critical approach in the selection of analysis tools and awareness of the need for thorough testing of the statistical adequacy of the models obtained, as well as to develop skills in meaningful interpretation of the results.	5	+	+	+			+	
7.	Corporate knowledge management technologies	A knowledge-based economy. Intellectual capital of the company. Knowledge as an object of management in organizations. Knowledge management as a management function. Information technologies of knowledge management. Communication and marketing technologies in knowledge management. Methods of knowledge extraction and structuring. Knowledge representation models. Expert systems and knowledge bases. Information systems that ensure the transfer of knowledge into a manageable form in the enterprise. Modern concepts of knowledge management technologies development at enterprises.	5	+	+	+			+	